Maine Yankee

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October 1, 2001
MN-01-038 RA-01-145

UNITED STATES NUCLEAR REGULATORY COMMISSION
Attention: Document Control Desk
Washington, DC 20555

Reference:
1. License No. DPR-36 (Docket No. 50-309)
2. MYAPC Letter to USNRC, dated August 13, 2001, Maine Yankee's License Termination Plan Revision 1, MN-01-032
3. MYAPC Letter to USNRC, August 16, 2001, Early Release of Backlands (Combined), MN-01-034

Subject: Submittal of Initial Characterization Survey Report and Historical Site Assessment

By this letter Maine Yankee Atomic Power Company (Maine Yankee) provides the NRC staff copies of the Initial Characterization Survey (ICS) Report and the Historical Site Assessment (HSA). This material is being provided as requested by the NRC Staff in support of the NRC review of the revised License Termination Plan (Reference 2) and the proposed early partial release of site lands (Reference 3).

We believe that additional information regarding the background and use of the ICS will be helpful to the NRC in its review of the above Maine Yankee license amendment requests; therefore, the following summary is provided here. The ICS was performed by GTS Duratek, Inc. for Maine Yankee during1997 and 1998 to define the nature and extent of residual radioactive contamination in the systems, structures and environs of the Maine Yankee plant. The survey's primary purpose was to aid potential Decommissioning Operations Contractors (DOCs) to bid on the decommissioning project. The survey was performed as part of the overall process of planning decommissioning activities at the site and was designed before the final end state of the site was determined.

The results from the ICS were used in the revised LTP, along with other historical and characterization information to classify survey areas, support source term determination, and develop Final Status Survey planning. The ICS results have been and will be augmented as necessary through continuing characterization. The ICS was planned before the final issuance of NUREG-1575. However, the ICS reflects the general philosophy associated with NUREG-1575 and was conducted under a Quality Assurance Project Plan that ensured the results from characterization activities were accurate, comprehensive, and reliable.

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As discussed in the revised LTP (Reference 2), Maine Yankee has continued to conduct additional ongoing characterization work since the completion of the ICS. This additional data supplements the ICS and is also being used in planning decommissioning and remediation activities and the Final Status Survey. Data from the additional characterization work may supplement or replace data collected in the ICS.
The ICS data contained in the attached report represents a significant resource in planning and completing the decommissioning of the Maine Yankee site. Maine Yankee encourages the NRC staff to view the data and results presented in the report in the context of its purpose and use described above.

As noted above, this letter also provides a copy of the site's HSA. Historical records contained in the radiation protection files, 10CFR50.75(g) file, Annual Radiological Environmental Operating Reports to the NRC, miscellaneous environmental reports and records, and one 10CFR20.302 submittal were reviewed to determine the location and extent of leaks and spills on site. The pertinent results of the record reviews, Initial Characterization Surveys, and employee interviews were captured in the HSA. The HSA documents events from prior to plant start up in 1972, through initial characterization in 1998. The 10CFR50.75(g) file is being used to document events since 1998, that may affect decommissioning.

If the NRC Staff has any questions on these reports, please contact me at (207) 882-4530 or Mike Whitney (207) 882-4927.

Sincerely,

Thomas L. Williamson, Director
Nuclear Safety and Regulatory Affairs

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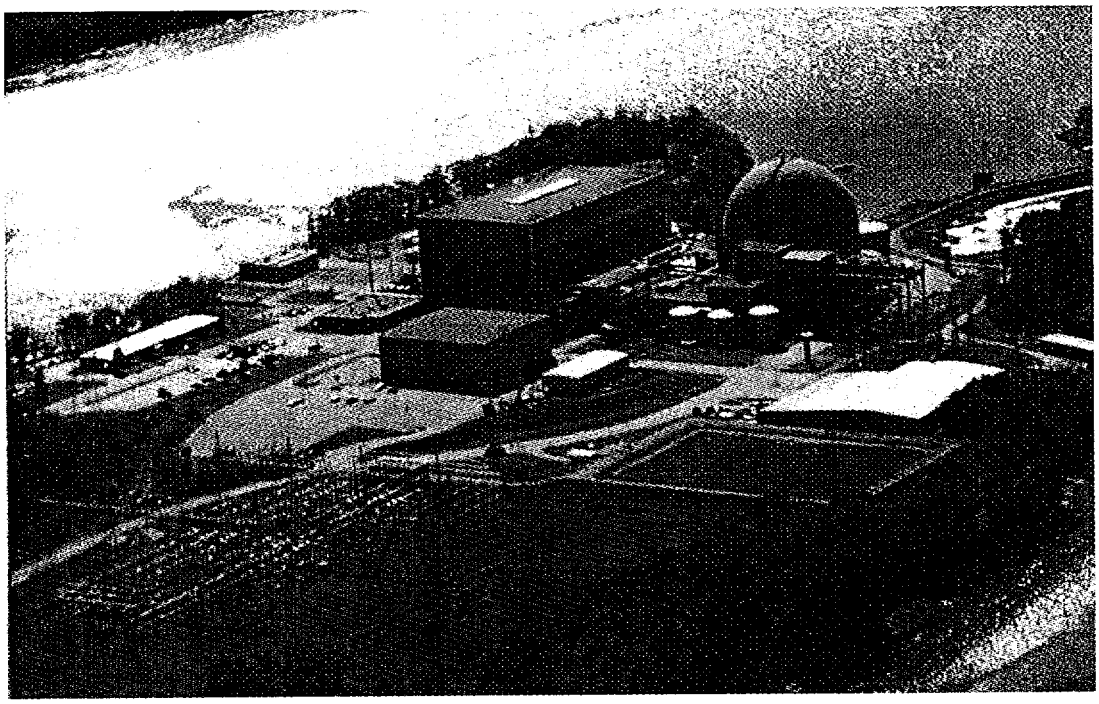
DURATEK

CHARACTERIZATION SURVEY REPORT
for the
MAINE YANKEE ATOMIC POWER PLANT

VOLUME 1
CHARACTERIZATION SURVEY DESCRIPTION



JUNE 1998
REVISION 2

Prepared By:

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GTS DURATEK

CHARACTERIZATION SURVEY REPORT

for the

MAINE YANKEE ATOMIC POWER PLANT

JUNE 1998

REVISION 2

VOLUME 1: CHARACTERIZATION SURVEY DESCRIPTION

Prepared by: GTS Duratek, Inc. Date 6-8-98

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EXECUTIVE SUMMARY

GTS Duratek prepared this nine-volume Characterization Survey Report for the Maine Yankee Atomic Power Company (MYAPCO) to document the results of the characterization surveys of the Maine Yankee Atomic Power Plant (MYAPP). The characterization surveys define the extent and magnitude of radioactive and hazardous materials within the power plant, associated facilities and on the Maine Yankee property. The characterization process followed the guidance provided in draft NUREG/CR-5849, *Manual for Conducting Radiological Surveys in Support of License Termination* and draft MARSSIM, *Multi-Agency Radiation Survey and Site Investigation Manual*. The NRC concluded in Maine Yankee Inspection Report 98-01 that the site characterization process used appropriate methods and instruments, and was adequately implemented to provide a sound starting point for the purpose of site decommissioning.

Volume 1 of the Characterization Survey Report provides the survey description. Volumes 2 through 6 summarize the radiological survey results and statistics. Complete survey results are in the survey packages provided separately to Maine Yankee. Volumes 7, 8 and 9 cover the hazardous materials characterization, activation analysis and asbestos quantity survey, respectively. The following paragraphs summarize key information from each volume.

Volume 1 describes the following aspects of the characterization survey: objectives, organization and responsibilities, instruments, planning, survey techniques, survey package implementation, sample analysis and quality control, characterization data review and reporting, and quality assurance.

Section 3.2 of Volume 1 describes the project organization and responsibilities. As prime contractor for the project, GTS Duratek managed all characterization activities at the Maine Yankee site. Subcontractors provided the following specialized services.

- IT Corporation performed the hazardous materials characterization survey.
- Duke Engineering & Services did the activation analysis.
- Canberra Industries provided instruments.
- Team Associates did the asbestos characterization.
- Quanterra performed laboratory analyses.

Section 3.3.2 of Volume 1 discusses minimum detectable activity (MDA). The MDA for direct measurements of total beta activity, when minimal residual activity was present, was 2000 dpm/100 cm^2 for the detectable radionuclides. This equates to 25% of the assumed license termination criteria of 25 mrem annual total effective dose equivalent (TEDE). MDA calculations assumed a conservative radionuclide mix based on 10CFR61 analysis results provided by Maine Yankee, and accounted for hard-to-detect radionuclides. Representative samples obtained and analyzed during the characterization survey confirmed the acceptability of the assumed radionuclide mix. GTS Duratek set the MDAs for removable alpha and beta activity at 10 dpm/100 cm^2 and 100 dpm/100 cm^2, respectively, based on instrument capabilities. MDAs for radionuclide-specific activity concentration analysis, also based on instrument capabilities, equate to a small fraction of the 25 mrem annual TEDE.

Section 3.4 of Volume 1 discusses survey planning. GTS Duratek developed the *Site Characterization Management Plan* (SCMP) to provide primary requirements and guidance for the project. Supporting plans included the *Quality Assurance Project Plan, Background Study Plan, Radiological Sample Analysis and Data Management Plan, Hazardous Materials Sampling, Analysis and Data Management Plan, and Health and Safety Plan.* The radiological characterization included three categories: surfaces and structures, systems, and environs. Using plant historical data, site walkdowns, and previous GTS Duratek experience, GTS Duratek subdivided these plant area categories into affected and unaffected according to their potential for residual levels of radioactive material. Each survey package described the area's history and use; and the quantity, type and location of measurements and samples to be collected. The following paragraphs summarize the significant findings and results for each survey category from Volumes 2-6.

Volume 2 summarizes the survey results for the 24 unaffected structures and surfaces, including 7,850 measurements. Only two areas showed radioactivity significantly above MDA: the 21 ft. elevation of the Turbine Building in the area of the Primary and Secondary Component Cooling Pumps and the basement of the Environmental Services Building. Volume 2 describes potential causes for the elevated readings (radioactive material stored near survey location, and naturally-occurring radioactivity in construction material, respectively), and describes follow-up measurements and analysis. The results of the structural background survey also appear in Volume 2. Project personnel used the results of the structural background survey to correct data gathered from similar on-site surfaces during the characterization survey.

Volume 3 summarizes the survey results for the 25 affected structures and surfaces, including 6,350 measurements. Some areas originally assumed to be affected had only low levels of contamination. This volume also includes gamma spectroscopy results for concrete core samples from floors, the containment crane wall and the bioshield, and containment cavity metal scrapings.

Volume 4 summarizes the survey results for the 34 unaffected systems, including approximately 3,800 measurements. Twenty packages had levels of radioactivity below, at, or only slightly above MDA. For the other 14 systems, Volume 4 identifies potential causes for the elevated readings (e.g., high area background), specifies the locations of the elevated activity to the extent possible, and describes any follow-up actions.

Volume 5 summarizes the survey results for the 17 affected systems, including 1,050 measurements. The contaminated system measurements can be used to plan the decommissioning, including decontamination techniques, ALARA measures for the dismantlement/removal of systems, schedules, costs, waste volumes, and health and safety considerations.

Volume 6 summarizes the survey results for the environs radiological characterization survey. This survey included gamma scans of approximately one-third of the 820-acre site land area.
Volume 6 designates each environs area as either affected or unaffected based on the survey results. Affected areas had Co-60 levels greater than MDA and/or Cs-137 levels greater than typical background. Two areas outside the restricted area fence, south of the Refueling Water Storage Tank (RWST) had measurable Cs-137. The project team collected approximately 70 surface and subsurface samples in this area to bound the contamination both laterally and vertically.

Volume 6 also contains the results of the environs background survey, including typical background exposure rates, and radioactivity in local soils, sediments and groundwater. The average background exposure rate was 11.4 μR/hr. Cs-137 concentrations ranged from 0.09 to 1.40 pCi/g in local soils and averaged 0.07 pCi/g in marine sediments. No groundwater samples had detectable Cs-137 concentrations. The groundwater samples averaged 955 pCi/L tritium with no detectable Cs-137.

Volume 7 contains the results of the hazardous material characterization survey, which included approximately 150 samples from both radiologically affected and unaffected areas. GTS Duratek sampled plant soil, sediments, groundwater wells, surface water, plant systems, and plant building materials, including eight existing monitoring wells, two existing chromate abatement wells, and the Containment Sump.

Project personnel collected surface and subsurface (Geoprobe) soil samples. VOCs exceeding the Method Detection Limit (MDL)-based trigger values include acetonitrile, carbon disulfide, and methyl methacrylate. Butyl benzyl phthalate and 4-methyl phenol (in one sample) are the only SVOCs to exceed MDL-based trigger levels in soil samples. However, the elevated butyl benzyl phthalate concentrations are attributable to blank contamination. The sample with 4-methyl phenol was only slightly above the trigger level. Arsenic was the only metal to exceed its MDL-based trigger value in the soil samples. However, arsenic concentrations were below the State of Maine Remedial Action Guidelines (RAGs).

Project personnel collected sediment samples at storm drain outfall locations and catch basins. Carbon disulfide in two sediment samples exceeded the MDL-based trigger value, but not the RAGs. Marine sediments near outfalls contained some SVOCs, mainly PAH constituents, above trigger values. For sediment samples where DRO concentrations exceeded trigger values, PAH constituents also exceeded trigger values. Again, arsenic was the only metal to exceed trigger values, but concentrations were all below the RAGs.

Surface water samples were from sumps and outfall discharge pipes around the site. Detected concentrations were low and detected constituents provide an indication of the composition of the waste or runoff waters handled by these systems. The only constituent exceeding trigger levels in groundwater samples was butyl benzyl phthalate found in the duplicate sample of Well BK-1.

Volumes 8 contains the activation analysis. As of March 1, 1998, the calculated reactor vessel activity was 3.4 million curies and the estimated neutron shield tank activity was 225 curies.

Volume 9 contains the asbestos quantity survey. Based on walkdown data, the total quantity of asbestos remaining in the plant is approximately 28,000 cubic feet.

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1.0 BACKGROUND INFORMATION

The Maine Yankee Atomic Power Company (MYAPCO) is the owner and licensee for the Maine Yankee Atomic Power Plant (MYAPP) in Wiscasset, Maine. The plant began commercial operation in December 1972 under Atomic Energy Commission Docket No. 50-309 License No. OL-FP DPR36, and permanently ceased operation in December 1996. Over its lifetime, the plant operated for a total of approximately 16 effective full power years based on its rated thermal power. MYAPCO decided to decommission the plant in August 1997, with a plan to free release the MYAPP site for unrestricted use within seven years.

This report describes the results of the radiological and hazardous material characterization surveys of the MYAPP site. The characterization surveys, designed and conducted by GTS Duratek, define the extent and magnitude of radioactive and hazardous materials within the power plant, associated facilities and on the Maine Yankee property. The characterization process followed the guidance provided in draft NUREG/CR-5849, *Manual for Conducting Radiological Surveys in Support of License Termination* and draft MARSSIM, *Multi-Agency Radiation Survey and Site Investigation Manual.*

The Characterization Survey Report comprises the nine volumes listed below. The format of Volume 1 is similar to the format of the sample report in NUREG 5849. Volume 1 mainly provides program information for the radiological survey results contained in volumes 2-6. Volumes 2-6 contain survey data summaries and statistics. Complete survey results are in the survey packages. Volume 7 contains the results of the hazardous materials characterization. Volumes 8 and 9 describe the activation analysis and asbestos survey, respectively.

Volume No.	Description
1	Characterization Survey Description
2	Radiological Characterization Results for Unaffected Structures and Surfaces, including Structural Background Survey
3	Radiological Characterization Results for Affected Structures and Surfaces
4	Radiological Characterization Results for Unaffected Systems
5	Radiological Characterization Results for Affected Systems
6	Radiological Characterization Results for Affected and Unaffected Environs, including Environs Background Survey
7	Hazardous Materials Characterization
8	Maine Yankee Reactor Vessel Activation Analysis to Support Site Characterization
9	Asbestos Quantity Survey

2.0 SITE INFORMATION

2.1 Site/Reactor Description

Maine Yankee Atomic Power Plant (MYAPP) is a three-loop pressurized water reactor with a power rating of 2,700 MWth or approximately 900 MWe. It is located on an 820-acre site in Lincoln County Wiscasset, Maine off Ferry Road which leads to Bailey Point. Figure 2-1 is a map of the general site location. Figure 2-2 provides the layout of the entire Maine Yankee site. Figure 2-3, the Maine Yankee Yard Plan, shows the location of individual plant buildings.

The power plant has a Nuclear Steam Supply System supplied by Asea Brown Boveri / Combustion Engineering. Major components inside the containment structure include the reactor vessel, three steam generators, pressurizer, three reactor coolant pumps, three safety injection tanks, a pressurizer quench tank, six containment fan coolers, and six loop stop valves. The Primary Auxiliary Building contains three high pressure safety injection /charging pumps. The Containment Spray Building houses two low pressure safety injection/residual heat removal pumps. Three spray pumps have been removed and are currently stored in a temporary building beside the Containment Spray Building.

The secondary plant consists of three Asea Brown Boveri turbines, one high pressure and two low pressure, coupled with a 950 MVA Westinghouse electric generator and associated auxiliary systems. Additional major secondary side components include a two-shell main condenser with four titanium tube bundles and seven pairs of feedwater heaters (four pair vertical heaters, three pair horizontal heaters and one pair condenser necks), three condensate pumps, two heater drain pumps, three main feedwater pumps (two electric pumps and one turbine driven pump), four moisture separator reheaters, and two (primary and secondary) closed loop component cooling water systems.

The MYAPP site also includes ancillary facilities used to support normal plant operations. These facilities consist of warehouses, administrative office buildings, security structures, an environmental support complex, a substation and a fire protection system.

2.2 Identity of Plant Radionuclides

Maine Yankee provided the 10 CFR 61 analysis results for the three samples described in Table 2-1. These analyses identified the following radionuclides: ^{3}H, ^{14}C, ^{54}Mn, ^{55}Fe, ^{57}Co, ^{58}Co, ^{60}Co, ^{59}Ni, ^{63}Ni, ^{90}Sr, ^{110m}Ag, ^{125}Sb, ^{134}Cs, ^{137}Cs, ^{241}Am, ^{238}Pu, $^{239/240}Pu$, ^{241}Pu, ^{242}Cm $^{243/244}Cm$.

Table 2-1
10 CFR 61 Sample Description

Sample Description	Sample Number	Analysis Date
Dry Active Waste	97-D-2	6/18/97
Resin	96-R-4	8/21/96
Liquid System Filter	96-F-15	9/4/96

GTS Duratek performed the radiological characterization survey of the MYAPP site from November 1997 through March 1998. The projected date for license termination/final survey is January 2003. GTS Duratek calculated radionuclide mixes representing conditions at the time of both surveys by decay correcting the 10 CFR 61 sample analysis results. Appendix A provides these calculated radionuclide distributions for the three waste streams.

As part of the characterization survey, GTS Duratek collected representative plant samples and samples from the surrounding environment for analysis. Survey Package R2800 in Volume 6 contains the results for these samples. Addendum 1 to this report compares the results of these samples with the 10 CFR 61 sample analysis results previously provided by Maine Yankee.

Figure 2-1
General Site Location Map

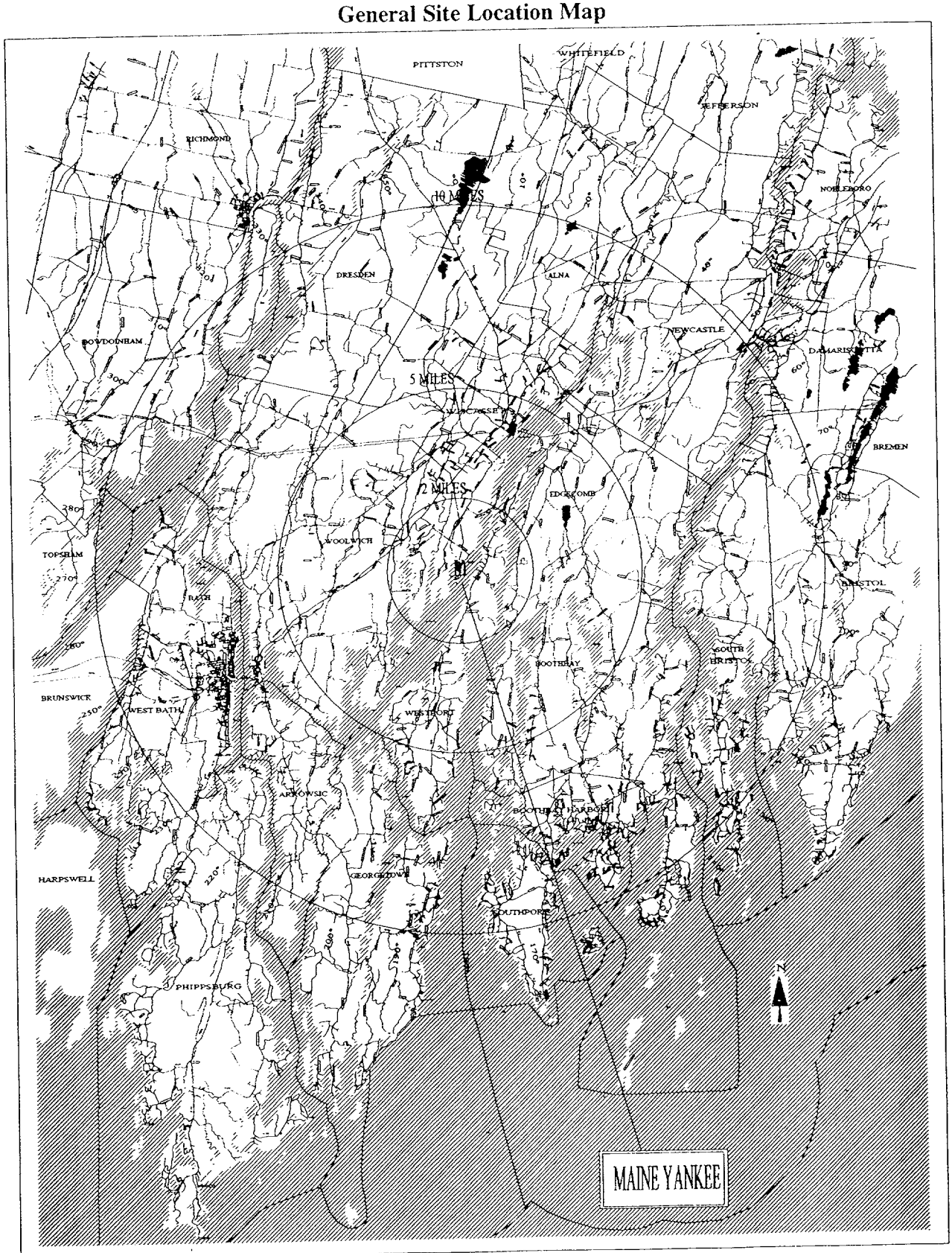


Figure 2-2
Site Plan

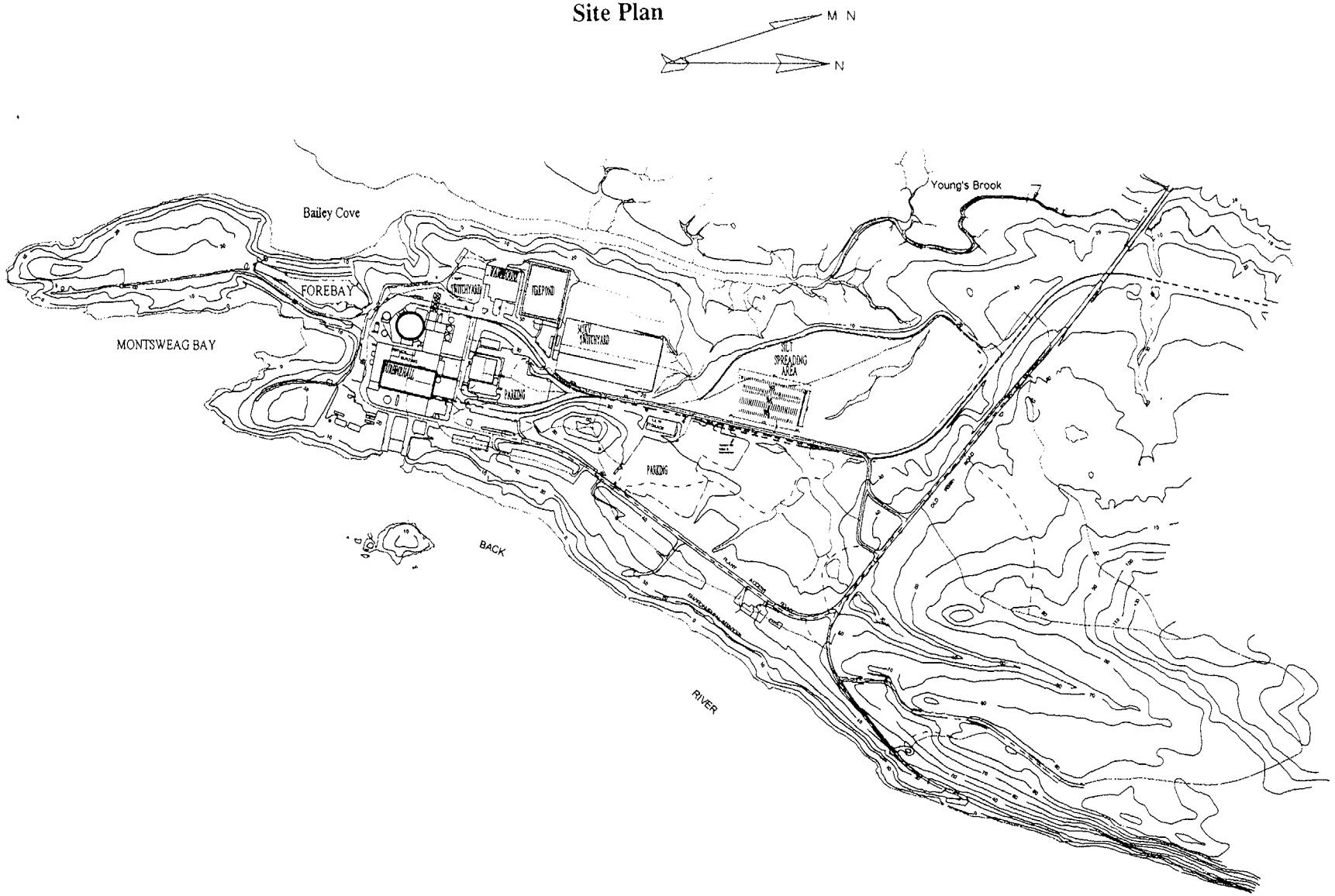
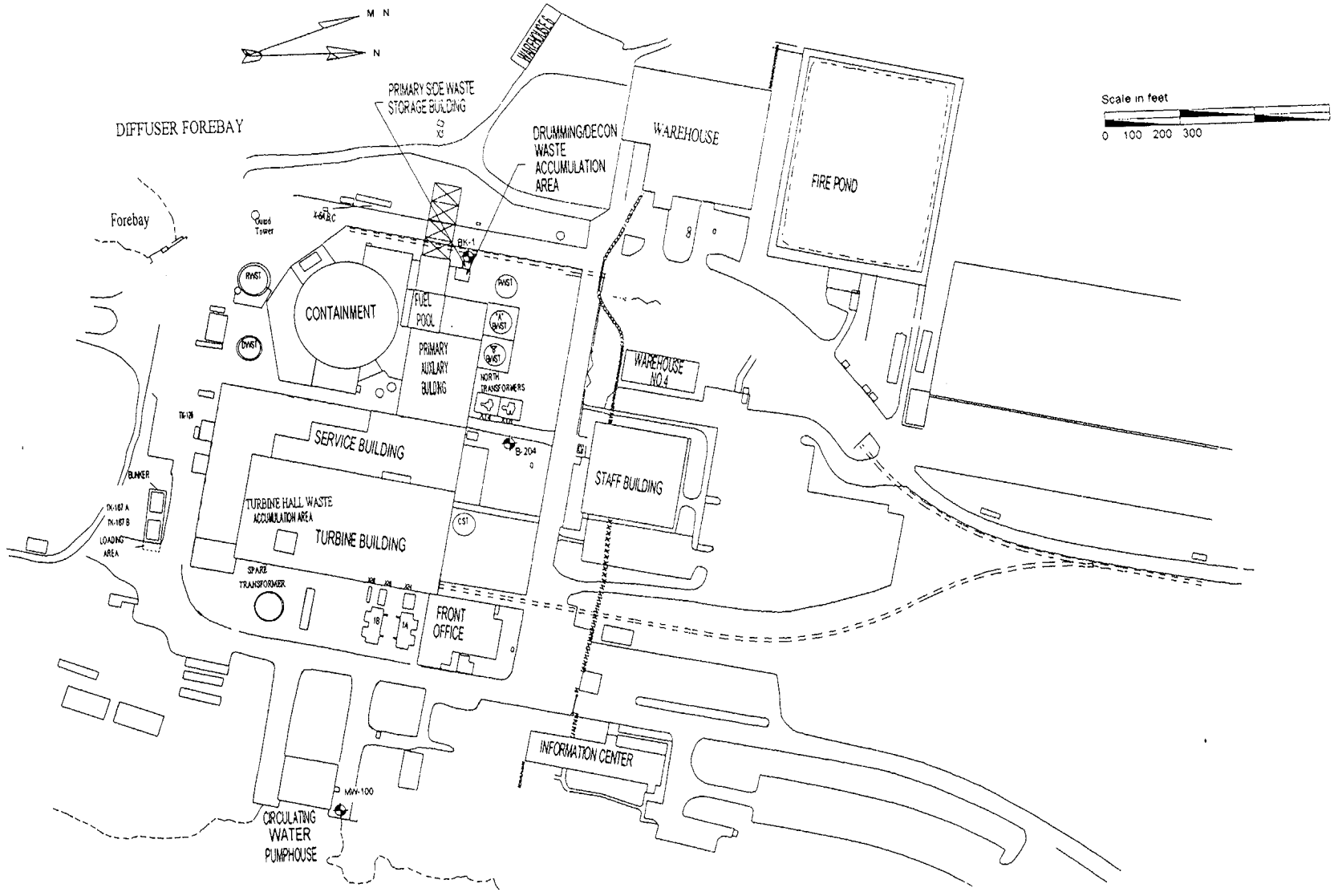


Figure 2-3
Yard Plan



3.0 CHARACTERIZATION SURVEY OVERVIEW

3.1 Survey Objectives

The purpose of the characterization survey was to define the extent and magnitude of residual radioactive and hazardous materials within the power plant, associated facilities and on the Maine Yankee property. The survey allows for the classification of site areas as affected or unaffected by plant operation. The survey data can also be used to plan the decommissioning, including decontamination techniques, schedules, costs, waste volumes, and health and safety considerations.

3.2 Organization and Responsibilities

GTS Duratek was the prime contractor for the project and managed all characterization activities at the Maine Yankee site. Subcontractors provided the following specialized services.

- IT Corporation performed the hazardous materials characterization survey.
- Duke Engineering & Services performed the activation analysis.
- Canberra Industries provided instruments.
- Team Associates performed the asbestos characterization.
- Quanterra performed laboratory analyses.

The project organization consisted of key managers and support personnel with expertise in characterization projects. Figure 3-1 shows the GTS Duratek organization for the characterization effort at MYAPP.

The Project Manager was the primary point of contact and interface with the MYAPCO Project Manager. He was responsible for overseeing all site characterization activities; performing periodic assessments of these activities; providing schedule, progress and budgetary reports to GTS Duratek and MYAPP management; and maintaining and controlling project records.

The Survey Supervisor was responsible for the performance of the project survey and sampling activities. He ensured all survey and sampling activities and record-keeping complied with all approved procedures, and that survey packages were accurate and complete. The Survey Supervisor was the acting GTS Duratek Project Manager in the Project Manager's absence.

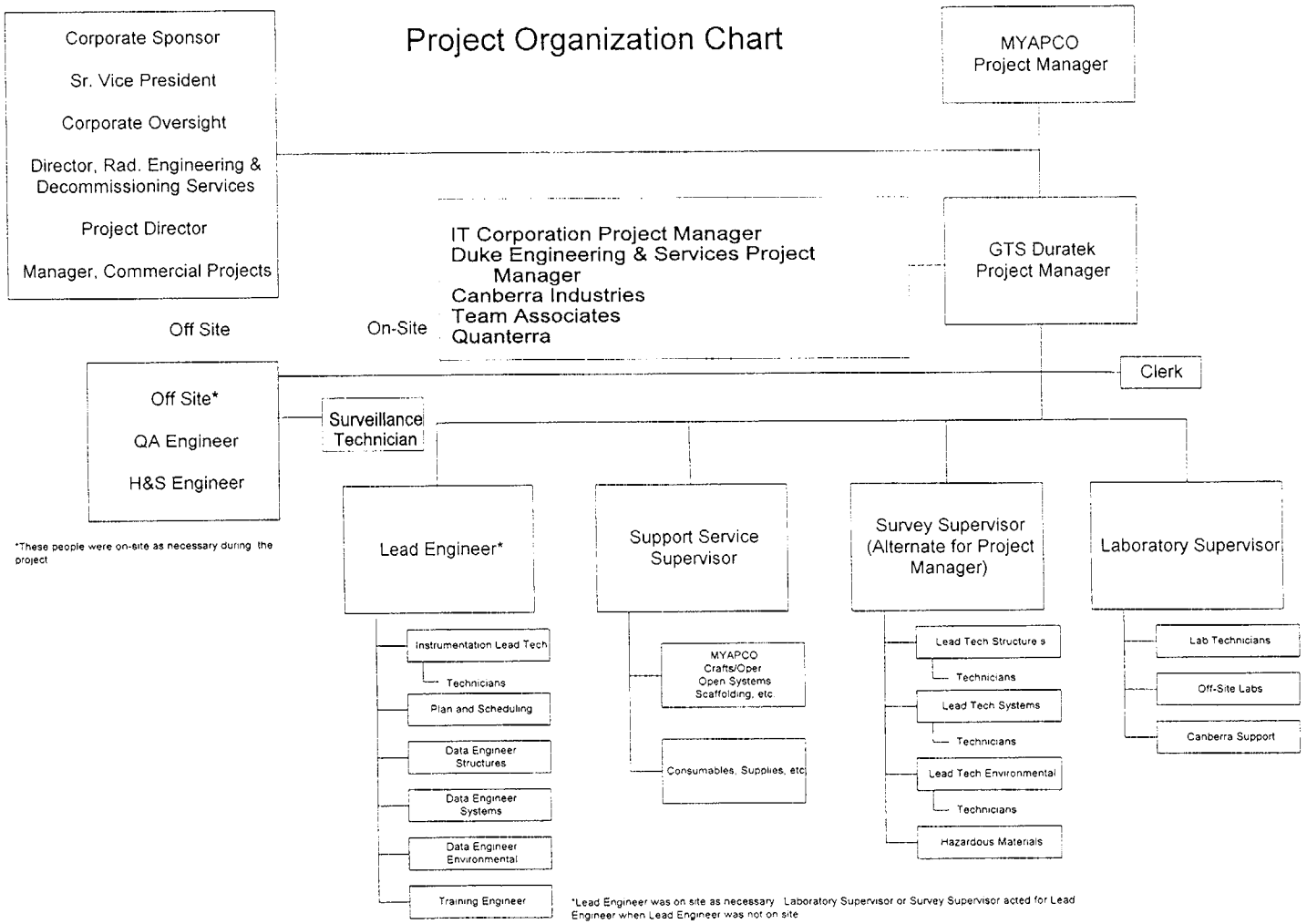
The Lead Engineer was responsible for providing technical support for the characterization survey. He maintained an adequate supply of calibrated field instruments, prepared project plans and procedures, performed data reduction and analysis, maintained project files and databases, and directed preparation of the Characterization Survey Report.

The Support Service Supervisor was responsible for providing logistical support for the characterization survey. He obtained necessary support from MYAPCO plant personnel and ensured an adequate inventory of supplies and consumables. He also acted as the Site Safety and Health Officer.

The Laboratory Supervisor was responsible for assuring that all laboratory activities were conducted in accordance with appropriate procedures. On-site analysis included gamma spectroscopy, liquid scintillation counting and gross alpha and beta analysis. The Laboratory Supervisor's responsibilities included sample chain of custody records, sample preparation, sample analysis and sample preservation. He was also responsible for the calibration and quality control of all related instruments and the preparation of samples for off-site laboratory analysis.

The Survey Technicians were responsible for performing surveys and sampling in an accurate, timely manner that satisfied the performance criteria and instructions in the survey packages and project procedures.

Figure 3-1


Project Organization Chart
Corporate Sponsor
Sr. Vice President
Corporate Oversight
Director, Rad. Engineering & Decommissioning Services
Project Director
Manager, Commercial Projects
MYAPCO Project Manager
IT Corporation Project Manager
Duke Engineering & Services Project Manager
Canberra Industries
Team Associates
Quanterra
GTS Duratek Project Manager
Off Site
On-Site
Clerk
Off Site*
QA Engineer
H&S Engineer
Surveillance Technician
*These people were on-site as necessary during the project
Lead Engineer*
Support Service Supervisor
Survey Supervisor (Alternate for Project Manager)
Laboratory Supervisor
Instrumentation Lead Tech
Technicians
Plan and Scheduling
Data Engineer Structures
Data Engineer Systems
Data Engineer Environmental
Training Engineer
MYAPCO Crafts/Oper Open Systems Scaffolding, etc.
Consumables, Supplies, etc
Lead Tech Structure s
Technicians
Lead Tech Systems
Technicians
Lead Tech Environmental
Technicians
Hazardous Materials
Lab Technicians
Off-Site Labs
Canberra Support
*Lead Engineer was on site as necessary. Laboratory Supervisor or Survey Supervisor acted for Lead Engineer when Lead Engineer was not on site

3.3 Instruments

3.3.1 Instrument Selection and Use

Instrument selection and use for the Maine Yankee characterization survey ensured that project specific commitments were met. Instrument selection and calibration was based on the assumed radionuclide mix and on GTS Duratek's prior experiences in performing similar surveys. Instrument selection, calibration and use was in accordance with site approved procedures or in accordance with procedures implemented by off site laboratories on GTS Duratek's approved suppliers list. Instrument use ensured that appropriate sensitivities were maintained. Minimum detectable activities (MDAs) were defined for measurements and analyses used to quantify activity with the exception of direct measurements for total beta activity in highly contaminated areas. For direct measurements in these areas, no specific MDA was specified; however, the count time was controlled. Appendix B lists the instruments used for on site measurements and analyses.

GTS Duratek used the Ludlum Model 2350 Data Logger for direct measurements of total beta activity and gamma exposure rates. The Data Logger was also used to perform scans of building surfaces and system internals, and to perform limited scans of open land areas. The Data Logger is a microcomputer based portable counting instrument capable of operating with a variety of detectors. Operating parameters such as high voltage, dead time, and calibration constants are stored for each detector. Measurements performed with the Data Logger can be stored and downloaded to a computer for evaluation and report preparation. Available information includes counts, count time, location code, date, time, survey technician, and operating parameters. The Data Logger can operate simultaneously in a scalar and rate meter mode (with audible output), which greatly enhanced the scanning process.

Where conditions allowed, survey technicians took direct measurements for total beta activity and scans of building surfaces and system internals with a 126 cm^2 gas flow proportional detector. However, in some cases the surface area to be measured was less than the surface area of the detector or there were access restrictions. In such cases, the survey technicians used alternate detectors. These detectors included Geiger-Mueller and gas flow proportional detectors of various sizes and shapes. To support the survey of small bore pipes, GTS Duratek supplied several unique detector delivery systems that allowed the detectors to be positioned in a reproducible geometry within the pipe.

GTS Duratek performed manual scans of open land areas with a NaI detector. In accessible open land areas, survey technicians supplemented the manual scans with drive-over scans using a computer-controlled large area plastic scintillator. The detector measured 1.5 inches by 3 inches by 33 inches and was mounted on the back of an all terrain vehicle. Suspect areas were marked for follow-up investigation.

On site sample analyses included gamma spectral analyses, gross alpha and beta analyses , and liquid scintillation analyses for tritium. GTS Duratek prepared a site specific analysis library to support the gamma spectral analyses. On site sample preparation was limited to drying and sizing activities. No analytical chemistry procedures were performed. In addition to on site analyses, select samples were sent off site for a variety of analyses including gamma/x-ray spectroscopy, alpha spectroscopy, and liquid scintillation counting.

3.3.2 Minimum Detectable Activities

Technical Basis Document MYAP-TBD-001 specifies *a priori* minimum detectable activities (MDAs) and their bases for the following measurements and analyses:

- Direct measurements for total beta activity
- Analyses for removable alpha and beta activity
- Radionuclide specific activity concentration analyses

The Technical Basis Document also includes a discussion on the sensitivities of scans for total beta activity on building surfaces and scans of open land areas.

GTS Duratek assumed the criteria for license termination will be an annual total effective dose equivalent (TEDE) of 25 mrem. The MDAs for measurements and analyses used for quantifying residual radioactivity were chosen to equate to a fraction of this annual TEDE based on conservative assumptions. The assumed radionuclide mix is based on available 10CFR61 analysis results provided by Maine Yankee and accounts for hard to detect radionuclides.

Table 2-1 describes the 10CFR61 analysis samples. GTS Duratek decay corrected the sample analysis results to 1/1/98 and 1/1/03 as part of the evaluation to determine the effects of radiological decay. Based on these evaluations the most conservative radionuclide mix was assumed. As part of the characterization survey, GTS Duratek collected representative plant samples and samples from the surrounding environment for analysis. Survey Package R2800 in Volume 6 contains the results for these samples. Addendum 1 to this report will compare the results of these samples with the 10 CFR 61 sample analysis results previously provided by Maine Yankee.

1. Direct Measurements of Total Beta Activity

GTS Duratek set the MDA for direct measurements of total beta activity, when minimal residual activity is present, at 2000 dpm/100 cm^2 for the detectable radionuclides. For direct measurements of total beta activity, detectable radionuclides were those radionuclides present in the mix with beta yields and beta energies such that their counting efficiency approximates or exceeds that for Tc-99. Based on the default value for the building occupancy scenario in NUREG 1500 and the assumed radionuclide mix (including both detectable and non-detectable radionuclides), 2000 dpm/100 cm^2 of detectable beta activity equates to 25 percent of an annual TEDE of 25 mrem. The following equation was used to determine count times to achieve the specified MDA.

$$MDA = \frac{\frac{2.71}{t_s} + 3.29\sqrt{\frac{B_b}{t_s^2} + \frac{B_b}{t_b^2}}}{E\,\frac{a}{100}} \qquad Eq.\ 3\text{-}1$$

Where: MDA = Minimum Detectable Activity (dpm/100 cm^2)

B_b = number of background counts in time interval t_b (counts)

E = efficiency of the survey instrument (cpd)

a = detector area (cm^2)

t_s = sample count time (min)

t_b = background count time (min)

Since count times were generally conservative, in most instances MDAs well below those required were achieved.

Based on the assumed radionuclide mix, direct measurements of total alpha activity would not prove useful in identifying residual radioactivity levels corresponding to the criteria for license termination, since the corresponding alpha activity is approximately 1 dpm/100 cm^2. The contributions from alpha emitters and other radionuclides considered to be non-detectable are accounted for in the MDA specified for direct measurements of total beta activity.

2. Analyses For Removable Alpha And Beta Activity

GTS Duratek set the MDAs for removable alpha and beta activity at 10 dpm/100 cm^2 and 100 dpm/100 cm^2, respectively. Although NUREG 1500 does not list values for evaluating removable activity in terms of an annual TEDE, such analyses are important in evaluating the characteristics of potential contamination. The MDAs are based in part on available instrument capabilities.

Based on the assumed radionuclide mix, little or no alpha activity is expected. To ensure that any removable alpha activity detected is due to licensed material, smears were held a minimum of 6 hours prior to analysis.

3. Radionuclide Specific Activity Concentration Analyses

Table 3-1 lists the MDAs for radionuclide specific activity concentration analysis.

Table 3-1
MDAs for Radionuclide-Specific Activity Concentration Analysis

Radionuclide	Purpose of Analysis	Type of Analysis[1]	MDA pCi/g or pCi/ml
Cs-137	Background Study	Gamma Spec	0.02
Fe-55	Characterization	X-ray Spec	5.0
Co-60	Characterization	Gamma Spec	0.10
Cs-137	Characterization	Gamma Spec	0.1
Ni-63	Characterization	Liq Scint	2.0
Mn-54	Characterization	Gamma Spec	0.1
Sr-90	Characterization	Gas Flow Prop	1.0
Tc-99	Characterization	Liq Scint	3.0
Am-241	Characterization	Alpha Spec	0.1
Pu-238	Characterization	Alpha Spec	0.1
Pu-239/240	Characterization	Alpha Spec	0.1
Pu-241	Characterization	Liq Scint	10
Cm-242	Characterization	Alpha Spec	0.1
Cm-244	Characterization	Alpha Spec	0.1

[1]Typical

These MDAs are based in part on instrument capabilities and apply to both on-site and off-site analysis of soil and water samples. Using the default values in NUREG 1500 for the residential scenario and the assumed radionuclide mix, if either Co-60 or Cs-137 were present at 0.1 pCi/g or less, the resulting annual TEDE would be less than 0.6 mrem from the radionuclides in the assumed mix. Since the default values in NUREG 1500 are considered conservative, the actual TEDE due to residual activity would likely be less if a site specific dose assessment model were to be developed. However, based on the absence of significant residual activity in the environment, such a model may not be required.

4. Scans For Total Beta Activity

Scans for total beta activity are performed on building surfaces and accessible system internals as a qualitative assessment of potential residual radioactive material. GTS Duratek believes that scan sensitivities are difficult to quantify since they depend on the ability of the surveyor to distinguish a change in the audible output of a count rate meter, the speed of the scan, background radiation level, background noise, the instrument's efficiency, the distribution of the contamination, and the area of the detector being used. There are no specific requirements for scan sensitivities. However, to provide a consistent approach to scanning, the process is controlled. GTS Duratek performed scans for total beta activity according to the guidance in Draft NUREG/CR-5849, which states"...the scan speed should not exceed one detector width per second." During on site training, using a Ludlum 43-68 126 cm^2 gas flow proportional detector, the scanning process could reliably detect a localized beta source equivalent to 5000 dpm in an area with low background radiation levels and low background noise level.

Evolving regulatory guidance indicates that scan sensitivities may impact the number of fixed point measurements required during a final status survey. To evaluate the impact of scan sensitivities on the final status survey, numerous site specific issues related to the survey, such as area classifications, the derived concentration guideline values for both the nonparametric statistical test, ($DCGL_w$) and the elevated measurement comparison,($DCGL_{emc}$) must be addressed.

GTS Duratek evaluated scan sensitivities using the guidance in NUREG 1575 (December 1997). According to NUREG 1575, the minimum detectable concentration (MDC) for scanning of building surfaces can be estimated using the following equation.

$$MDC_{scan}(building\ surfaces) = \frac{1.38\ \sqrt{B}\ 60}{\sqrt{p}\ E_i\ E_s\ \frac{a}{100\ cm^2}\ t} \qquad Eq.\ 3\text{-}2$$

Where: MDC_{scan} = Minimum Detectable Concentration for scanning building surfaces (dpm/100 cm^2)

1.38 = the index of sensitivity, d'

60 = seconds per minute

B	=	number of background counts in time interval t (counts)
p	=	surveyor efficiency, assumed to be equal to 0.5 per NUREG 1575 (unitless)
E_i	=	instrument efficiency for the emitted radiation (counts/beta)
E_s	=	source efficiency (betas/dis) (assumed to be 1.0 based on a Tc-99 calibration standard)
a	=	detector area (cm^2)
t	=	the time interval of the observation while the probe passes over the source (sec)

GTS Duratek evaluated this equation. We believe that it may overestimate actual scanning sensitivities, resulting in unsubstantiated conclusions concerning the radiological status of the area scanned. The following are our concerns regarding use of this equation.

- An index of sensitivity, d', of 1.38 according to NUREG 1575 equates to a probability of detection of 95% with a probability of falsely concluding that contamination is present when it is not of 60%. Although this calculation applies to the initial scanning stage, a false positive rate of 60% may not be desirable.

- The surveyor's efficiency, p, is difficult to quantify and is likely highly variable. It depends on factors such as the surveyor's attentiveness, reflexes, and potential hearing loss; ambient noise levels; and the distribution of the contamination.

- The equation is apparently based on an assumed gaussian distribution. While the process of radioactive decay is best defined in terms of poisson statistics, a gaussian distribution will approximate a poisson distribution if there are enough defining events. In a reasonable background (50-600 cpm) there may not be enough counts in a 1 second counting interval (0.83-10 counts) to assume that the observed counts will follow a gaussian distribution.

- Using equation 3-2 to calculate scan sensitivities results in sensitivities that are less than the sensitivities that are calculated using the standard equation for direct measurements, equation 3-1, even though direct measurements are not dependent on the surveyor's efficiency.

GTS Duratek calculated *a posteriori* scan sensitivities using equation 3-2 for each of the detectors used to scan for total beta activity on building surfaces and system internals. GTS Duratek also calculated scan sensitivities using equation 3-3, which is a modification of equation 3-2. Equation 3-3 adjusts the index of sensitivity. Table 3-2 contains the results of these calculations.

$$MDC_{scan}(building\ surfaces) = \frac{3.28\ \sqrt{B}\ 60}{\sqrt{p}\ E_i\ E_s\ \frac{a}{100}\ t} \qquad Eq.\ 3\text{-}3$$

Where: MDC_{scan}	=	Minimum Detectable Concentration for scanning building surfaces (dpm/100cm^2)
3.28	=	the index of sensitivity that equates to a probability of detection of 95% and a probability 5% of falsely concluding residual radioactivity is present when it is not per Table 6.1 of NUREG 1507 (unitless)
60	=	seconds per minute
B	=	number of background counts in time interval t (counts)
p	=	surveyor efficiency, assumed to be equal to 0.5 per NUREG 1575 (unitless)
E_i	=	instrument efficiency for the emitted radiation, (counts/beta)
E_s	=	source efficiency (betas/dis) (assumed to be 1.0 based on a Tc-99 calibration standard)
a	=	detector area (cm^2)

t = the time interval of the observation while the probe passes over the source (sec)

GTS Duratek performed a computerized sort of the direct measurements of total beta activity obtained during the characterization survey of unaffected areas by detector type, efficiency, local area background and use (building surfaces vs system internals). The calculation results presented in Table 3-2 were based on the average instrument efficiency and average background value.

TABLE 3-2
Calculated Scan MDCs

Detector Type	Detector Area (cm^2)	Use	E_i (counts/beta) range and average	B (cpm) range and average	MDC_{scan} dpm/100 cm^2 Eq. 3-2	MDC_{scan} dpm/100 cm^2 Eq. 3-3
43-68 and 43-106	126	Building Surfaces	0.189-0.222 0.206	151-516 375[3]	1,100	2,700
44-40	15	System Internals	0.078-0.131 0.112	13-99 32	5,100	12,000
SP-175	46.5	System Internals	0.064-0.120 0.088	48-133 88	3,500	8,200
SP-113	19.4	System Internals	0.093-0.120 0.101	23-104 61	6,000	14,000
43-68 and 43-106	126	System Internals	0.187-0.222 0.207	68-1336 238	890	2,100
43-68 and 43-106 with spacer	126	System Internals	0.165-0.198 0.184	100-417 175	860	2,100
43-94[1]	100[2]	System Internals	0.020-0.044 0.03	20-75 46	3,400	8,100
43-98[1]	100[2]	System Internals	0.018-0.044 0.027	74-325 148	6,800	16,000

[1] Typical

[2] For these detectors a field of view is specified instead of the detector area. The field of view is directly related to the detector's efficiency.

[3] The number of background counts (B) in time interval (t) is composed of two components. The first component is due to ambient exposure rates and instrument noise, and is accounted for by obtaining shielded background measurements. The second component is due to natural radioactivity in the material being scanned, and is accounted for by performing material specific background evaluations. For building surfaces, the assumed background count rate was adjusted to account for the contribution of natural radioactivity in concrete as determined during the site specific background evaluation.

Although scan sensitivities are difficult to quantify, under ideal conditions, equation 3-3 may provide a reasonable first estimate of scan sensitivities.

5. Scans Of Open Land Areas

As discussed in Technical Basis Document MYAP-TBD-001,the survey team used scans of open land areas at Maine Yankee as a qualitative assessment to identify isolated areas that may contain elevated levels of radioactive material. The scans supplemented soil sampling and analysis. Quantitative soil sample analysis results and statistical tests of the results, as appropriate, were used to define the radiological status of open land areas. Technicians marked elevated areas identified during the scans for follow-up investigation, which included additional gamma scans, a minimum of five additional biased soil samples, a one meter exposure rate measurement and an *in-situ* gamma spectroscopy measurement.

Technicians performed gamma scans of open land areas using a Ludlum 44-2, 1 inch by 1 inch sodium iodide detector, and a TSA Systems Limited large area plastic scintillator, VRM-1X. In accessible areas, the VRM-1X detector, a 1.5 inch thick, by 3 inch wide, by 33 inch long block of scintillator-impregnated plastic, was the detector of choice. The relatively large surface area of the VRM-1X detector greatly improves the probability of detecting isolated areas that contain elevated levels of radioactive materials. Both detectors were controlled by micro-processors that logged counts for subsequent evaluation. In addition to logging counts from the VRM-1X detector, the TSA System also logged global positioning system (GPS) data so that the counts could be mapped and areas of interest identified.

Ideally, there should be an *a priori* determination of gamma scan sensitivities. However, gamma scan sensitivities, in terms of radionuclide activity concentrations in soil, depend on many parameters that are difficult to define. These parameters include:

- The vertical and horizontal distribution of the radioactive material.
- The radionuclides involved.
- Background radiation levels and the variability in these levels.
- The energy response of the detector.
- The ability of the surveyor to distinguish changes in the audible output of a count rate meter.

The project team did not make *a priori* determinations of scan sensitivities. Instead, a retrospective assessment of scan sensitivities compared the quantitative soil sample analysis results to the findings documented during the scans. One comparison used biased soil sample analysis results from locations identified during the scanning process as having elevated levels of radioactive material. A second comparison used soil sample analysis results associated with random soil samples collected from areas where the scanning process did not identify elevated levels of radioactive material.

Gamma scans performed with the VRM-1X detector identified 24 locations as having elevated levels of radioactive material. Soil samples from two of the 24 locations showed evidence of licensed radionuclides:

- A small area containing Co-60 in the dry cask storage area
- An area where a discrete Co-60 particle was discovered on Bailey Point

For areas where the scanning process, using the VRM-1X detector, did not identify elevated levels of radioactive material, the soil sample analysis results did not indicate activity concentrations in excess of 2.0 pCi/g of either Co-60 or Cs-137.

Gamma scans performed with the 44-2 detector identified one area as having elevated levels of radioactive material. However, the follow-up investigation did not find evidence of licensed radionuclides. Of the 24 areas identified during scans performed with the VRM-1X detector as having elevated levels of radioactive material, only the area on Bailey Point could be identified during follow-up investigations using the 44-2 detector. For areas where the scanning process, using the 44-2 detector, did not identify elevated levels of radioactive material, the soil sample analysis results did not indicate activity concentrations in excess of 2.0 pCi/g of either Co-60 or Cs-137.

Although gamma scanning sensitivities depend on many parameters that are difficult to define, the survey team collected sufficient empirical data during the characterization survey to directly compare the relative sensitivities of the two different detectors used to perform gamma scans of open land areas.

According to NUREG 1507, theoretical minimum detectable concentrations or minimum detectable activities for scans performed with a sodium iodide detector can be estimated by determining the minimum detectable count rate (MDCR) based on a 1 second count and the ambient background. Assuming a 10 μR/hr background and a calibration factor of 1E10 counts/ R, the background B for a 1 second count is:

$$B = \frac{10\ \mu R}{hr}\ \frac{R}{1E6\ \mu R}\ \frac{hr}{3600\ s}\ \frac{1E10\ counts}{R}\ 1\ s = 28\ counts$$

The MDCR is then:

$$MDCR = d'\sqrt{B}\ \frac{60}{t} \qquad Eq.\ 3\text{-}4$$

Where: MDCR = Minimum Detectable Count Rate (cpm)

d' = the index of sensitivity. 3.28 is the index of sensitivity that equates to a probability of detection of 95% and a probability 5% of falsely concluding residual radioactivity is present when it is not per Table 6.1 of NUREG 1507 (unitless)

B = number of background counts in time interval t (counts)

t = the time interval of the observation while the probe passes over the source (sec)

$$MDCR = 3.28\ \sqrt{28\ counts}\ \frac{60}{1} = 1040\ cpm$$

Taking into account the surveyor's efficiency:

$$MDCR_{surveyor} = \frac{MDCR}{\sqrt{p}} \qquad Eq.\ 3\text{-}5$$

Where p = surveyor efficiency, assumed to be equal to 0.5 per NUREG 1575 (unitless)

$$MDCR_{surveyor} = \frac{1040\ cpm}{\sqrt{0.5}} = 1475\ cpm$$

Based on the calibration factor of 1E10 counts/R the $MDCR_{surveyor}$ equates to an exposure rate of approximately 9 μR/hr. The computer code MicroShield was used to calculate exposure rates for 4 different geometries. Table 3-3 lists theoretical scanning sensitivities for each of these geometries assuming that the speed of the scan does not exceed 0.5 meters per second.

TABLE 3-3
Theoretical Scanning Sensitivities
For The Ludlum 44-2

ASSUMED GEOMETRY	MINIMUM DETECTABLE CONCENTRATION/ACTIVITY
Point source at 6 inches	1.4 μCi of Cs-137
Rectangular slab, 72 inches wide and 72 inches long	4.3 μCi of Cs-137
Rectangular slab, 72 inches wide, 72 inches long and 0.25 inches thick	145 pCi/g of Cs-137
Rectangular slab, 72 inches wide, 72 inches long and 6 inches thick	12 pCi/g of Cs-137

Theoretical minimum detectable concentrations or minimum detectable activities for scans performed with a vehicle mounted VRM-1X detector, traveling at less than 5 mph, were calculated for several geometries based on empirical data and numerical integrations. Table 3-4 contains the results of these calculations.

TABLE 3-4
Theoretical Scanning Sensitivities
For The VRM-1X

ASSUMED GEOMETRY	MINIMUM DETECTABLE CONCENTRATION/ACTIVITY
Point source beneath the center of the detector	0.7 μCi of Cs-137
Point source beneath the detector, 24 inches of center	1.2 μCi of Cs-137
Rectangular slab, 72 inches wide and 72 inches long beneath the center of the detector.	0.8μCi of Cs-137
Rectangular slab, 72 inches wide, 72 inches long and 0.25 inches thick beneath the center of the detector.	24.0 pCi/g of Cs-137 Does not account for self attenuation

The values in Tables 3-3 and 3-4 demonstrate that, for like geometries, the VRM-1X detector is more sensitive than the 44-2 detector. Although NUREG 1575 and NUREG 1507 imply that gamma scans of open land areas are performed with sodium iodide detectors, these calculations clearly demonstrate that use of the VRM-1X detector improves the probability that isolated areas containing elevated levels of radioactive material will be detected.

3.3.3 Instrument Calibrations and Quality Control

Analytical and field instruments were calibrated at the frequency required by approved procedures using National Institute of Standards and Technology traceable sources representative of the assumed radionuclide mix at the MYAPP site. Instruments were calibrated by GTS Duratek at the MYAPP site and at the GTS Duratek Central Calibration Facility in Oak Ridge, Tennessee or by vendors in accordance with the GTS Duratek Quality Assurance Project Plan for Site Characterization of the MYAPP site. The calibration program ensured that equipment was of the proper type, range, accuracy and precision to provide data compatible with the specific requirements of the MYAPP characterization.

Instrument procedures developed for the MYAPP Characterization Project governed issue, operation, maintenance and quality control of survey instruments. Project personnel performed daily instrument response checks and compared results to ranges of acceptable performance. If an instrument response did not fall within the acceptable range, GTS Duratek removed the instrument from service until the cause of the deviation was determined and corrected.

Laboratory instrument procedures incorporated the guidance in ANSI N42.2, *Measurement and Quality Assurance for Radioassay Laboratories, February 1994,* and ANSI N42.23, *Measurement and Associated Instrumentation Quality Assurance for Radioassay Laboratories, September 1995*. The gamma spectral analysis libraries used energies and yields from industry accepted radioactive decay data tables. For each laboratory instrument, the laboratory technicians kept daily quality control charts, a log of samples analyzed to provide traceability, and a maintenance log. The quality control charts for each gamma spectroscopy system included energy, full width at half maximum, and efficiency. The technicians performed trend analysis daily. The analytical balance used to weigh samples was also checked daily. Routine background and blank counts demonstrated that the detector cave had not become contaminated and confirmed sample detection levels.

3.4 Survey Planning

3.4.1 Reference Documents

GTS Duratek prepared the Site Characterization Management Plan (SCMP) and supporting documents by applying:

- current regulatory guidance as of the start of the project
- state of the art technology
- corporate knowledge and experience

Characterization plans and procedures used guidance contained in References 6.1 through 6.6.

3.4.2 Site Specific Documents

The *Site Characterization Management Plan* (SCMP) is the upper tier document that provides requirements and guidance for characterization of the Maine Yankee Atomic Power Plant (MYAPP) site. From this document, GTS Duratek developed plans and procedures that provided more detailed instructions. The following paragraphs describe the sub-tier plans. Appendix D lists the project specific procedures. Together, the SCMP and sub-tier documents ensured adequate planning, implementation of work directives, and documentation of processes and results.

The *Quality Assurance Project Plan* (QAPP) described the quality assurance requirements for the site characterization survey. The QAPP included applicable criteria from the GTS Duratek Quality Management System Manual specific to the Maine Yankee project. The plan addressed sample collection, field survey measurements, sample analysis, data analysis/verification, and document control.

The *Background Study Plan* provided guidelines for measuring environmental radionuclide concentrations, beta surface activity and exposure rates on materials similar to those found on the Maine Yankee site but not affected by plant operations. This background study provided the baseline for the radiological characterization.

The *Radiological Sample Analysis and Data Management Plan* described how to analyze samples and evaluate data that was obtained using the site-specific survey procedures and survey packages.

The *Hazardous Materials Sampling, Analysis and Data Management Plan* described how to collect and analyze hazardous materials samples and evaluate the data that was obtained using the site-specific survey procedures and survey packages.

The *Health and Safety Plan* integrated GTS Duratek and MYAPP Environmental Health and Safety policies and procedures applicable to characterization survey activities. GTS Duratek project personnel adhered to radiological protection requirements in the existing Maine Yankee Atomic Power Plant Radiation Protection Program.

3.4.3 Area Classification

A survey area is a contiguous area (usually) with similar characteristics and potential for residual radioactive material. GTS Duratek established the survey areas listed in Appendix B for characterization of the Maine Yankee Atomic Power Plant based on this definition. Project personnel then assigned sampling and measurement frequency and patterns for each survey area, and separately evaluated data from each survey area. A survey unit is a division of a Survey Area that is expected to have similar radioactive or hazardous material deposition patterns (e.g., a room, elevation or some other portion of a survey area).

1. The radiological characterization included three categories:

   - Surfaces and Structures: This category included building interiors and exteriors with associated structures, and, where applicable, the exterior surfaces of plant systems and components because these surfaces have the same potential for residual levels of radioactive material as the building surfaces in which they are located. Surface and structure survey packages also included ancillary buildings and structures.

- Systems: This category included interior surfaces of process piping, components, ventilation ductwork, and installed drains and sumps. The levels of radioactive material on the internal surfaces of plant systems and components primarily depend on process operations. Therefore, these survey packages are separate from surface and structure survey packages. Plant system survey packages generally included one plant system.

- Environs: This category included facility grounds within and outside the Restricted Area, the liquid effluent pathway, bay, groundwater wells and remote locations within the Maine Yankee Atomic Power Plant site boundaries.

GTS Duratek subdivided these plant area categories according to their potential for residual levels of radioactive material as either affected or unaffected.

- Radiologically Affected: This category included areas that have a history of or potential for residual radioactivity

- Radiologically Unaffected: This category included areas that have no history or expectation of residual radioactivity

2. GTS Duratek also established two survey area categories for characterization of hazardous materials:

- Surfaces, Structures and Systems
- Environs

3.4.4 Survey Package Preparation

GTS Duratek personnel developed a survey package for each survey area by 1) preparing a walkdown worksheet, 2) developing specific survey instructions for that area, and 3) assembling the survey package.

GTS Duratek personnel walked down each survey area, interviewed individuals having knowledge of the area, and reviewed historical documents, including previous surveys of the area, when available. For each area, GTS Duratek prepared specific survey instructions based on the results of the walkdown and characterization plan requirements. Project personnel revised the survey instructions as more information became available. The survey instructions included:

- General information concerning the survey area such as a description of the area, its history, and the basis for its classification
- Types of instruments to use

- Required count times
- The location for biased measurements and samples
- Required sample analysis
- Special instructions such as required support and safety concerns
- Number and types of measurements and samples required
- Location codes for each type of measurement

For each survey area, GTS Duratek then developed a survey package. These packages provided specific requirements for the survey of each area, and allowed for results tracking. A typical survey package included:

- A drawing or diagram of the survey area
- Photographs if available
- General and area-specific survey instructions

3.5 Survey Techniques

3.5.1 Scans for Total Beta Activity

Beta scans provided a qualitative assessment of the potential for residual levels of radioactive material on surfaces, structures and systems. To ensure a consistent approach to the scanning process, GTS Duratek followed the guidance in draft NUREG/CR-5849: "... the scan speed should not exceed one detector width per second." If the survey technician believed an increase in the audible response had occurred in a specific area, he resurveyed the area at a slower speed. If this confirmed the increase in audible response, the surveyor held the detector stationary until the meter response stabilized. The area became a direct measurement location. Headphones or amplified speakers were available to aid the surveyor in performing the scan. They were especially useful when ambient noise levels made it difficult to hear the audible response of the meter.

3.5.2 Scans of Open Land Areas

Scans of open land areas, like scans for surface radioactivity, provided a qualitative assessment of potential for residual levels of radioactive material. The survey technicians performed walk-over and manual scans using NaI detectors. Scan surveys of large accessible open land areas employed a vehicle-mounted large area plastic scintillation detector. The surveyor marked elevated areas identified during the scan with a flag for further evaluation. The quantitative assessment of radionuclide activity concentrations in the environment was based on a gamma spectral analysis of representative soil samples.

3.5.3 Direct Measurements for Total Beta Activity

Each survey package specified the location and number of surface activity measurements based on the survey unit's classification as affected or unaffected, the size of the area, and preliminary survey results. GTS Duratek used the Ludlum Model 2350 Data Logger for these measurements. The Data Logger is a microprocessor-based portable counting instrument capable of operating with a variety of detectors. Where conditions permitted, the survey technicians took direct measurements for total beta activity with a 126 cm^2 gas flow proportional detector. In some cases, the Data Logger was operated with speciality pipe detectors developed by GTS Duratek. The configuration of these detectors and their unique delivery system allowed survey of internal piping surfaces.

For the assumed radionuclide mixes at MYAPP, measurable alpha activity due to licensed activities is unlikely. Also, alpha measurements are not useful for showing compliance with the dose limits for license termination. Therefore, the survey did not include measurements of total alpha activity.

3.5.4 Analyses for Removable Alpha and Beta Activity

GTS Duratek collected a smear sample at each direct surface radioactivity measurement location. Smear samples generally represented a 100 cm^2 area. The laboratory technician routinely analyzed smears for both alpha and beta activity, and tritium where applicable. To ensure that any detected alpha activity was due to licensed material, smears were held at least six hours before analysis. Due to the large influx of project smear samples, some smears were processed at the GTS Duratek facility in Oak Ridge, Tennessee. Oak Ridge personnel counted these samples using the same sample analysis criteria as the MYAPP site.

3.5.5 Exposure Rate Measurements

GTS Duratek collected exposure rate measurements at one meter from accessible floor surfaces and from specific affected system components using the Ludlum Model 2350 Data Logger with a NaI detector. The survey plan did not require measurements at locations where physical interferences were present. However, the surveyors often took measurements at such locations if possible.

3.5.6 Sampling

Survey technicians conducted radiological and hazardous material sampling, packaging and shipping according to approved project procedures. GTS Duratek checked each hazardous material sample taken from components, systems and structures for radioactivity.

Surface soil samples represented the top 6 inches of soil. Subsurface soil samples were from depths of 6 inches to 6 feet. GTS Duratek also collected biased samples of loose paint, dust and other sediment from drain receptacles, sumps, and other catchments in affected areas.

GTS Duratek obtained subsurface soil samples with the Geoprobe. The depth of Geoprobe sampling was to bedrock, groundwater, or refusal, whichever occurred first, or as identified in the survey packages. When refusal was due to suspected buried materials such as concrete or rocks, as opposed to bedrock, the rig was relocated in the same sampling location. Two or three additional attempts to complete the borehole were made before a sampling location was abandoned. The subsurface soil samples were taken just above groundwater, if encountered, or bedrock. GTS Duratek backfilled Geoprobe boreholes using "Vol-Clay" or equivalent material.

3.5.7 Activation Analysis

Duke Engineering and Services performed activation analysis to estimate activity in the Reactor Vessel, neutron shield tank and biological shield wall. Volume 8 contains the results of this analysis, and recommended biological shield sample point locations.

GTS Duratek did not take direct radiation measurements or samples of reactor components. However, the survey did include biological shield wall core samples to evaluate the horizontal and vertical distribution of the radioactivity. The results of the sample analysis appear in Volumes 3 and 8 of this report.

3.5.8 Contamination Profile Sampling

GTS Duratek collected concrete core samples from 11 locations within the affected area that had high levels of surface radioactivity to determine the depth of activity penetration. The core samples were approximately 6 inches in diameter and 6 inches deep. Project personnel cut ¼ inch slices from each core, taking a direct surface activity measurement at the top of the core after each cut. The process terminated when two successive background measurements were recorded. Volume 3 contains the contamination profile sampling results.

3.6 Survey Package Implementation

3.6.1 Affected/Unaffected Plant Surfaces and Structures Radiological Survey Packages

Lists of affected and unaffected plant surfaces and structures survey packages appear in Appendix D pages 1 and 2. The radiological characterization survey of surfaces and structures consisted of scans, biased and unbiased radiation measurements and collection and radiological analysis of building material samples. GTS Duratek took radiation measurements in each plant facility. Radiation measurements included total activity, removable activity, and exposure rate measurements. GTS Duratek based biased measurement locations, in part, on the results of the beta scan.

In total, the survey included approximately 7,850 measurements in unaffected areas and approximately 6,350 measurements in affected areas.

For affected areas, the survey packages suggested one measurement per 20 square meters of surface area. However, GTS Duratek personnel based actual measurement frequency on the size of the area being surveyed and preliminary survey results, while ensuring that the survey results were statistically valid. At each measurement location, the technician measured total beta activity and took a smear for evaluating removable alpha and beta activity. At each floor location, the technician took a one meter exposure rate measurement. In some affected areas, exposure rates or radioactivity levels limited the ability to do a beta scan or collect total beta activity measurements. In such cases, GTS Duratek collected samples or performed special evaluations to assess levels.

For unaffected areas, the survey packages suggested one measurement per 50 square meters of surface area. However, GTS Duratek personnel based actual measurement frequency on the size of the area being surveyed and preliminary survey results, while ensuring that the survey results were statistically valid. At each measurement location, the technician did a beta scan covering a minimum of five square meters (10% of the surface area) and marked the point of highest activity. Additionally, the technician measured total beta activity and exposure rate and took a smear for evaluating removable alpha and beta activity.

The survey packages included specific instructions for sample collection and special evaluations. The survey technicians collected concrete core samples from floor and wall surfaces of plant facilities that contained radioactive systems and components to:

- Verify the anticipated radionuclide mix
- Confirm activation analysis calculations
- Determine the depth, or profile, of residual radioactive material in porous (concrete) surfaces
- Investigate below or behind surface coverings such as paint, insulation, floor tile, ceilings, carpet

- Determine activity concentrations in bulk materials
- Assess the levels of residual radioactive material in areas where exposure rates were too high to perform direct measurements

3.6.2 Affected/Unaffected Plant Systems Radiological Survey Packages

Lists of affected and unaffected plant systems survey packages appear in Appendix D pages 3 and 4. The radiological characterization survey of plant systems consisted of radiation measurements and the collection and radiological analysis of material samples. GTS Duratek obtained radiation measurements and samples for each Maine Yankee plant system. Measurements included total activity measurements (where possible), removable activity measurements, and exposure rate measurements. Whenever possible, survey personnel collected measurements and samples at biased locations where activity concentration was likely to be high. However, location selection was sometimes based on system/component availability, as determined by Maine Yankee. Samples were taken at system access points if internals were not accessible. Technicians performed beta scans at each direct beta activity measurement location to the extent possible, based on access, dose rate and surface radioactivity limitations.

The survey included approximately 3,800 unaffected system measurements and approximately 1,050 affected system measurements.

Some unaffected systems are located in high background areas. Project personnel used the following techniques to improve the data accuracy for these systems.

- Increased counting times to improve the statistics.
- Took measurements on system components located in lower background areas that provide equivalent information about the plant system
- Took smears or material samples to supplement direct measurements

To accurately assess such systems, MYAPCO may need to perform another survey when background levels are lower, or remove a portion of the system to a lower background area for survey.

Survey frequencies in unaffected systems exceeded those in affected systems since affected systems are more likely to be disposed of as radioactive waste, while unaffected systems may be disposed of as clean waste.

GTS Duratek characterized highly contaminated plant systems using indirect measurements (e.g., smears or material samples) and exposure rate measurements.

3.6.3 Affected/Unaffected Environs Radiological Survey Packages

A list of environs radiological survey packages appears in Appendix D page 5. The environs radiological characterization survey included gamma scans, exposure rate measurements and radiological analysis of biased and unbiased soil, sediment and water samples taken throughout the Maine Yankee property. Approximately one-third of the 820-acre site land area received a gamma scan. Exposure rate measurements taken over the entire property used a grid system to ensure adequate survey of all areas. Samples were from surface soils, sediments in the bays, and groundwater wells and surface waters on the Maine Yankee property. For both affected and unaffected areas, GTS Duratek based requirements for number and type of samples on the need to investigate elevated results from the gamma scans, and suspect areas based on physical characteristics or historical information.

3.6.4 Hazardous Materials Survey Packages

A list of the hazardous materials survey packages appears in Appendix D pages 6 and 7. The hazardous material characterization survey of the plant facilities and property consisted of approximately 150 samples from both radiologically affected and unaffected areas. GTS Duratek collected samples from plant soil, groundwater wells, plant systems, and plant building materials throughout the Maine Yankee plant and property. The survey included samples from eight existing monitoring wells, two existing chromate abatement wells, and the Containment Sump within the MYAPP Protected Area. The Hazardous Material Characterization Sampling Plans identified sample locations and provided the rationale for the number and locations of samples.

3.7 Background Study

The purpose of this study was to measure and document the levels of radionuclides present in materials and typical background exposure rates. The survey sampling and measurement techniques complied with approved procedures and applicable guidance provided in the *Background Study Plan*. The background study survey included samples and measurements of materials that had characteristics in common with the samples and measurements collected during the MYAPP site characterization. Sample materials included surface soils, sediments and groundwater. The project team performed gamma spectroscopy analysis for all samples, and analyzed groundwater for tritium. The survey also included an *in situ* gamma spectrum with a MicroSpec multichannel analyzer/sodium iodide detector. Measurements included direct surface activity and exposure rates for various types of materials. Survey technicians measured background exposure rates with a sodium iodide detector. Additionally, the survey team took both sodium iodide and pressurized ion chamber (PIC) measurements at each of the background soil sample locations in the hay field at Merrymeeting Airfield to observe the energy response of the PIC versus the sodium iodide detector. The project team calculated the background exposure rate and PIC measurement ratio for information, and did not use the results to adjust any other measurements.

Soil and sediment measurement locations were near the MYAPP ten mile Emergency Planning Zone to the extent practicable. MYAPCO preapproved all measurement locations within the Emergency Planning Zone. These areas are unaffected (free from licensed radioactive materials) and believed to be representative of the site background. After collecting the samples and measurements, GTS Duratek personnel documented the locations on a map. Environmental soil and sediment sample locations were documented using Global Positioning System coordinates. Results of the background survey for construction materials appear in Volume 2. The results of the background survey for environmental materials appear in Volume 6.

Survey packages B9800 and R2200 were developed for performing measurements for the surfaces and structures and environs Background Studies, respectively. Raw data results from the measurements collected for B9800 and R2200 are located in the packages, which have been turned over to MYAPCO. A discussion of the background study survey for B9800 is presented in Volume 2, section 3.0. Volume 2, section 4.1 provides the average values of the direct measurements for total beta activity for each surface/material in the B9800 surfaces and structures background study package. These material backgrounds were applied to direct measurements for total beta activity in volumes 2, 3, and 6 as indicated in the "Materials" listing under the "Summary of Survey Units" for package reports, as appropriate. A discussion of the background study measurements for R2200 is presented in Volume 6, section 3.2, and the measurement results for the R2200 environs background study package are presented in the report for R2200 in Volume 2, Appendix A.

Equation 3-8 in Section 3.9.3 best describes how a material-specific beta background value was subtracted from the gross measurements. The equation shows how local area background and material-specific background were applied to the gross direct beta measurement counts, taking into consideration detector area and detector efficiency, to calculate the total beta activity in net dpm/100cm^2.

3.8 Sample Analysis and Quality Control

The site characterization included approximately 1350 soil, sediment and water samples for radiological analysis and 150 samples for hazardous materials analysis. The project used both on site and off site laboratory analysis to quantify radionuclides in the samples. The on site laboratory was equipped with: gamma spectroscopy systems to quantify gamma emitting nuclides in plant and environmental samples, a liquid scintillation counter to analyze smears and groundwater samples for tritium, and an alpha beta counter to count smears for gross activity. The off site laboratory quantified nuclide concentrations for nuclides that decay by electron capture (Fe-55), pure beta emission (such as Sr-90/Y-90, and Ni-63), and alpha emission (such as Am-241). An off site laboratory also performed hazardous materials analysis.

3.8.1 Sample Preparation

Sample preparation depended on the analysis to be performed. No sample preparation was required for smears analyzed for gross alpha or gross beta activity. Laboratory personnel prepared smears analyzed for tritium in vials by adding known volumes of water and liquid scintillation cocktail. Preparation of soil samples for gamma spectral analysis included drying and sieving the samples to remove debris greater than 1/4 inch in diameter. Laboratory personnel weighed the prepared samples using a calibrated balance and logged them for counting and analysis. Sieved materials were labeled and saved for additional analysis as needed.

The only sample preparation required for samples being sent off site for analysis was the addition of preservative in the sample containers used to collect the samples as prescribed by the vendor laboratory. Some samples prepared and analyzed on site were also sent off site for additional analysis.

3.8.2 On Site Laboratory

The on-site laboratory operated by GTS Duratek analyzed liquids, soil, smears, and environmental samples. GTS Duratek based equipment selection and analysis protocols on the nuclides and contaminants of concern for Maine Yankee. The laboratory included a liquid scintillation counter for analyzing smears and groundwater for tritium; two intrinsic germanium gamma spectroscopy, HPGe, systems for quantification of gamma emitting nuclides; alpha and beta counters; and all drying and weighing equipment required to prepare the samples for analysis. GTS Duratek set up and operated the on-site laboratory using procedures and protocols that ensured sample control, minimized potential for cross-contamination, and maximized instrument control and accuracy. Project personnel routinely monitored areas used for sample storage and preparation to verify the controls were effective. Laboratory instrument calibration was performed using NIST traceable standards with geometries and matrices that are representative of the samples collected.

3.8.3 Off Site Laboratories

Off site laboratories performed quality control checks of the onsite laboratory analyses, nuclide analysis for all required hard-to-detect nuclides, and non-radiological laboratory analysis (hazardous materials). Core Laboratories in Casper, Wyoming performed radiological analysis and Quanterra, Inc. in Earth City, Missouri performed hazardous materials analysis.

Hard-to-detect nuclide analysis was performed on samples which showed relatively high activity concentrations of gamma emitting nuclides. High gamma activity was needed due to the low relative fraction of the non-gamma emitters (determined by review of the available 10 CFR Part 61 waste stream analyses) and the laboratory detection levels. Nuclide analyses included: C-14, Fe-55, Ni-63, I-129, Sr-90, Tc-99, U-234, U-235, U-238, Pu-238, Pu-239/240, Pu-214, Am-241, Cm-242, and Cm-243/244.

Hazardous materials analysis included: volatile organic chemicals, PCBs, asbestos, total metals (As, Ba, Cd, Cr, Cu, Hg, Pb, Se, Ag, Zn) and semi-volatile organic chemicals (including oil and grease).

3.8.4 Quality Control Samples and Measurements

For each laboratory instrument, laboratory personnel kept daily quality control charts, a log of samples analyzed to provide traceability for each step of the analysis, and a maintenance log. Daily quality control checks were compared to specified tolerances. Control charts were developed at the time of initial calibration using a statistical analysis of repetitive measurements. Laboratory personnel maintained control charts for energy, full width at half maximum (FWHM), and efficiency for each gamma spectroscopy system and performed trend analysis daily. Routine background and blank counts demonstrated that the detector cave had not become contaminated and confirmed sample detection levels. Daily checks were also made on the analytical balance which was used to weigh the samples.

The Sample Analysis and Data Management Plan identified required quality control samples and measurements. In addition to the daily instrument quality control described above, laboratory personnel used quality control samples and measurements to verify system performance and data reproducibility.

The following on site QC analyses were performed and compared using criteria in US NRC Inspection Procedure 84750:

- 10% of all samples were analyzed twice in the on-site laboratory (duplicate analysis)
- 10% of all samples were split and analyzed as two separate samples

Quality control at the contract (off site) laboratories also included daily instrument checks and quality control samples that were analyzed during analysis of a batch of samples. Quality control samples and analyses for a batch of 20 (or fewer) samples analyzed by the contract laboratory included: a blank sample, a matrix spike sample (laboratory control sample, LCS), and a homogenized split sample. Laboratory control samples and analyses performed by the off-site laboratory were required to meet a relative percent difference (RPD) of 20% in accordance with the laboratory's internal procedures.

The methods used by the off site laboratory for analysis of hazardous materials were based on the EPA method for solid waste analysis SW-846. Specific quality control samples, analysis, and acceptance criteria are specified in the analysis methods.

3.9 Characterization Data Review and Reporting

3.9.1 Characterization Data Review

GTS Duratek personnel verified the following for each survey package, as a minimum:

- The survey technician initialed and dated the survey package instructions.
- The survey technician collected the number of measurements and samples specified in the survey package in the appropriate locations.
- The sensitivity of the measurements met designated criteria (i.e., count times, background, and detection efficiency were appropriate to meet MDAs).
- Properly calibrated/response checked instruments were used to perform measurements/analysis.
- Quality control checks were performed as designated in the survey package.
- Chain of custody forms, data download reports, and laboratory analysis results were complete and in the survey package.
- Any outlying data in the survey/sample results that differed significantly from those expected were evaluated for need for follow-up samples/measurements.

The Laboratory Supervisor reviewed on-site and off-site laboratory analysis results for accuracy. The GTS Duratek data reviewer, Survey Supervisor and Project Manager signed the Survey Package Cover Sheet signifying survey package completion.

3.9.2 Characterization Survey Data Reports

GTS Duratek uses a proprietary computer program to perform data analysis calculations and generate the characterization survey data reports. The program compiles data from survey units or survey packages, and generates a statistical summary report for each survey area or unit (structure, system or open land area).

The compilation of statistical summaries, area-specific historical information, applicable maps and drawings, and conclusions constitutes the characterization survey report for each survey package. After completion of data reviews and data evaluation, the Project Manager reviewed and signed the survey package, signifying closure.

3.9.3 Characterization Data Analysis Equations

The following sections describe the equations used for characterization data analysis in the report.

1. Mean and Standard Deviation

The following equations calculated mean and standard deviation of characterization measurements in a survey package data set:

$$\bar{x} = \frac{1}{n} \sum x_i \qquad Eq.3-6$$

Where:
- $\bar{x}$ = the mean of the measurements
- x_i = the individual measurement
- n = the number of sample measurements

$$s = \sqrt{\frac{\Sigma(\bar{x} - x_i)^2}{n-1}} \qquad Eq.3-7$$

Where:
- s = the standard deviation of the population
- $\bar{x}$ = the mean of the measurements
- x_i = the individual measurement
- n = the number of sample measurements

2. Beta Activity Per Unit Area

The following equation calculated beta activity per unit area for counts from the Ludlum Model 2350-1 Data Logger.

$$A = \frac{\left(C * \frac{1}{t_s}\right) - \left[R_b + \left(A_m * E * \frac{a}{100}\right)\right]}{E * \left(\frac{a}{100}\right)} \qquad Eq.3-8$$

Where:
- A = net surface activity (dpm/100 cm^2),
- C = integrated gross counts (counts),
- t_s = sample count time (min),
- R_b = background count rate (cpm),
- A_m = naturally-occurring material-specific surface activity (dpm/100 cm^2),
- E = efficiency of the survey instrument (cpd), and
- a = detector area (cm^2).

3. Removable Combined Surface Radioactivity Per Unit Area

The survey technicians typically measured removable surface radioactivity by analyzing smear samples from a 100 cm^2 area. The following equation converted gross counts into net activity per unit area.

$$A = \frac{\left(C * \frac{1}{t_s}\right) - R_b}{E * \left(\frac{a}{100}\right)} \qquad Eq.3-9$$

Where:
- A = net removable activity (dpm/100 cm^2),
- C = integrated gross counts (counts),
- t_s = sample count time (min),
- R_b = background count rate (cpm),
- E = efficiency of the survey instrument (cpd), and
- a = area of the sample (cm^2).

4. Minimum Detectable Activity (MDA)

Survey packages for unaffected areas specified instrument count times to achieve MDA requirements according to the guidance in the *Sample Analysis and Data Management Plan*.

The following equation calculated MDA for characterization survey measurements.

$$MDA = \frac{\frac{2.71}{t_s} + 3.29\sqrt{\frac{R_b}{t_s} + \frac{R_b}{t_b}}}{E\left(\frac{a}{100}\right)} \qquad Eq.3-10$$

Where:
- MDA = Minimum Detectable Activity (dpm/100cm^2).
- t_s = sample count time (min),
- R_b = background count rate (cpm),
- t_b = background count time (min),
- E = efficiency of the survey instrument (cpd),and
- a = detector area (cm^2).

3.10 Quality Assurance

Before mobilizing personnel, GTS Duratek developed a site-specific *Quality Assurance Project Plan* (QAPP) for the Maine Yankee Atomic Power Plant (MYAPP) characterization project. The QAPP incorporated the 18 criteria in 10 CFR 50 Appendix B. These criteria include requirements for training, document control, measuring and test equipment, audits and surveillances, nonconformances, and records.

GTS Duratek personnel implemented the QAPP through:

- Scheduled audits and surveillances by on-site and off-site personnel
- Development of training matrices and training of personnel
- Development of records flow schedules
- Development of document control criteria
- Completion of readiness review checklists

3.10.1 Audits and Surveillances

External audits of project activities included assessments by Maine Yankee personnel and subcontractors. These included an audit of the GTS Duratek facility in Kingston, TN and a project-specific audit based on the Quality Assurance Program Plan and other project plans. These audits did not identify any project-specific nonconformances. In addition, Maine Yankee personnel and their contractors performed surveillances on daily project operations. GTS Duratek personnel identified, tracked, and corrected concerns generated by these surveillances.

Radiological Engineering and Field Services personnel and GTS Duratek corporate personnel performed internal audits of the project. Also, at the request of Maine Yankee, GTS Duratek appointed an on-site surveillance technician. This inspector, trained on quality assurance procedures, performed daily surveillances on project activities. GTS Duratek personnel tracked and corrected nonconformances identified by these surveillances according to approved procedures.

3.10.2 Personnel Training and Qualifications

Before the start of survey and sampling activities, all on-site project personnel received training on applicable characterization plans, procedures and survey package instructions. In addition, survey technicians received specific training on survey methods and use of the Ludlum Model 2350-1 and applicable detectors. Throughout the characterization project, GTS Duratek provided continuing training to project personnel to maintain their cognizance of project and procedure changes. GTS Duratek documented and conducted training according to the requirements of GTS Duratek/QA 2.1, *Personnel Training, Indoctrination, and Qualification*.

3.10.3 Records

GTS Duratek maintained site characterization survey records in the survey packages prepared for each survey area. The specific records compiled in a survey package typically included:

- Survey package identification, survey location information, historical information for area surveyed, general survey instructions and any specific survey instructions
- Comments from the survey technician regarding any unusual situation that he may have encountered while surveying
- The survey diagram of the area surveyed, including survey grids, if applicable
- Photographs of the area surveyed, if applicable
- Printout of smear survey analyses, if performed
- Chain of Custody Records
- Printout of gamma spectroscopy results, if performed
- Raw data files and Paradox converted values for all direct beta activity and exposure rate measurements (The technician who took the measurement or collected the sample reviewed the hard copy results, obtained the appropriate supervisor's approval, and filed the results with the survey package.)
- Signature blocks completed by the technician performing the survey, designated reviewer and approver

Survey package revisions were recorded on a revision tracking sheet, approved by the Survey Supervisor, and included as part of the survey package. The revision tracking sheets explain what was revised and why. This aided in package review and closure.

4.0 SURVEY FINDINGS AND RESULTS

The results of the characterization survey appear in the following report volumes:

Volume No.	Description
2	Radiological Characterization Results for Unaffected Structures and Surfaces, including Structural Background Survey
3	Radiological Characterization Results for Affected Structures and Surfaces
4	Radiological Characterization Results for Unaffected Systems
5	Radiological Characterization Results for Affected Systems
6	Radiological Characterization Results for Affected and Unaffected Environs, including Environs Background Survey
7	Hazardous Materials Characterization
8	Maine Yankee Reactor Vessel Activation Analysis to Support Site Characterization
9	Asbestos Quantity Survey

Volumes 2 through 6 contain the radiological characterization survey results for the survey described in Volume 1. Table 4-1 summarizes the typical contents of the report for each survey area. Volumes 7, 8 and 9 present the hazardous material characterization results, activation analysis, and asbestos survey results, respectively.

Table 4-1
Typical Survey Area Characterization Report Contents

Form Title	Contents
Characterization Summary	• General historical information on the survey area, including equipment operating history, construction and coating materials, and past contamination incidents • Summary and results of characterization activities • References (e.g., documents, interviews)
Summary of Survey Units	• Package description (e.g., building and elevation) • List of units within each survey area (i.e., area, room, or equipment identification), and surfaces (i.e., ceiling, equipment, floor, walls) within each unit, if applicable • List of materials in each survey area (e.g., concrete, metal) and the assigned beta levels for each taken from the background survey results
Survey Map or Drawing	• Representative diagram of the survey area and units • Location of survey measurements.
Statistical Summary and Graph	Statistics and a graph of results for each type of measurement (direct measurements for total beta activity, removable alpha and beta activity, and gamma exposure rate at 1 meter) performed for the survey area. Statistics typically include: mean, maximum, minimum, standard deviation, minimum detectable activity, samples reported, and samples prescribed.
Results Listing Report	Corrected data and location information for each applicable measurement type.
Download File & Survey Instrumentation Calibration Summary	A summary of survey date, file number (Download #- Station #), detector model number, instrument and detector serial numbers and calibration due date(s), detector efficiency and Technician's ID number for each instrument and detector combination used to collect data.

5.0 GLOSSARY

5.1 Definitions

AFFECTED AREA:

Areas, structures or systems with a history of or potential for residual radioactivity or, Areas, structures or systems with a history of or potential for residual levels of hazardous material.

BACKGROUND RADIATION:

Naturally occurring radiation which may include cosmic, terrestrial (radiation from the naturally radioactive elements) and man-made radiation from global fallout.

BIASED/JUDGEMENT MEASUREMENTS:

Measurements performed at locations selected using professional judgement based on physical appearance and potential for residual levels of radioactive material.

BIASED SURVEY:

A survey based on measurement or sample locations selected in a non-random manner, considering the expected distribution of radioactivity and usually performed in an affected area.

CHARACTERIZATION SURVEY:

A survey with a limited number of measurements and samples obtained from site locations considered to be the most likely to contain residual activity, and from other site locations both immediately adjacent to the radioactive materials use areas, and in areas not expected to have been affected by site operations.

CLASSIFICATION:

The designation of an area as affected or unaffected.

COMPONENT:

An individual equipment item, e.g., a valve, pump, tank, or motor.

CONFIDENCE LEVEL:

The probability associated with a confidence interval which expresses the probability that the confidence interval contains the population parameter value being estimated.

DATA REDUCTION:

Refers to the protocol of preparing raw survey data for statistical analysis and the preparation of a histogram and log depicting the normal distribution of the analyzed data for visual presentation.

DATA LOGGER:

The base electronic unit which controls detector parameters and stores user and collected data information; Ludlum Measurements Inc. Model 2350 or 2350-1 Series Data Logger.

DESIGN GUIDELINES:

Criteria established to provide the appropriate level of survey intensity for systems, structures, surfaces and outdoor areas, based upon their classification.

DIRECT MEASUREMENT:

A radiological survey measurement performed by holding a detector on or close to the surface and recording the response.

DOCUMENT:

Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.

GUIDELINE VALUE:

The value in dpm/100 cm^2 corresponding to the Nuclear Regulatory Commission criteria of 25 mrem/yr TEDE criteria for plant license termination.

HARD-TO-DETECT NUCLIDE (HTDN):

A nuclide emitting radiation(s) of low energy or intensity such that detection using typical field instruments is difficult. Also: Difficult-to-Detect, Difficult-to-Measure.

MEASUREMENT LOCATION:

In the MYAPP survey design, each survey area is divided into survey units (rooms or areas). Survey units are divided into surfaces (floors, walls, equipment), and surfaces are divided into measurement locations or points. Specific locations are selected in accordance with the design guidelines based upon the type and classification of the survey unit.

MINIMUM DETECTABLE ACTIVITY (MDA):

The smallest amount or concentration of radioactive material in a sample that will yield a net positive count with a 5% probability of falsely interpreting background responses as true activity. The MDA value is dependent upon the counting time, geometry, sample size, detector efficiency and background count rate.

NULL HYPOTHESIS:

An assumption about the true state of nature.

OPEN LAND AREA:

The category of survey units which includes site grounds within the Restricted Area, the liquid effluent pathway and selected owner-controlled areas.

QUALITY:

The degree to which an item, process, or service meets or exceeds the user's requirements and expectations.

QUALITY ASSURANCE:

Refers to those process or product features which meet the needs of customers, and thereby, provide process or product satisfaction; and/or, it refers to freedom from deficiencies in a process or product.

RECORD:

A comprehensive term for specific documentation that includes all books, papers, maps, photo-negatives, machine readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by GTS Duratek and preserved or appropriate for preservation by GTS Duratek or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations and other activities of the Company or because of the informational value of data in them.

SCAN SURVEY:

A qualitative radiological monitoring technique which is performed by moving a detector over a surface at a specified constant speed to detect elevated surface activity or radiation levels.

SITE CHARACTERIZATION REPORT:

A report (including addenda) which documents the surveys, calculations and evaluations and presents the results of the Maine Yankee Atomic Power Plant site characterization.

SURFACES AND STRUCTURES:

All Maine Yankee Atomic Power Plant site buildings and their surfaces(e.g., floors, walls and ceilings). For purposes of the Characterization Survey external surfaces of piping systems, heating and ventilation systems, tanks, stacks, etc., are also treated as surfaces and structures.

SURVEY:

An evaluation of an area, specific location or an item for the presence of radioactive and/or hazardous material that is accomplished through the use of instruments, a historical records review, personnel interviews, etc.

SURVEY AREA:

An easily identifiable area selected for radiological and/or hazardous material evaluation that may be divided into smaller, more manageable units as necessary.

SURVEY DESIGN:

The process of determining the type, location, number and frequency (or density) of radiological and hazardous material measurements/samples to be taken in the Characterization Survey.

SURVEY INSTRUCTIONS:

Written directions which specify the type and number of measurements and samples to be taken in a survey unit. Each survey package includes survey instructions.

SURVEY PACKAGE:

The portfolio for a specific area being surveyed. Each survey package contains the details for surveillance including sample locations, types of measurements, sample point selection criteria, background determinations, maps, diagrams, photographs and the results and analysis of all data collected.

SURVEY UNIT:

A division of a Survey Area that is expected to have similar radioactive or hazardous material deposition patterns (e.g., a room, elevation or some other portion of a survey area).

TECHNICAL BASIS DOCUMENT (TBD):

Document which justifies, illustrates, describes or details the technical basis for processes, techniques and evaluations used to support the Characterization Survey.

TEST STATISTIC:

A function of the measurements (or their ranks) that has a known distribution if the null hypothesis is true. This is compared to the critical level to determine if the null hypothesis should be accepted or rejected.

TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE):

The sum of the Deep-Dose Equivalent (for external exposure) and the Committed Effective Dose Equivalent (for internal exposure).

TRACEABILITY:

The ability to verify the history, location, or application of an item by means of recorded identification and documentation.

UNAFFECTED AREA:

Areas, structures, or systems with no history or expectation of residual radioactivity or, Areas, structures, or systems with no history or expectation of residual levels of hazardous material.

UNBIASED MEASUREMENTS:

Measurements are performed at randomly selected or systematic measurement locations. In the case of randomly selected measurement locations, each potential measurement location is assumed to have an equal probability of being selected.

VALIDATION:

An activity that demonstrates that an item or process will perform under conditions of actual use, and will satisfy requirements of the end user.

VERIFICATION:

An activity that serves as a check of data accuracy such as occurs in the course of comparing source document data with a summary compilation of the same data.

5.2 List of Acronyms

ABS	Auxiliary Boiler System
ABVS	Auxiliary Building Ventilation System
ALARA	As Low As Reasonably Achievable
ASS	Auxiliary Steam System
ASTM	American Society for Testing and Materials
ATV	All Terrain Vehicle
BRS	Boron Recovery System
BSP	Background Study Plan
CAP	Citizens Advisory Panel
CAS	Compressed Air System
CCS	Component Cooling System
CEDS	Control Element Drive System
CFR	Code of Federal Regulations
CHM	Chemistry
CHR	Characterization
cpm	Counts per Minute
CRDL	Contract Required Detection Level
CS	Condensate System
CSS	Containment Spray System
CVCS	Chemical and Volume Control System
CVS	Containment Ventilation System
CWS	Circulating Water System
DCGL	Derived Concentration Guideline Level
D&D	Decontamination and Decommissioning
DEP	Department of Environmental Protection
DQO	Data Quality Objectives
dpm	Disintegrations per Minute
DRO	Diesel Range Organics
EAFS	Emergency/Auxiliary Feedwater System
ECCS	Emergency Core Cooling System
EML	Environmental Measurements Laboratory
EFPY	Effective Full Power Years
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ER	Exposure Rate
FHS	Fuel Handling System
FID	Flame Ionization Chamber
FPS	Fire Protection System
GM	Geiger Mueller
GPS	Global Positioning System
GRO	Gasoline Range Organics
HPGe	Hyper-Pure Germanium
HASP	Health and Safety Plan
HDESS	Heater Drain and Extraction Steam System
HTDN	Hard to Detect Nuclide

HVAC	Heating, Ventilation and Air Conditioning
I&C	Instrumentation and Control
LEL	Lower Explosive Limit
LLW	Low Level Waste
LOS	Lubricating Oil System
LWDS	Liquid Waste Disposal System
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCC	Motor Control Center
MDA	Minimum Detectable Activity
MDL	Minimum Detectable Level
MFS	Main Feedwater System
MRSS	Main and Reheat Steam System
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSDS	Material Safety Data Sheet
MTTCS	Main Turbine and Turbine Control System
MYAPP	Maine Yankee Atomic Power Plant
MYAPCO	Maine Yankee Atomic Power Company
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
OCA	Owner Controlled Area
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PEL	Permissible Exposure Limit
PFD	Process Flow Diagram
PID	Photo Ionization Detector
PORC	Plant Operations Review Committee
PPASS	Primary and Post Accident Sampling System
PPE	Personal Protective Equipment
PPRS	Pressurizer and Pressure Relief System
PVDS	Primary Vent and Drains System
PWR	Pressurized Water Reactor
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
QMSM	GTS Duratek Quality Management System Manual
RCA	Radiologically Controlled Area
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RCSRM	Removable Combined Surface Radiaoctivity Measurements
RCRA	Resource Conservation and Recovery Act
REDS	Radiological Engineering and Decommissioning Services
REFS	Radiological Engineering and Field Services
RG	Regulatory Guide
RHRS	Residual Heat Removal System
RMS	Radiation Monitoring System
RPSRRS	Reactor Protective System and Reactor Regulating System

RSADMP	Radiological Sample Analysis and Data Management Plan
RWP	Radiation Work Permit
SADMP	Sample Analysis and Data Management Plan
SCMP	Site Characterization Management Plan
SCP	Site Characterization Plan
STDB	Steam Dump and Turbine Bypass
SGS	Steam Generating System
SOP	Standard Operating Procedure
SPGV	Site-Specific Guideline Value
SPSS	Secondary Plant Sealing System
SSCAS	Secondary Sampling and Chemical Addition System
SWS	Service Water System
TBD	Technical Basis Document
TEDE	Total Effective Dose Equivalent
TPH	Total Petroleum Hydrocarbons
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TSA	Total Specific Activity
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOC	Volatile Organic Chemical
VPARS	Vacuum Priming and Air Removal System
WCP	Worker Concerns Program
WGDS	Waste Gas Disposal System
WSS	Waste Solidification System
WTP	Water Treatment Plant

6.0 REFERENCES

6.1 NUREG-1500 *Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC Staff's Draft for Comment*, August 1994.

6.2 NUREG-1575 *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (Draft), December 1996. [Note: The final version was issued while the characterization survey was in progress. Only the draft version was available during the planning and early implementation stages of the characterization survey.]

6.3 NUREG/CR-5849 *Manual for Conducting Radiological Surveys in Support of License Termination (Draft)*, 1992.

6.4 ANSI N42.2, *Measurement and Quality Assurance for Radioassay Laboratories,* February 1994.

6.5 ANSI N42.23, *Measurement and Associated Instrumentation Quality Assurance for Radioassay Laboratories,* September 1995.

6.6 SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 1994.

6.7 NUREG-1507 *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*, 1997.

APPENDIX A
Radionuclide Distributions for 10 CFR 61 Samples

DAW Smear Data (97-D-2)						
Radionuclide	Halflife [Yr]	Activity [6/18/97]	Activity [1/1/98]	f [1/1/98]	Activity [1/1/03]	f [1/1/03]
H-3	1.2280E+1	1.8600E-2	1.8042E-2	1.6681E-2	1.3606E-2	1.9848E-2
Mn-54	8.5700E-1	1.6300E-3	1.0533E-3	9.7382E-4	1.8477E-5	2.6952E-5
Fe-55	2.7000E+0	2.4600E-1	2.1416E-1	1.9800E-1	5.9347E-2	8.6571E-2
Co-57	7.4200E-1	2.3700E-4	1.4313E-4	1.3233E-4	1.3417E-6	1.9571E-6
Co-58	1.9400E-1	4.1500E-2	6.0299E-3	5.5750E-3	1.0555E-10	1.5397E-10
Co-60	5.2710E+0	4.4800E-1	4.1730E-1	3.8581E-1	2.1625E-1	3.1545E-1
Ni-63	1.0010E+2	3.3400E-1	3.3275E-1	3.0765E-1	3.2143E-1	4.6888E-1
Ag-110m	6.8500E-1	1.3700E-3	7.9335E-4	7.3349E-4	5.0423E-6	7.3554E-6
Sb-125	2.7700E+0	5.8100E-3	5.0758E-3	4.6929E-3	1.4529E-3	2.1194E-3
Cs-134	2.0620E+0	5.5400E-3	4.6205E-3	4.2719E-3	8.6080E-4	1.2557E-3
Cs-137	3.0170E+1	8.0600E-2	7.9606E-2	7.3601E-2	7.0969E-2	1.0352E-1
Pu-238	8.7750E+1	1.4100E-5	1.4040E-5	1.2981E-5	1.3496E-5	1.9688E-5
Pu239/240	2.4131E+4	2.2400E-5	2.2400E-5	2.0710E-5	2.2396E-5	3.2670E-5
Pu-241	1.4400E+1	1.9800E-3	1.9292E-3	1.7837E-3	1.5166E-3	2.2123E-3
Am-241	4.3220E+2	3.0000E-5	2.9974E-5	2.7713E-5	2.9735E-5	4.3375E-5
Cm-243/244	2.8500E+1	1.1900E-5	1.1745E-5	1.0859E-5	1.0400E-5	1.5171E-5
			1.0816E+0	9.9998E-1	6.8553E-1	1.0000E+0

Resin Data (96-R-4)						
Radionuclide	Halflife [Yr]	Activity [8/21/96]	Activity [1/1/98]	f [1/1/98]	Activity [1/1/03]	f [1/1/03]
H-3	1.2280E+1	2.0000E-1	1.8638E-1	2.3350E-3	1.4056E-1	2.5503E-3
Mn-54	8.5700E-1	8.0100E-1	2.9151E-1	3.6521E-3	5.1136E-3	9.2783E-5
Fe-55	2.7000E+0	9.8100E+0	7.1176E+0	8.9171E-2	1.9724E+0	3.5788E-2
Co-57	7.4200E-1	2.0700E-2	6.4410E-3	8.0694E-5	6.0378E-5	1.0955E-6
Co-58	1.9400E-1	7.7000E-2	8.8568E-4	1.1096E-5	1.5503E-11	2.8130E-13
Co-60	5.2710E+0	9.6800E+0	8.2130E+0	1.0289E-1	4.2561E+0	7.7225E-2
C-14	5.7300E+3	8.5100E-2	8.5087E-2	1.0660E-3	8.5036E-2	1.5429E-3
Sr-90	2.8600E+1	2.3800E-1	2.3090E-1	2.8928E-3	2.0455E-1	3.7115E-3
Cm-242	4.4680E-1	1.6400E-4	2.3596E-5	2.9562E-7	1.0112E-8	1.8347E-10
Ni-59	7.5000E+4	1.0400E-1	1.0400E-1	1.3029E-3	1.0399E-1	1.8869E-3
Ni-63	1.0010E+2	1.4200E+1	1.4078E+1	1.7637E-1	1.3599E+1	2.4674E-1
Sb-125	2.7700E+0	2.7200E-1	1.9895E-1	2.4925E-3	5.6950E-2	1.0333E-3
Cs-134	2.0620E+0	2.0000E+1	1.3140E+1	1.6462E-1	2.4479E+0	4.4416E-2
Cs-137	3.0170E+1	3.7200E+1	3.6147E+1	4.5286E-1	3.2225E+1	5.8471E-1
Pu-238	8.7750E+1	6.6700E-4	6.6045E-4	8.2742E-6	6.3488E-4	1.1520E-5
Pu239/240	2.4131E+4	2.7900E-4	2.7899E-4	3.4952E-6	2.7895E-4	5.0614E-6
Pu-241	1.4400E+1	2.0500E-2	1.9303E-2	2.4183E-4	1.5175E-2	2.7534E-4
Am-241	4.3220E+2	3.5600E-4	3.5529E-4	4.4511E-6	3.5245E-4	6.3950E-6
Cm-243/244	2.8500E+1	4.5300E-4	4.3944E-4	5.5054E-6	3.8913E-4	7.0606E-6
			7.9820E+1	1.0000E+0	5.5113E+1	1.0000E+0

Liquid System Filter Data (96-F-15)						
Radionuclide	Halflife [Yr]	Activity [9/4/96]	Activity [1/1/98]	f [1/1/98]	Activity [1/1/03]	f [1/1/03]
Fe-55	2.7000E+0	7.4900E-1	5.4343E-1	1.6249E-1	1.5059E-1	6.7565E-2
Co-60	5.2710E+0	1.6400E+0	1.3915E+0	4.1606E-1	7.2107E-1	3.2352E-1
Ni-63	1.0010E+2	1.4000E+0	1.3879E+0	4.1500E-1	1.3407E+0	6.0153E-1
Sb-125	2.7700E+0	2.6200E-3	1.9164E-3	5.7302E-4	5.4856E-4	2.4612E-4
Cs-137	3.0170E+1	3.3500E-3	3.2552E-3	9.7332E-4	2.9020E-3	1.3020E-3
Pu-238	8.7750E+1	1.5300E-4	1.5150E-4	4.5299E-5	1.4563E-4	6.5340E-5
Pu239/240	2.4131E+4	1.9100E-4	1.9099E-4	5.7108E-5	1.9097E-4	8.5680E-5
Pu-241	1.4400E+1	1.6500E-2	1.5537E-2	4.6456E-3	1.2214E-2	5.4800E-3
Am-241	4.3220E+2	2.7100E-4	2.7046E-4	8.0869E-5	2.6830E-4	1.2038E-4
Cm-243/244	2.8500E+1	2.3400E-4	2.2699E-4	6.7873E-5	2.0101E-4	9.0186E-5
			3.3444E+0	9.9999E-1	2.2288E+0	1.0000E+0

APPENDIX B
Characterization Field and Laboratory Instrumentation

Manufacturer and Model Number	Detector Type	Use	Detector Area and Window Tthickness
Ludlum 43-68 and 43-106	Gas Flow Proportional	Fixed Measurements For Total Beta Activity and Beta Scans.	126 cm^2 0.8 mg/cm^2
Ludlum 44-40	GM	Fixed Measurements For Total Beta Activity and Beta Scans.	15 cm^2 1.7 mg/cm^2
Ludlum 43-98	Cylindrical Gas Flow Proportional	Fixed Measurements For Total Beta Activity and Beta Scans of System Internals	100 cm^2 0.8 mg/cm^2
Ludlum 43-94	Cylindrical Gas Flow Proportional	Fixed Measurements For Total Beta Activity and Beta Scans of System Internals	100 cm^2 0.8 mg/cm^2
Ludlum 44-2	Sodium Iodide	Exposure Rate Measurements	NA
Ludlum 133-4	GM	Exposure Rate Measurements	NA
GTS[1] SP-175-3M	GM	Fixed Measurements For Total Beta Activity and Beta Scans of System Internals	46.5 cm^2 1.2 mg/cm^2
GTS[1] SP-113-3M	GM	Fixed Measurements For Total Beta Activity and Beta Scans of System Internals	19.4 cm^2 1.2 mg/cm^2
Packard 2550	Liquid Scintillation	Tritium Analyses	NA
Tennelec LB-5100	Gas flow Proportional	Gross Alpha and Beta Analyses	25.7 cm^2 80 $\mu g/cm^2$
Canberra Genie-PC	High-Purity Germanium	Gamma Spectroscopy	NA
Canberra Inspector	High-Purity Germanium	Gamma Spectroscopy	NA
Ludlum 44-38	GM	Exposure Rate Measurements	NA
Bubble Technology Micro Spec	Sodium Iodide	Gamma Spectroscopy	NA
Reuter Stokes RSS-112	Pressurized Ion Chamber	Exposure Rate Measurements	NA

[1]Three detector array fabricated by GTS Duratek

APPENDIX C
Project Specific Procedures

Procedure Number	Procedure Title
MYAP-CHM-101	Sample Identification and Chain of Custody
MYAP-CHM-102	Laboratory Quality Control
MYAP-CHM-103	Radiochemistry Calculations
MYAP-CHM-108	Data Quality Management Guidelines
MYAP-CHM-109	On-Site Project Laboratory Quality Management
MYAP-CHM-205	Sample Preparation for Gross Alpha and Gross Beta Analysis
MYAP-CHM-206	Sample Preparation for Gamma Spectral Analysis
MYAP-CHM-215	Operation and Calibration of Mettler Model PJ1220 Balance
MYAP-CHM-312	Sample Preparation for Tritium Analysis
MYAP-CHM-321	Calibration of Auto Pipets
MYAP-CHM-322	Operation and Calibration of A&D Model ER-182A Balance
MYAP-CHR-100	Site Characterization Plan
MYAP-CHR-101	Characterization of Structures
MYAP-CHR-102	Characterization of Systems
MYAP-CHR-103	Characterization of Environs
MYAP-CHR-104	Characterization Data Handling and Analysis
MYAP-CHR-108	Surface Soil Surveys and the Collection of Water, Sediment, Vegetation, and Soil Samples
MYAP-FSP-104	Final Survey Data Handling and Analysis
MYAP-HS-316	Drill Rig Operations
MYAP-INST-100	Radiation Protection Instrumentation Program
MYAP-INST-101	Issue, Control and Accountability of Radiation Protection Instruments
MYAP-INST-102	Quality Control of Counting Systems and Portable Counters
MYAP-INST-104	Calibration and Test Requirements for Radiation Protection Instrumentation
MYAP-INST-201	Operation of the Ludlum Model 2350 Data Logger
MYAP-INST-202	Operation of the Ludlum Model 77-3 Stretch Scope
MYAP-INST-204	Operation of the Eberline RO7 High Range Ion Chamber
MYAP-INST-206	Operation of the Ludlum Model 19 Micro-R Meter
MYAP-INST-207	Operation of the Eberline Ion Chamber Model RO2/RO2A

Procedure Number	Procedure Title
MYAP-INST-210	Operation of the GE Reuter Stokes Pressurized Ion Chamber
MYAP-INST-211	Operation of the Eberline BC-4 Portable Beta Counter
MYAP-INST-212	Operation of the Eberline SAC-4 Portable Alpha Counter
MYAP-INST-213	Operation of the Tennelec LB5100/Alpha/Beta Counter
MYAP-INST-221	Operation of the Genie PC Gamma Spectroscopy System
MYAP-INST-231	Operation of the Inspector Field Gamma Spectroscopy System
MYAP-INST-232	In Situ Operation of the Inspector Field Gamma Spectroscopy System
MYAP-INST-239	Operation of the Bubble Technology Industries Microspec-2 Portable Gamma Spectroscopy System
MYAP-INST-311	Calibration of the Eberline BC-4 Portable Beta Counter
MYAP-INST-312	Calibration of the Eberline SAC-4 Portable Alpha Counter
MYAP-INST-313	Calibration of the Tennelec LB5100/Alpha/Beta Counter
MYAP-INST-331	Calibration of the Inspector Field Gamma Spectroscopy System
MYAP-INST-401	Ludlum Model 2350 Data Logger Download Operation
MYAP-INST-404	DOP Testing of Portable HEPA Filter Systems Including AFS Components
MYAP-INST-428	Operation/Calibration of the Packard 2750 Liquid Scintillation Counter
MYAP-INST-429	Operation of the Western Enterprises P-10 Transfilling Cascade System
MYPP-01	Radiological Surveys at the MY Power Plant
MYAP-OPS-302	Survey Documentation and Review
MYAP-PDC-102	Document Control for Procedures
MYAP-PDC-103	Review and Approval of Documents
MYAP-PDC-104	Acknowledgment of Document Understanding
MYAP-PDC-106	Preparation and Review of Technical Basis Documents
MYAP-RAM-104	Radioactive Source Inventory, Leak Testing, and Control
RPP-VRM-01	Calibration of VRM01X Large Area Detector
SOP No. 2.1	Sample Handling, Packaging and Shipping
SOP No. 3.1	Surface and Shallow Subsurface Soil Sampling
SOP No. 3.2	Subsurface Soil Sampling While Drilling
SOP No. 6.1	Sampling Equipment and Well Material Decontamination
SOP No. 6.2	Drill, Development, and Heavy Equipment Decontamination

Procedure Number	Procedure Title
SOP No. 7.1	Surface and Subsurface Geophysics
SOP No. 8.3	Borehole and Well Abandonment
SOP No. 10.2	Cone Penetration Testing (CPT) and Hydropunch Groundwater Sampling
SOP No. 14.1	Hollow Stem Auger Drilling
SOP No. 17.1	Sample Labeling
SOP No. 17.2	Sample Numbering
SOP No. 19.1	On-Site Sample Storage

APPENDIX D
Survey Packages

PACKAGE NUMBER	GROUP "A" Affected Structures and Surfaces Survey Packages
A0100	Containment Building - Elevation -2 ft.
A0200	Containment Building - Elevation 20 ft.
A0300	Containment Building - Elevation 46 ft
A0400	Fuel Building - Elevation 21 ft.
A0500	Demineralized Water Storage Tank TK-21 - Elevation 21 ft.
A0600	Primary Auxiliary Building - Elevation 11 ft.
A0700	Primary Auxiliary Building - Elevation 21 ft.
A0800	Primary Auxiliary Building - Elevation 36 ft.
A0900	Service Building Hot Side - Elevation 21 ft.
A1100	Low Level Waste Storage Building - Elevation 21 ft.
A1200	RCA Building - Elevation 21 ft.
A1300	Equipment Hatch Area - Elevation 21 ft.
A1400	Personnel Hatch Area - Elevation 21 ft.
A1500	Mechanical Penetration Room - Elevation 21 ft.
A1600	Electrical Penetration Room - All Elevations
A1700	Containment Spray Building - All Elevations
A1800	Auxiliary Feed Pump Room - Elevation 21 ft.
A1900	HV-9 Area - Elevation 21 ft.
A2100	Refueling Water Storage Tank (RWST) TK-4 - Elevation 21 ft.
A2200	Borated Water Storage Tank (BWST) - Elevation 21 ft.
A2300	Processed Water Storage Tank (PWST) - Elevation 21 ft.
A2400	Test Tanks 14A/14B -Elevation 21 ft.
A9900	Concrete core contamination profile sampling
A9901	Activation analysis core sampling
A9902	Activation analysis core sampling

PACKAGE NUMBER	GROUP "B" Unaffected Structures and Surfaces Survey Packages
B0100	Turbine Deck - Elevation 61 ft.
B0200	Control Room - Elevation 21 ft.
B0300	Motor Control Center (MCC)/Battery Room - Elevation 62 ft.
B0400	Fire Pump House - Elevation 1
B0500	Condenser Bay - Elevation 21 ft.
B0600	Condenser Bay - Elevation 39 ft.
B0700	Service Building Cold Side - Elevation 21 ft.
B0800	Fuel Oil Building - Elevation 21 ft.
B0900	Emergency Diesel Generators - Elevation 21 ft.
B1000	Auxiliary Boiler Room - Elevation 21 ft.
B1100	Recirculating Water Pump House - All Elevations
B1200	Administration Center - Elevation 21 ft.
B1300	WART Building - All Elevations
B1400	Visitor and Information Center - Elevation 1
B1500	Warehouse 2 - Elevation 1
B1600	Training Annex Building - Elevation 1
B1700	Staff Building - All Elevations
B1800	Spare Generator Building - Elevation 1
B1900	Environmental Services Building - All Elevations
B2000	Bailey Barn - Elevation 1
B2100	Lube Oil Storage Room - Turbine Building Elevation 21 ft.
B2200	Cold Machine Shop - Turbine Building Elevation 21 ft.
B2300	Cable Vault Room - Turbine Building Elevation 39 ft.
B2400	Staff Building Tunnel - Staff Building to Turbine Building Elevation 21 ft.
B9800	Structural Background Survey

PACKAGE NUMBER	GROUP "C" Affected Plant Systems Survey Packages
C0100	Primary and Post Accident Sampling System
C0200	Waste Solidification System
C0300	Containment Spray System
C0400	Emergency Core Cooling System
C0500	Residual Heat Removal System
C0600	Primary Vents and Drains
C0700	Fuel Pool Cooling System
C0800	Waste Gas Disposal System
C0900	Pressurizer and Pressurizer Relief System
C1100	Reactor Coolant System
C1200	Boron Recovery System
C1300	Chemical and Volume Control System
C1400	Liquid Waste Disposal System
C1500	Primary Auxiliary Building Drains
C1600	Primary Auxiliary Building Ventilation
C1800	Containment Ventilation System
C1900	Steam Generators

PACKAGE NUMBER	GROUP "D" Unaffected Plant Systems Survey Packages
D0100	Condensate System
D0200	Water Treatment Plant Systems
D0300	Potable Water System
D0400	Sanitary Sewer System
D0500	Circulating Water and Screen Wash System
D0600	Service Water System
D0700	Fire Protection System
D0800	Lube Oil System
D0900	Compressed Air System
D1000	Auxiliary Boiler System
D1100	Steam Generator System
D1200	Main and Reheat Steam System
D1300	Auxiliary Steam System
D1400	Main Turbine and Turbine Control System
D1500	Steam Dump and Turbine Bypass System
D1600	Main Feedwater System
D1700	Emergency/Auxiliary Feedwater System
D1800	Heater Drain and Extraction Steam System
D1900	Component Cooling Water System
D2000	Vacuum Priming and Air Removal System
D2100	Amertap System
D2200	Secondary Plant Sealing System
D2300	Auxiliary Diesel Generator
D2400	Secondary Sample and Chemical Addition System
D2500	High Pressure Drains
D2600	Environmental Services Laboratory Systems
D2700	Administration Building HVAC System
D2800	Information Building HVAC System
D2900	Turbine Building Ventilation System
D3000	Staff Building HVAC System
D3100	Service Building HVAC System
D3200	Hydrogen and Nitrogen System
D3300	Turbine Building Sumps and Drains
D3400	Low Level Radioactive Waste Storage Facility

PACKAGE NUMBER	GROUP "R" Environs Affected and Unaffected Survey Packages
AFFECTED	
R0100	RCA portion (West Side) of Protected Area Yard
R0200	Balance of Protected Area (East Side)
R0300	Roof and Yard Drains #006, #007 and #008
R0400	Forebay Area Shorelines
R0500	Bailey Point
R0600	Ball Field
R0700	Construction Debris Landfill
UNAFFECTED	
R0800	Administration and Parking Areas
R0900	Balance of Plant Areas
R1000	Foxbird Island
R1100	Roof and Yard Drains #005, #009-12, #017 and N-12
R1200	Low Level Radioactive Waste (LLRW) Storage Building Yard
R1300	Dry Cask Storage Area
R1400	Westport, Montsweag Bay, Bailey Point Cove and Plant Area Shorelines
R1500	Ash Road Area Rubble Piles
R1600	Owner Controlled Area West of Bailey Cove
R1700	Owner Controlled Area North of Old Ferry Road
R1800	Bailey House Area
R1900	Bailey Cove
R2000	Diffusers
R2100	Maintenance Yard (Stockyard)
R2200	Background
R2300	SFPI Substation Slab
R2400	IT Duplicate Samples
R2500	Driveover Elevated Areas
R2501	Follow-up sampling at Elevated Soil Sample Locations (north of Forebay and Proposed Dry Cask Storage Area)
R2800	10 CFR 61 Analysis Sampling

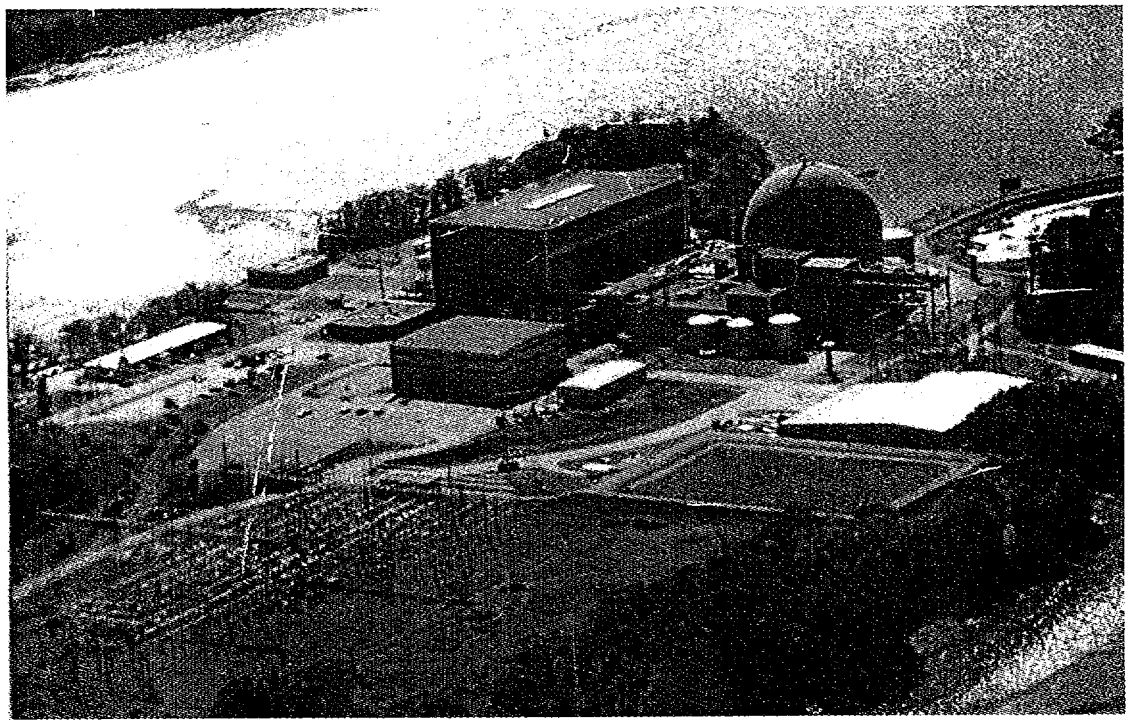
PACKAGE NUMBER	GROUP "E" Plant Surfaces, Structures and Systems Hazardous Material Survey Packages
E0100	Protected Area Paint
E0200	Plant Electric Components
E0300	Transformer Oils
E0400	Plant Pump Oils
E0500	Various Plant Fluids
E0600	Component Cooling Water
E0700	Brass, Bronze and Cadmium Plated Components
E0800	Plant Batteries
E0900	Mercury Components
E1000	Asbestos Insulation and Other Materials
E1100	Asbestos Containing Components
E1200	Lead Shielding
E1300	Paint Outside Protected Area

PACKAGE NUMBER	GROUP "H" Environs Areas Hazardous Material Survey Packages
H0100	Oil and Hazardous Material Transfer and Handling Areas (4)
H0200	Diesel Oil Tank Loading Area
H0300	Main, North, Spare and Shutdown Transformers
H0400	Roof and Yard Drains #006, #007 and #008
H0500	Solid Waste Storage Area
H0600	Primary and Secondary Side Waste Storage Building Yard Areas
H0700	Drumming/Decontamination Waste Accumulation Area
H0800	Diffuser Forebay
H0900	Reactor Water Storage Tank Area
H1000	Groundwater Monitoring Wells B-201 through 206, MW-100, BK-1
H1100	Warehouse Yards
H1200	Fire Pond and Yard Area
H1300	Construction Debris Landfill
H1400	Bailey Point
H1500	Administration and Parking Areas
H1600	Roof and Yard Drains #005, #009-12 and N-12
H1700	Surface Flow Drain #005
H1800	Balance of Plant Area
H1900	Foxbird Island
H2000	Low Level Waste Storage Yard
H2100	Dry Cask Area
H2200	Environmental Services Laboratory
H2300	Switchyards
H2400	Areas Outside Plant Impact

DURATEK

CHARACTERIZATION SURVEY REPORT
for the
MAINE YANKEE ATOMIC POWER PLANT

VOLUME 8
MAINE YANKEE REACTOR VESSEL ACTIVATION ANALYSIS TO SUPPORT SITE CHARACTERIZATION



MAY 1998
REVISION 2

Prepared By:

DE&S
Duke Engineering and Services
580 Main Street
Bolton, MA 01740-1398

GTS DURATEK

CHARACTERIZATION SURVEY REPORT

for the

MAINE YANKEE ATOMIC POWER PLANT

MAY 1998

REVISION 2

VOLUME 8: MAINE YANKEE REACTOR VESSEL ACTIVATION ANALYSIS TO SUPPORT SITE CHARACTERIZATION

Prepared by: GTS Duratek, Inc. Date _____

Reviewed by: Signature on File Date _____
Dave Lovett
Project Manager

Reviewed by: Signature on File Date _____
Dave Hall, CHP
Manager, RE&DS Technical Department

Approved by: Harvey F. Story Date 5-29-98
Harvey F. Story
Director, Radiological Engineering
and Decommissioning Services

DE&S
Duke Engineering & Services

580 Main Street
Bolton, Massachusetts 01740-1398

978-779-6711
Fax 978-568-3730

May 26, 1998
DSD 98-0148

Mr. David Hall
Manager of Commercial Projects
GTS Duratek
628 Gallaher Rd.
Kingston, TN 37763

RE: Transmittal of Maine Yankee Reactor Vessel Characterization Summary Report

Dear Mr. Hall:

The enclosed report is the final deliverable to subcontract No. S1012, change order No. 2 between Duke Engineering & Services (DE&S) and GTS Duratek, Inc. The report contains the activation analysis results and classification for the Maine Yankee reactor vessel and reactor vessel internal components. An unbound copy of the report is also enclosed for your ease to distribute. Also, a copy of the report has been mailed to Steve Dalgren at Maine Yankee per your request.

DE&S would be pleased to support Maine Yankee with any future scope changes such as internals segmentation, vessel transportation cask design, GTCC removal or other disposal scenarios.

It was a pleasure to be of service to GTS Duratek in support of Maine Yankee's decommissioning. Should you have any questions, please contact me at 978-568-2708.

Sincerely,

Adam Mancini
Project Manager
Environmental Health & Safety

Enclosures

c: R. Carter
S. Dalgren, MY

DE&S
Duke Engineering & Services

580 Main Street
Bolton, MA 01740-1398

978-779-6711
Fax 978-568-3700

Maine Yankee
Reactor Vessel Characterization

Prepared for

GTS Duratek, Inc.
628 Gallaher Road
Kingston, Tennessee 37763

DE&S/S1012-2
00435.00.0001.00.00000

DE&S
Duke Engineering & Services
580 Main Street
Bolton, MA 01740-1398
978-779-6711
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Forward

This report summarizes the analysis performed by Duke Engineering & Services (DE&S) to support the reactor vessel disposal campaign for the Maine Yankee nuclear facility. This summary report and the analysis performed by DE&S was fulfilled in accordance with the scope of work outlined in subcontract #S1012 as revised under GTS Duratek, Inc.

The summary report is the deliverable document from DE&S to GTS Duratek, Inc. All supporting calculations and reference calculations were performed in accordance with the DE&S/Yankee Atomic Electric Company's Quality Assurance Program. These calculations shall be considered proprietary property and are available for client inspection at the DE&S Bolton, MA office.

DE&S
Duke Engineering & Services
580 Main Street
Bolton, MA 01740-1398
978-779-6711
Fax 978-568-3700

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List of Tables

List of Figures

DE&S
Duke Engineering & Services
580 Main Street
Bolton, MA 01740-1398
978-779-6711
Fax 978-568-3700

1. Introduction

Reactor vessel characterization is the comparison of the calculated radioactivity within the vessel to the regulatory limits prescribed in 10CFR61 and 10CFR71. This report supports the low level waste disposal classification for each vessel component and an intact vessel as well as an intact vessel transportation determination. Intact reactor vessel is defined as the reactor vessel assembly and all reactor vessel internal components together as one unique waste package. This intact vessel concept is not currently an approved disposal method and would need both US NRC and disposal state approval. Partial segmentation of the vessel internals to remove GTCC metal may be necessary to complete a vessel disposal campaign.

This report is a continuation of report "Maine Yankee Reactor Vessel Activation Analysis to Support Site Characterization," published February 27, 1998 (Reference 9). The above referenced report describes Maine Yankee's fuel operating history, component chemical composition, activation analysis methodology, and activity estimates for all reactor vessel components between the upper and lower core plates. Reference 9 inputs and methodologies will not be reiterated. The following information contained herein documents the activation analysis results for reactor vessel components above and below the upper and lower core plates, respectively. Please note that, although not a classification driver, surface contamination activity (not in current scope) must be added to the activation activity prior to manifesting. Figure 1.1 illustrates a cross sectional view of the reactor and internals.

In the future, the results of the activation analysis can be used to support several reactor vessel disposal activities. These activities may include: internals segmentation, GTCC concentration averaging within the Barnwell "Rule-of-Ten" to maximize GTCC disposal, packaging plans, Safety Analysis Report for cask design, cask shielding design, GTCC storage configuration, disposal approval requests and uniform waste manifest documentation.

2. Summary

The activation models described in Reference 9 were enhanced to include all reactor vessel (RV) components. The entire RV assembly and 15 internals were defined from Maine Yankee drawings. All inputs were used to define the two-dimensional DORT fluence model radially and axially. The fluence output was then introduced as input to the ORIGEN activation code and ACTIV activation code for each component or component region. The calculated activation output, represented in curies per gram, was then applied to the component mass within the defined model boundaries to derive the estimated activity in curies. Regional activation results were weighted to determine average activation concentrations for each multi-regional component. These results were then decay corrected to the desired report dates.

The calculated RV activity, as defined in this report as of March 1, 1998, is estimated at 3.5 million curies. Table 2.1 summarizes the total activity as of March 1, 1998 and August 1, 1999, and summarizes the 10CFR61 burial classification for these components as of March 1, 1998.

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Figure 1.1, Reactor and Internals Cross Section

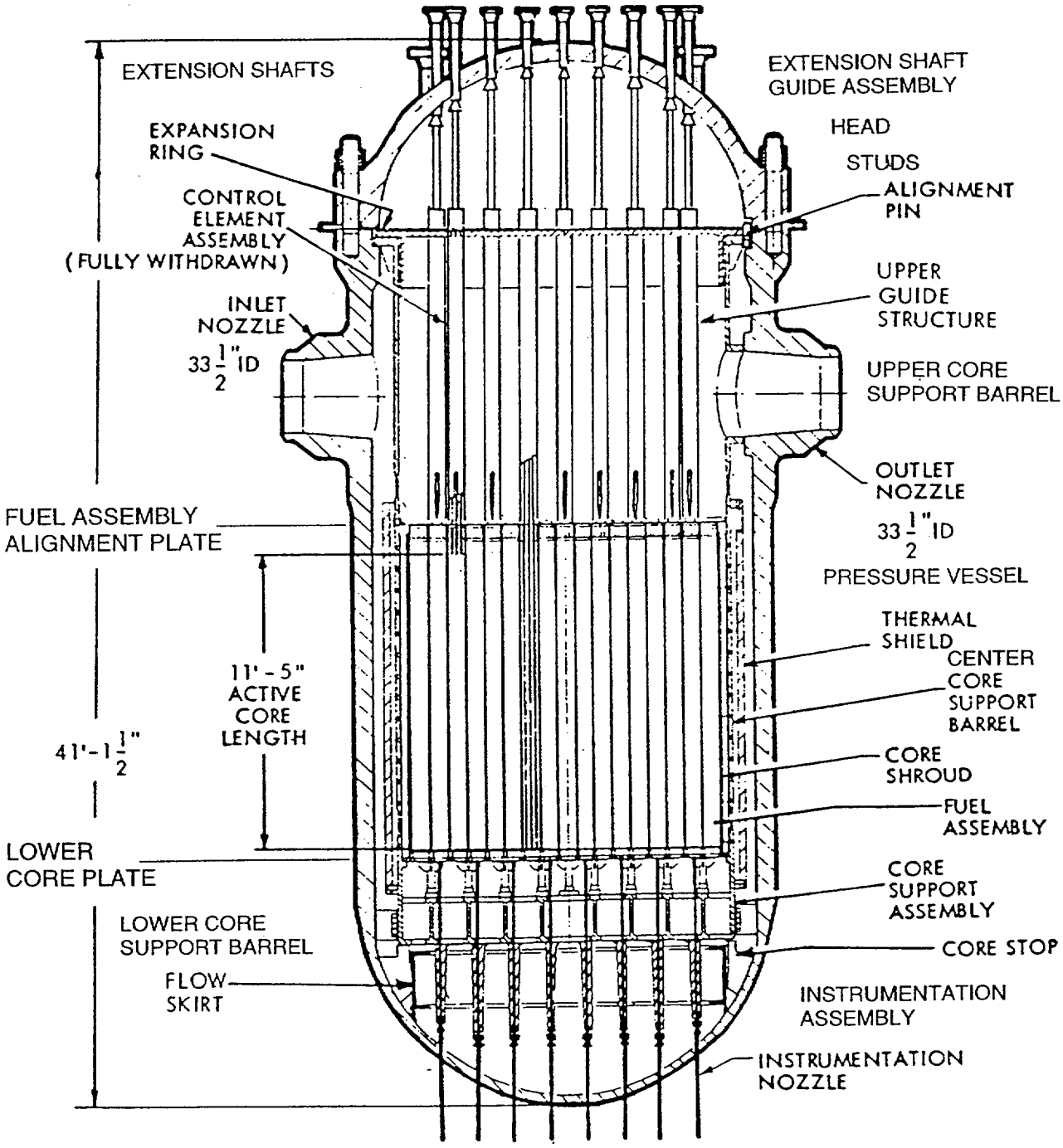

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Table 2.1, Summary of Component Activity and Classification

Maine Yankee Reactor Vessel Activation: Component Classification Summary

ID#	Component Description (Acronym)	Weight (lb)	Volume (ft3)	Activity (Ci) 3/1/98	Activity (Ci) 8/1/99	Class (10CFR61)
	Above Core Region Internals					
1	Extension Shafts (EX)	2,175	4.3	<1	<1	A
2	Extension Shaft Guide Assembly (ESGA)	3,395	6.8	<1	<1	A
3	Expansion Compensating Ring (ECR)	895	1.8	<1	<1	A
4	Upper Guide Structure Assembly (UGSA)	41,798	83.4	<1	<1	A
5	Control Element Shroud Assembly (CESA)	22,612	45.1	2,746	2,102	B
6	Upper Core Support Barrel (UCSB)	55,765	111.3	72,100	55,184	C
	Core Region Internals					
7	Fuel Assembly Alignment Plate (FAAP)	8,717	17.4	18,273	13,965	C
8	Thermal Shield (TS)	64,461	128.7	71,742	55,015	C
9	Center Core Support Barrel (CCSB)	29,282	58.4	355,619	272,188	GTCC
10	Core Shroud (CS)	40,124	80.1	2,698,979	2,059,954	GTCC
11	Lower Core Plate (LCP)	6,751	13.5	130,007	99,504	GTCC
	Below Core Region Internals					
12	Lower Core Support Barrel (LCSB)	20,466	40.9	63,097	48,296	C
13	Lower Support Assembly (LSA)	42,370	84.6	33,665	25,772	C
14	Instrumentation Assembly (IA)	11,588	23.1	5,114	3,915	B
15	Flow Skirt (FS)	5,030	10.0	<1	<1	A
	Reactor Vessel Internals Subtotal:	355,429	709.4	3,451,343	2,635,895	
16	Reactor Vessel Assembly					
a	Pressure Vessel	735,870	1,497.8	4,959	3,590	A
b	Head	158,500	322.6	<1	<1	A
c	Studs	38,900	79.2	<1	<1	A
d	Insulation	8,108	16.2	8	7	A
	Reactor Vessel Assembly Subtotal:	941,378	1,915.8	4,967	3,596	
	Reactor Vessel Total:	1,296,807	2,625.3	3,456,310	2,639,492	C

3. Scope of Work

The Maine Yankee vessel characterization study is an increase in scope to the GTS Duratek, Inc. subcontract #S1012. The scope of work is defined as:

Scope Change Order No. 2, Subcontract No. S1012:

> The scope of work will consist of providing a summary report with the calculated activity per radionuclide for the all vessel subcomponents and classify them in accordance with 10CFR61. The report will also include the transportation calculation for intact vessel removal in accordance with 10CFR71. The calculation modeling is performed with the expansion of the axial DORT model for the inclusion of all axial subcomponents and an additional calculation for vessel classification.
>
> Please note that the incorporation of surface contamination activity is not at this time part of the scope.

4. Activation Analysis

The DORT (Reference 1) neutron transport code, in conjunction with the BUGLE-96 (Reference 2) cross section library, was used to calculate region average neutron flux and spectra for the Maine Yankee RV from the core centerline through the bioshield wall radially and axially from beyond the top and bottom of the reactor vessel. Using the component/region average flux and spectra data and a detailed operating history of the Maine Yankee Plant, region average activities by radionuclide were determined with the ACTIV (Reference 3) and ORIGEN-S (Reference 4) activation analysis codes. Table 4.1 describes each reactor vessel component within the defined regional boundaries and cites the associated reference drawings.

Output from the DORT and input to the ORIGEN codes are illustrated in Figure 4.1 and presented in Table 4.2.

Activation results from the two-dimensional modeling provide detailed profiles both axially and radially for each component. This information is useful to determine segmentation plans, packaging plans and package shielding requirements.

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Table 4.1, Regional Component Description

Maine Yankee Reactor Vessel Activation: Component Description Detail

ID#	Component Description (Acronym)	Quantity	Weight lb	O.D. inch	Height inch	Thick inch	Orig. Dwg #	MY Dwg #
	Above Core Region Internals							
1	Extension Shafts (EX)	65	2,175	1.750	48.000	N/A	4467-162-010	5.20-20/21C
2	Extension Shaft Guide Assembly (ESGA)	45	3,395	10.000	34.000	0.250	Derived (no dwg found)	
3	Expansion Compensating Ring (ECR)	1	895	168.500	2.250	6.250	4467-164-034	5.10-33D
4	Upper Guide Structure Assembly (UGSA)							
4.1	Support Plate (UGSSP)	1	19,189	168.500	4.000	N/A	4467-164-032	5.10-26C
4.2	Skirt (UGSS)	1	6,347	147.250	24.000	2.000	4467-164-032	5.10-26C
4.3	Grid (UGSG)	1	16,262	N/A	24.000	1.500	4467-164-032	5.10-26C
5	Control Element Shroud Assembly (CESA)							
5.1	Single (CESAS)	45	8,455	8.500	132.250	0.438	4467-164-035	5.10-35B
5.2	Dual (CESAD)	20	14,158	9.125	146.000	0.312	4467-164-036	5.10-23B
6	Upper Core Support Barrel (UCSB)	1	55,765	171.000	141.750	2.500	4467-164-014	5.10-27C
	Core Region Internals							
7	Fuel Assembly Alignment Plate (FAAP)	1	8,717	147.000	3.000	N/A	4467-164-033	5.10-21C
8	Thermal Shield (TS)	1	64,461	162.750	152.000	3.000	4467-164-019	5.10-25B
9	Center Core Support Barrel (CCSB)	1	29,282	151.500	121.250	1.750	4467-164-015	5.10-28D
10	Core Shroud (CS)	1	40,124	147.313	152.500	0.750	4467-164-025	5.10-87/89
11	Lower Core Plate (LCP)	1	6,751	146.875	2.000	N/A	4467-164-012	5.10-36C
	Below Core Region Internals							
12	Lower Core Support Barrel (LCSB)	1	20,466	151.500	65.500	2.250	4467-164-016	5.10-24B
13	Lower Support Assembly (LSA)							
13.1	Support Columns, 4-arm	36	2,350	N/A	17.750	N/A	4467-164-017	5.10-29C
13.2	Support Columns, 3-arm	8	427	N/A	17.750	N/A	4467-164-017	5.10-29C
13.3	Support Columns, 2-arm	24	628	N/A	17.750	N/A	4467-164-017	5.10-29C
13.4	Beam	8	13,199	N/A	20.500	2.000	4467-164-012	5.10-36C
13.5	Beam, short	8	2,257	N/A	17.500	2.000	4467-164-012	5.10-36C
13.6	Skirt	1	9,628	146.875	36.500	2.000	4467-164-012	5.10-36C
13.7	Plate	1	12,708	145.000	3.500	N/A	4467-164-012	5.10-36C
13.8	Supports	8	1,173	4.000	31.750	N/A	4467-164-010	5.10-67C
14	Instrumentation Assembly (IA)							
14.1	Guide Tubes (IGT)	45	7,091	3.750	94.500	N/A	4467-164-009	5.10-18C
14.2	Guide Tube Support Plate (IGTSP)	1	4,496	136.688	2.000	N/A	4467-164-008	5.10-69C
15	Flow Skirt (FS)	1	5,030	144.375	30.250	N/A	234-139	5.10-69C
	Reactor Vessel Internals Subtotal:		355,429					
16	Reactor Vessel Assembly							
a	Pressure Vessel	1	735,870	189.250	235.250	8.625	234-111-7	5.10-82B
b	Head	1	158,500	205.000	N/A	7.375	234-111-7	5.10-82B
c	Studs	54	38,900				234-111-7	5.10-82B
d	Insulation	1	8,108	196.250	N/A	3.000	3831-1	4.90-1A
	Reactor Vessel Assembly Subtotal:		941,378					
	Reactor Vessel Total:		1,296,807					

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Figure 4.1, DORT Axial Thermal Neutron Fluence Results

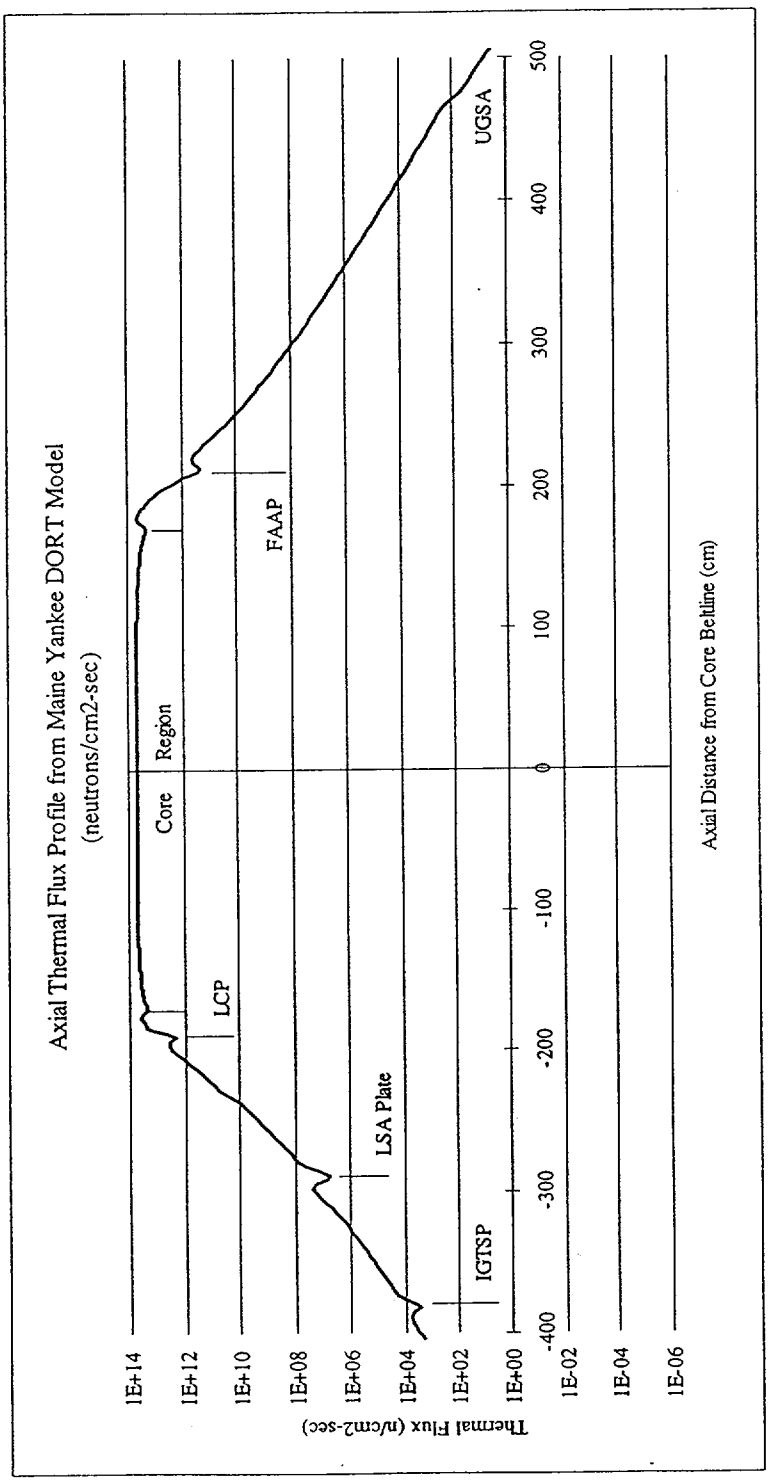

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Table 4.2, DORT Neutron Fluence Output by Region

Region	Components (from vessel bottom)	Zone Volume (cm^2)	Thermal Flux (n/cm^2-s)	Total Flux (n/cm^2-s)	ORIGEN Flux Factors THERM	RES	FAST
2	*IGT*	6.08E+06	5.150E+05	7.065E+05	0.6949	0.0255	0.0031
3	*IGT, IGTSP*	5.71E+05	2.579E+05	7.356E+05	0.6593	0.1261	0.0276
4	*IGT, LSA Supports*	8.16E+06	3.114E+06	5.257E+06	0.6940	0.0301	0.3660
5	*IGT, LSA Plate*	9.73E+05	6.827E+06	5.087E+07	0.6267	0.2885	3.2912
6	*IGT, LSA Beams*	4.97E+06	2.390E+09	5.433E+09	0.6829	0.0527	0.7397
7	*IGT, LSA Columns*	3.88E+06	1.026E+12	1.730E+12	0.6910	0.0339	0.2834
8	*IGT, LCP*	4.76E+05	2.077E+12	1.061E+13	0.6345	0.2113	1.5164
	Core Region						
9	*FAAP*	7.14E+05	2.263E+11	1.106E+12	0.6312	0.1936	1.5727
10	*CESA*	6.73E+06	7.039E+10	1.121E+11	0.6940	0.0285	0.2603
11	*CESA*	1.12E+07	2.399E+07	3.900E+07	0.6985	0.0223	0.4397
12	*CESA*	6.43E+06	3.195E+03	5.476E+03	0.6985	0.0226	0.5601
13	*CESA, UGSG*	5.82E+06	1.087E+01	2.993E+01	0.6809	0.0594	1.2937
14	*CESA, UGSS*	1.46E+06	2.846E+01	1.746E+02	0.6007	0.3535	0.0123
15	*CESA, ESGA*	1.21E+07	4.751E+01	6.621E+01	0.6929	0.0271	0.0006
16	*EX*	9.63E+06	3.366E-01	4.618E-01	0.6955	0.0255	0.0019

5. Classification and Activation Results

Component mass was estimated from referenced drawings within the defined boundary regions. The ORIGEN and ACTIV activation results, represented per radionuclide in curies per gram, was applied to the component mass to derive curies per component. Components within multiple activation regions were weighted to estimate component average activity concentrations before applying mass conversion to yield curies per component. The results given in this section are decayed to the report date of March 1, 1998.

Reactor vessel components are divided into 15 reactor vessel internals and the reactor vessel assembly which includes the vessel, head, studs and insulation.

5.1. Extension Shafts

The 65 Extension Shafts (EX) are comprised of 304 stainless steel. During operation these shafts are located between the ESGA and reactor vessel head. The activated metal portion of the EX is considered to be within the lower 48 inches. The activated portion of the EX has an average

concentration of 6.462E-15 Ci/g, weighs 2,175 lb, contains 6.38 nCi and is Class A. Table 5.1 presents the per radionuclide concentration, activity and classification.

5.2. Extension Shaft Guide Assembly

The Extension Shaft Guide Assembly (ESGA) is comprised of forty-five 304 stainless steel flanged tubes located between the UGSSP and EX. The ESGA has an average concentration of 9.117E-13 Ci/g, weighs 3,395 lb, contains 1.41 uCi and is Class A. Table 5.2 presents the per radionuclide concentration, activity and classification.

5.3. Expansion Compensating Ring

The Expansion Compensating Ring (ECR) is comprised of 304 stainless steel and is located between the UGSSP and reactor vessel head flange. The ECR has an average concentration of 6.454E-13 Ci/g, weighs 895 lb, contains 0.26 uCi and is Class A. Table 5.3 presents the per radionuclide concentration, activity and classification.

5.4. Upper Guide Structure Assembly

The Upper Guide Structure Assembly (UGSA) is comprised of 304 stainless steel and is located beneath the EX. The UGSA is made up of a support plate and lower grid/skirt. The UGSA has an average concentration of 3.743E-13 Ci/g, weighs 41,798 lb, contains 7.10 uCi and is Class A. Table 5.4 presents the per radionuclide concentration, activity and classification.

5.5. Control Element Shroud Assembly

The Control Element Shroud Assembly (CESA) is comprised of 304 stainless steel and is located between the UGSA and FAAP. The CESA is made up of 45 single and 20 dual control element shroud tubes. The CESA has an average concentration of 2.675E-04 Ci/g, weighs 22,612 lb, contains 2,746 Ci and is Class B. Table 5.5 presents the per radionuclide concentration, activity and classification.

5.6. Upper Core Support Barrel

The Upper Core Support Barrel (UCSB) is comprised of 304 stainless steel and is located between the UGSA and CCSB extending beneath the FAAP. The UCSB is the upper section of the core support barrel and contains the hot leg nozzle flanges. The UCSB has an average

concentration of 2.848E-03 Ci/g, weighs 55,765 lb, contains 72,100 Ci and is Class C. Table 5.6 presents the per radionuclide concentration, activity and classification.

5.7. Fuel Assembly Alignment Plate

The Fuel Assembly Alignment Plate (FAAP) is comprised of 304 stainless steel and is located between the CESA and core region. The FAAP has an average concentration of 4.617E-03 Ci/g, weighs 8,717 lb, contains 18,273 Ci and is Class C. Table 5.7 presents the per radionuclide concentration, activity and classification.

5.8. Thermal Shield

The Thermal Shield (TS) is comprised of 304 stainless steel and is located between the CSB and vessel wall. The TS has an average concentration of 2.451E-03 Ci/g, weighs 64,461 lb, contains 71,742 Ci and is Class C. Table 5.8 presents the per radionuclide concentration, activity and classification.

5.9. Center Core Support Barrel

The Center Core Support Barrel (CCSB) is comprised of 304 stainless steel and is located radially between the CS and TS, and axially between the UCSB and LCSB. The axial boundaries are defined by the circumfrential welds which are 121.25 inches apart. The CCSB has an average concentration of 2.675E-02 Ci/g, weighs 29,282 lb, contains 355,619 Ci and is GTCC. Table 5.9 presents the per radionuclide concentration, activity and classification.

5.10. Core Shroud

The Core Shroud (CS) is comprised of 304 stainless steel and is located between the core region and CCSB. The CS has an average concentration of 1.482E-01 Ci/g, weighs 40,124 lb, contains 2,698,979 Ci and is GTCC. This component contains the majority of RV activity. Table 5.10 presents the per radionuclide concentration, activity and classification.

5.11. Lower Core Plate

The Lower Core Plate (LCP) is comprised of 304 stainless steel and is located between the core region and LSA. The LCP has an average concentration of 4.242E-02 Ci/g, weighs 6,751 lb,

contains 130,007 Ci and is GTCC. Table 5.11 presents the per radionuclide concentration, activity and classification.

5.12. Lower Core Support Barrel

The Lower Core Support Barrel (LCSB) is comprised of 304 stainless steel and is located between the CCSB and FS. The LCSB has an average concentration of 6.791E-03 Ci/g, weighs 20,466 lb, contains 63,097 Ci and is Class C. Table 5.12 presents the per radionuclide concentration, activity and classification.

5.13. Lower Support Assembly

The Lower Support Assembly (LSA) is comprised of 304 stainless steel and is located between the LCP and LCSB flange. The LSA has an average concentration of 1.750E-03 Ci/g, weighs 42,370 lb, contains 33,665 Ci and is Class C. Table 5.13 presents the per radionuclide concentration, activity and classification.

5.14. Instrumentation Assembly

The Instrumentation Assembly (IA) is comprised of 304 stainless steel and is located beneath the LCP. The IA has an average concentration of 9.721E-04 Ci/g, weighs 11,588 lb, contains 5,114 Ci and is Class B. Table 5.14 presents the per radionuclide concentration, activity and classification.

5.15. Flow Skirt

The Flow Skirt (FS) is comprised of 304 stainless steel and pieces of inconel and is located beneath the LCSB. The FS is welded to the reactor vessel bowl. The FS has an average concentration of 6.082E-08 Ci/g, weighs 5,030 lb, contains 0.14 Ci. Table 5.15 presents the per radionuclide concentration, activity and classification.

5.16. Reactor Vessel Assembly

The Reactor Vessel (RV) Assembly is comprised of a pressure vessel, head, studs and surrounding insulation. The RV assembly has been characterized by each component.

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5.16.a. Pressure Vessel

The Pressure Vessel is comprised of carbon steel with a 5/16 inch thick 304 stainless steel clad. The majority of activity is within the cylindrical region between the FAAP and LCP. Overall the pressure vessel has an average concentration of 1.484E-05 Ci/g, weighs 735,870 lb, contains 4,959 Ci and is Class A. Table 5.16.a presents the per radionuclide concentration, activity and classification.

5.16.b. Head

The Head is comprised of carbon steel with a 5/16 inch thick 304 stainless steel clad and is located above the pressure vessel. The head has an average concentration of 7.990E-13 Ci/g, weighs 158,500 lb, contains 57.5 uCi and is Class C. Table 5.16.b presents the per radionuclide concentration, activity and classification.

5.16.c. Studs

The 54 Studs are comprised of carbon steel and are located within the pressure vessel and head flanges. The studs are slightly activated in the lower portion, conservatively assuming that they've all been in service throughout power operations. The studs have an average concentration of 7.681E-13 Ci/g, weigh 38,900 lb, contain 13.6 uCi and are Class A. Table 5.16.c presents the per radionuclide concentration, activity and classification.

5.16.d. Insulation

The Insulation is comprised mainly of stainless steel foil and surrounds the RV. The majority of activity is within the cylindrical region between the FAAP and LCP. The insulation has an average concentration of 2.301E-06 Ci/g, the activated stainless steel weighs 8,108 lb, contains 8.47 Ci and is Class A. Table 5.16.d presents the per radionuclide concentration, activity and classification.

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Table 5.1, Extension Shafts Classification

Extension Shafts

	Weight (lb):	2.18E+03	Classification				
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	2.991E-18	2.95E-12					
C14	5.574E-19	5.50E-13	5.57E-13			5.57E-14	
Mn54	4.537E-20	4.48E-14					
Fe55	3.548E-15	3.50E-09					
Co58	4.219E-21	4.17E-15					
Co60	2.425E-15	2.39E-09					
Ni59	4.289E-18	4.24E-12	1.56E-12			1.56E-13	
Ni63	4.811E-16	4.75E-10		1.10E-10	5.50E-12		5.50E-13
Nb94	3.645E-21	3.60E-15	1.46E-12			1.46E-13	
Tc99	3.250E-23	3.21E-17	8.67E-16			8.67E-17	
Total:	6.462E-15	6.38E-09	3.58E-12	1.10E-10	5.50E-12	3.58E-13	5.50E-13
Class:			A	A			

Table 5.2, Extension Shaft Guide Assembly Classification

Extension Shaft Guide Assembly

	Weight (lb):	3.40E+03	Classification				
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	4.210E-16	6.49E-10					
C14	7.844E-17	1.21E-10	7.84E-11			7.84E-12	
Mn54	8.247E-18	1.27E-11					
Fe55	4.995E-13	7.70E-07					
Co58	6.950E-19	1.07E-12					
Co60	3.434E-13	5.29E-07					
Ni59	6.038E-16	9.31E-10	2.20E-10			2.20E-11	
Ni63	6.771E-14	1.04E-07		1.55E-08	7.74E-10		7.74E-11
Nb94	5.246E-19	8.09E-13	2.10E-10			2.10E-11	
Tc99	4.750E-21	7.32E-15	1.27E-13			1.27E-14	
Total:	9.117E-13	1.41E-06	5.08E-10	1.55E-08	7.74E-10	5.08E-11	7.74E-11
Class:			A	A			

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Table 5.3, Expansion Compensating Ring Classification

Expansion Compensating Ring

	Weight (lb):	8.95E+02			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	2.415E-16	9.81E-11					
C14	4.503E-17	1.83E-11	4.50E-11			4.50E-12	
Mn54	9.738E-17	3.96E-11					
Fe55	2.964E-13	1.20E-07					
Co58	8.366E-18	3.40E-12					
Co60	3.099E-13	1.26E-07					
Ni59	3.494E-16	1.42E-10	1.27E-10			1.27E-11	
Ni63	3.832E-14	1.56E-08		8.76E-09	4.38E-10		4.38E-11
Nb94	1.092E-18	4.44E-13	4.37E-10			4.37E-11	
Tc99	2.500E-20	1.02E-14	6.67E-13			6.67E-14	
Total:	6.454E-13	2.62E-07	6.10E-10	8.76E-09	4.38E-10	6.10E-11	4.38E-11
Class:			A	A			

Table 5.4, Upper Guide Structure Assembly Classification

Upper Guide Structure Assembly

	Weight (lb):	4.18E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	1.605E-16	3.05E-09					
C14	2.677E-17	5.08E-10	2.68E-11			2.68E-12	
Mn54	4.591E-15	8.71E-08					
Fe55	1.917E-13	3.64E-06					
Co58	3.990E-16	7.57E-09					
Co60	1.545E-13	2.93E-06					
Ni59	2.049E-16	3.89E-09	7.45E-11			7.45E-12	
Ni63	2.269E-14	4.31E-07		5.19E-09	2.59E-10		2.59E-11
Nb94	4.422E-19	8.39E-12	1.77E-10			1.77E-11	
Tc99	9.293E-21	1.76E-13	2.48E-13			2.48E-14	
Total:	3.743E-13	7.10E-06	2.78E-10	5.19E-09	2.59E-10	2.78E-11	2.59E-11
Class:			A	A			

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Table 5.5, Control Element Shroud Assembly Classification

Control Element Shroud Assembly

	Weight (lb):	2.26E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	1.267E-07	1.30E+00					
C14	2.310E-08	2.37E-01	2.31E-02			2.31E-03	
Mn54	7.888E-07	8.10E+00					
Fe55	1.468E-04	1.51E+03					
Co58	7.862E-08	8.07E-01					
Co60	9.972E-05	1.02E+03					
Ni59	1.768E-07	1.81E+00	6.43E-02			6.43E-03	
Ni63	1.983E-05	2.04E+02		4.53E+00	2.27E-01		2.27E-02
Nb94	1.491E-10	1.53E-03	5.96E-02			5.96E-03	
Tc99	1.439E-12	1.48E-05	3.84E-05			3.84E-06	
Total:	2.675E-04	2.75E+03	1.47E-01	4.53E+00	2.27E-01	1.47E-02	2.27E-02
Class:					B		

Table 5.6, Upper Core Support Barrel Classification

Upper Core Support Barrel

	Weight (lb):	5.58E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	1.339E-06	3.39E+01					
C14	2.390E-07	6.05E+00	2.39E-01			2.39E-02	
Mn54	1.925E-05	4.87E+02					
Fe55	1.505E-03	3.81E+04					
Co58	1.980E-06	5.01E+01					
Co60	1.118E-03	2.83E+04					
Ni59	1.799E-06	4.55E+01	6.54E-01			6.54E-02	
Ni63	2.001E-04	5.07E+03		4.57E+01	2.29E+00		2.29E-01
Nb94	2.355E-09	5.96E-02	9.42E-01			9.42E-02	
Tc99	4.454E-11	1.13E-03	1.19E-03			1.19E-04	
Total:	2.848E-03	7.21E+04	1.84E+00	4.57E+01	2.29E+00	1.84E-01	2.29E-01
Class:						C	C

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Table 5.7, Fuel Assembly Alignment Plate Classification

Fuel Assembly Alignment Plate

	Weight (lb):	8.72E+03			Classification		
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	2.084E-06	8.25E+00					
C14	3.698E-07	1.46E+00	3.70E-01			3.70E-02	
Mn54	5.894E-05	2.33E+02					
Fe55	2.334E-03	9.24E+03					
Co58	5.996E-06	2.37E+01					
Co60	1.908E-03	7.55E+03					
Ni59	2.752E-06	1.09E+01	1.00E+00			1.00E-01	
Ni63	3.052E-04	1.21E+03		6.98E+01	3.49E+00		3.49E-01
Nb94	4.828E-09	1.91E-02	1.93E+00			1.93E-01	
Tc99	1.110E-10	4.39E-04	2.96E-03			2.96E-04	
Total:	4.617E-03	1.83E+04	3.30E+00	6.98E+01	3.49E+00	3.30E-01	3.49E-01
Class:						C	C

Table 5.8, Thermal Shield Classification

Thermal Shield

	Weight (lb):	6.45E+04			Classification		
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	1.042E-06	3.05E+01					
C14	1.925E-07	5.63E+00	1.93E-01			1.93E-02	
Mn54	2.809E-05	8.22E+02					
Fe55	1.198E-03	3.51E+04					
Co58	2.914E-06	8.53E+01					
Co60	1.064E-03	3.11E+04					
Ni59	1.411E-06	4.13E+01	5.13E-01			5.13E-02	
Ni63	1.558E-04	4.56E+03		3.56E+01	1.78E+00		1.78E-01
Nb94	3.115E-09	9.12E-02	1.25E+00			1.25E-01	
Tc99	8.240E-11	2.41E-03	2.20E-03			2.20E-04	
Total:	2.451E-03	7.17E+04	1.95E+00	3.56E+01	1.78E+00	1.95E-01	1.78E-01
Class:						C	C

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Table 5.9, Center Core Support Barrel Classification

Center Core Support Barrel

	Weight (lb):	2.93E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	1.258E-05	1.67E+02					
C14	2.245E-06	2.98E+01	2.25E+00			2.25E-01	
Mn54	1.800E-04	2.39E+03					
Fe55	1.414E-02	1.88E+05					
Co58	1.852E-05	2.46E+02					
Co60	1.050E-02	1.40E+05					
Ni59	1.690E-05	2.25E+02	6.15E+00			6.15E-01	
Ni63	1.880E-03	2.50E+04		4.30E+02	2.15E+01		2.15E+00
Nb94	2.212E-08	2.94E-01	8.85E+00			8.85E-01	
Tc99	4.180E-10	5.56E-03	1.11E-02			1.11E-03	
Total:	2.675E-02	3.56E+05	1.72E+01	4.30E+02	2.15E+01	1.72E+00	2.15E+00
Class:						GTCC	GTCC

Table 5.10, Core Shroud Classification

Core Shroud

	Weight (lb):	4.01E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	3.669E-05	6.68E+02					
C14	1.210E-05	2.20E+02	1.21E+01			1.21E+00	
Mn54	2.000E-03	3.64E+04					
Fe55	7.525E-02	1.37E+06					
Co58	2.066E-04	3.76E+03					
Co60	6.096E-02	1.11E+06					
Ni59	8.829E-05	1.61E+03	3.21E+01			3.21E+00	
Ni63	9.609E-03	1.75E+05		2.20E+03	1.10E+02		1.10E+01
Nb94	2.058E-07	3.75E+00	8.23E+01			8.23E+00	
Tc99	4.750E-09	8.65E-02	1.27E-01			1.27E-02	
Total:	1.482E-01	2.70E+06	1.27E+02	2.20E+03	1.10E+02	1.27E+01	1.10E+01
Class:						GTCC	GTCC

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Table 5.11, Lower Core Plate Classification

Lower Core Plate

	Weight (lb):	6.75E+03			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	1.809E-05	5.54E+01					
C14	3.428E-06	1.05E+01	3.43E+00			3.43E-01	
Mn54	4.417E-04	1.35E+03					
Fe55	2.153E-02	6.60E+04					
Co58	4.550E-05	1.39E+02					
Co60	1.754E-02	5.38E+04					
Ni59	2.548E-05	7.81E+01	9.27E+00			9.27E-01	
Ni63	2.813E-03	8.62E+03		6.43E+02	3.21E+01		3.21E+00
Nb94	4.683E-08	1.44E-01	1.87E+01			1.87E+00	
Tc99	1.080E-09	3.31E-03	2.88E-02			2.88E-03	
Total:	4.242E-02	1.30E+05	3.15E+01	6.43E+02	3.21E+01	3.15E+00	3.21E+00
Class:						GTCC	GTCC

Table 5.12, Lower Core Support Barrel Classification

Lower Core Support Barrel

	Weight (lb):	2.05E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	3.187E-06	2.96E+01					
C14	5.691E-07	5.29E+00	5.69E-01			5.69E-02	
Mn54	4.615E-05	4.29E+02					
Fe55	3.584E-03	3.33E+04					
Co58	4.750E-06	4.41E+01					
Co60	2.671E-03	2.48E+04					
Ni59	4.283E-06	3.98E+01	1.56E+00			1.56E-01	
Ni63	4.763E-04	4.43E+03		1.09E+02	5.44E+00		5.44E-01
Nb94	5.678E-09	5.28E-02	2.27E+00			2.27E-01	
Tc99	1.086E-10	1.01E-03	2.90E-03			2.90E-04	
Total:	6.791E-03	6.31E+04	4.40E+00	1.09E+02	5.44E+00	4.40E-01	5.44E-01
Class:						C	C

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Table 5.13, Lower Support Assembly Classification

Lower Support Assembly

	Weight (lb):	4.24E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	8.610E-07	1.66E+01					
C14	1.508E-07	2.90E+00	1.51E-01			1.51E-02	
Mn54	5.690E-06	1.09E+02					
Fe55	9.572E-04	1.84E+04					
Co58	5.746E-07	1.11E+01					
Co60	6.557E-04	1.26E+04					
Ni59	1.151E-06	2.21E+01	4.19E-01			4.19E-02	
Ni63	1.288E-04	2.48E+03		2.94E+01	1.47E+00		1.47E-01
Nb94	1.062E-09	2.04E-02	4.25E-01			4.25E-02	
Tc99	1.256E-11	2.42E-04	3.35E-04			3.35E-05	
Total:	1.750E-03	3.37E+04	9.94E-01	2.94E+01	1.47E+00	9.94E-02	1.47E-01
Class:						C	C

Table 5.14, Instrumentation Assembly Classification

Instrumentation Assembly

	Weight (lb):	1.16E+04			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	4.817E-07	2.53E+00					
C14	8.411E-08	4.43E-01	8.41E-02			8.41E-03	
Mn54	2.737E-06	1.44E+01					
Fe55	5.342E-04	2.81E+03					
Co58	2.756E-07	1.45E+00					
Co60	3.617E-04	1.90E+03					
Ni59	6.431E-07	3.38E+00	2.34E-01			2.34E-02	
Ni63	7.198E-05	3.79E+02		1.65E+01	8.23E-01		8.23E-02
Nb94	5.616E-10	2.95E-03	2.25E-01			2.25E-02	
Tc99	5.849E-12	3.08E-05	1.56E-04			1.56E-05	
Total:	9.721E-04	5.11E+03	5.43E-01	1.65E+01	8.23E-01	5.43E-02	8.23E-02
Class:					B		

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Table 5.15, Flow Skirt Classification

Flow Skirt

	Weight (lb):	5.03E+03			Classification		
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	2.880E-11	6.58E-05					
C14	5.185E-12	1.18E-05	5.19E-06			5.19E-07	
Mn54	3.976E-10	9.08E-04					
Fe55	3.342E-08	7.63E-02					
Co58	3.794E-11	8.66E-05					
Co60	2.245E-08	5.13E-02					
Ni59	3.963E-11	9.05E-05	1.44E-05			1.44E-06	
Ni63	4.445E-09	1.02E-02		1.02E-03	5.08E-05		5.08E-06
Nb94	3.373E-14	7.70E-08	1.35E-05			1.35E-06	
Tc99	3.340E-16	7.63E-10	8.91E-09			8.91E-10	
Total:	6.082E-08	1.39E-01	3.31E-05	1.02E-03	5.08E-05	3.31E-06	5.08E-06
Class:			A	A			

Table 5.16.a, Pressure Vessel Classification

Pressure Vessel

	Weight (lb):	7.36E+05			Classification		
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	1.275E-08	4.26E+00					
C14	7.043E-10	2.35E-01	7.04E-04			7.04E-05	
Mn54	2.845E-07	9.50E+01					
Fe55	1.109E-05	3.70E+03					
Co58	3.924E-09	1.31E+00					
Co60	2.953E-06	9.86E+02					
Ni59	4.431E-09	1.48E+00	1.61E-03			1.61E-04	
Ni63	4.942E-07	1.65E+02		1.13E-01	5.65E-03		5.65E-04
Nb94	9.408E-12	3.14E-03	3.76E-03			3.76E-04	
Tc99	2.224E-12	7.43E-04	5.93E-05			5.93E-06	
Total:	1.484E-05	4.96E+03	6.14E-03	1.13E-01	5.65E-03	6.14E-04	5.65E-04
Class:			A	A			

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Table 5.16.b, Reactor Vessel Head Classification

Reactor Vessel Head

	Weight (lb):	1.59E+05			Classification		
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	5.107E-16	3.68E-08					
C14	1.394E-17	1.00E-09	1.39E-11			1.39E-12	
Mn54	1.565E-15	1.13E-07					
Fe55	6.723E-13	4.84E-05					
Co58	8.039E-18	5.79E-10					
Co60	1.193E-13	8.58E-06					
Ni59	5.385E-17	3.87E-09	1.96E-11			1.96E-12	
Ni63	5.327E-15	3.83E-07		1.22E-09	6.09E-11		6.09E-12
Nb94	2.294E-18	1.65E-10	9.18E-10			9.18E-11	
Tc99	1.073E-18	7.72E-11	2.86E-11			2.86E-12	
Total:	7.990E-13	5.75E-05	9.80E-10	1.22E-09	6.09E-11	9.80E-11	6.09E-12
Class:			A	A			

Table 5.16.c, Reactor Vessel Studs Classification

Reactor Vessel Studs

	Weight (lb):	3.89E+04			Classification		
Nuclide	Ci/g	Ci	Table 1 A Fraction	Table 2 A Fraction	Table 2 B Fraction	Table 1 C Fraction	Table 2 C Fraction
H3	5.022E-16	8.87E-09					
C14	1.023E-17	1.81E-10	1.02E-11			1.02E-12	
Mn54	1.606E-15	2.84E-08					
Fe55	6.634E-13	1.17E-05					
Co58	8.238E-18	1.45E-10					
Co60	1.006E-13	1.78E-06					
Ni59	2.380E-17	4.20E-10	8.65E-12			8.65E-13	
Ni63	1.970E-15	3.48E-08		4.50E-10	2.25E-11		2.25E-12
Nb94	2.295E-18	4.05E-11	9.18E-10			9.18E-11	
Tc99	1.100E-18	1.94E-11	2.93E-11			2.93E-12	
Total:	7.681E-13	1.36E-05	9.66E-10	4.50E-10	2.25E-11	9.66E-11	2.25E-12
Class:			A	A			

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Table 5.16.d, Reactor Vessel Insulation Classification

Reactor Vessel Insulation

	Weight (lb):	8.11E+03			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	5.750E-10	2.12E-03					
C14	1.385E-10	5.10E-04	1.38E-04			1.38E-05	
Mn54	1.544E-08	5.68E-02					
Fe55	8.213E-07	3.02E+00					
Co58	1.724E-09	6.35E-03					
Co60	1.375E-06	5.06E+00					
Ni59	8.823E-10	3.25E-03	3.21E-04			3.21E-05	
Ni63	8.659E-08	3.19E-01		1.98E-02	9.90E-04		9.90E-05
Nb94	9.113E-12	3.35E-05	3.65E-03			3.65E-04	
Tc99	4.490E-13	1.65E-06	1.20E-05			1.20E-06	
Total:	2.301E-06	8.47E+00	4.12E-03	1.98E-02	9.90E-04	4.12E-04	9.90E-05
Class:			A	A			

6. Intact Reactor Vessel 10CFR61 Classification

The intact RV is comprised of the reactor vessel assembly and all reactor vessel internals. Utilities that are currently involved in decommissioning are considering intact RV disposal as a cost effective and ALARA option over segmentation. It is assumed that classification for the intact RV is accomplished by comparing the average activity concentration to the concentration limits prescribed in 10CFR61.55, Tables 1 & 2. This methodology, as it applies to concentration averaging significant quantities of GTCC metal, is currently under investigation by the US NRC and has not yet been approved for any commercial facility. In addition, the regulatory authority for the disposal site would need to approve this methodology.

The intact RV classification described above is presented in Table 6.1, "Intact Reactor Vessel Classification."

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Table 6.1, Intact Reactor Vessel Classification

Reactor Vessel Assembly with Internals

	Weight (lb):	1.30E+06			Classification		
			Table 1	Table 2	Table 2	Table 1	Table 2
Nuclide	Ci/g	Ci	A Fraction	A Fraction	B Fraction	C Fraction	C Fraction
H3	1.729E-06	1.02E+03					
C14	4.807E-07	2.83E+02	4.81E-01			4.81E-02	
Mn54	7.198E-05	4.24E+04					
Fe55	3.001E-03	1.77E+06					
Co58	7.418E-06	4.37E+03					
Co60	2.399E-03	1.41E+06					
Ni59	3.529E-06	2.08E+03	1.28E+00			1.28E-01	
Ni63	3.858E-04	2.27E+05		8.82E+01	4.41E+00		4.41E-01
Nb94	7.537E-09	4.44E+00	3.01E+00			3.01E-01	
Tc99	1.723E-10	1.01E-01	4.59E-03			4.59E-04	
Total:	5.871E-03	3.46E+06	4.78E+00	8.82E+01	4.41E+00	4.78E-01	4.41E-01
Class:						C	C

7. Intact Reactor Vessel 10CFR71 Determination

The intact RV is comprised of the reactor vessel assembly and all reactor vessel internals. At the present time, decommissioning nuclear power facilities are considering intact RV disposal as a cost effective and ALARA option over segmentation. To dispose of the intact RV it will become necessary to gain transportation certification for the package. It is assumed that transportation determination for the intact RV is accomplished by comparing the total activity to the limits prescribed in 10CFR71 and 49CFR (DOT). This methodology, as it applies to shipping significant quantities of GTCC metal, is currently under investigation by the US NRC and has not yet been approved for any commercial facility. In addition, the regulatory authority for the disposal site would need to approve this methodology.

The intact RV transportation determination described above is presented in Table 7.1, "Intact Reactor Vessel Transportation Determination."

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Table 7.1, Intact Reactor Vessel Transportation Determination

MY Intact Reactor Vessel 10CFR71 Determination
Fractions

Nuclide	Type A Limit 49CFR173.435 A_2 Value (Ci)	Type (Ci) / (A_2)	LSA II (Ci/g) / (A_2x1E-4)	LSA III (Ci/g) / (A_2x2E-3)
H3	1.08E+03	9.43E-01	1.60E-05	8.00E-07
C14	5.41E+01	5.23E+00	8.89E-05	4.44E-06
Mn54	2.70E+01	1.57E+03	2.67E-02	1.33E-03
Fe55	1.08E+03	1.64E+03	2.78E-02	1.39E-03
Co58	2.70E+01	1.62E+02	2.75E-03	1.37E-04
Co60	1.08E+01	1.31E+05	2.22E+00	1.11E-01
Ni59	1.08E+03	1.92E+00	3.27E-05	1.63E-06
Ni63	8.11E+02	2.80E+02	4.76E-03	2.38E-04
Nb94	1.62E+01	2.74E-01	4.65E-06	2.33E-07
Tc99	2.43E+01	4.17E-03	7.09E-08	3.54E-09
Total:		1.34E+05	2.28E+00	1.14E-01
Determination:		B	No	Yes*

*Intact Vessel meets LSA III only if unshielded vessel is less than 1 rem/hr @ 3 meters.

8. Conclusion

The Maine Yankee reactor vessel has been characterized under the scope of work in GTS Duratek subcontract #S1012-2.

The classification tables for each subcomponent's calculated activation activity provided in this report can be used in conjunction with vessel validation and the addition of surface contamination activity for the purpose of manifesting for disposal.

9. References

1) "DORT Two-Dimensional Discrete Ordinates Transport Code,," Oak Ridge National Library (ORNL), November, 1989.

2) "BUGLE-96 Coupled 47 Neutron 20 Gamma-Ray Group Cross Section Library Derived from ENDF/B-VI for LWR Shielding and Pressure Vessel Dosimetry Applications," RSIC Data Library Collection, March, 1996.

3) "Release Version 1 of the ACTIV Code," UMass-Lowell Project No: 05-07741, J. R. White, June, 1997.

4) NUREG/CR-0200, "ORIGEN-S: Scale System Module to Calculate Fuel Depletion, Actinide Transmutation, Fission Product Buildup and Decay, and Associated Radiation Source Terms," O. W. Hermann and R. M. Westfall, September, 1995.

5) NUREG/CR-3474, "Long-Lived Activation Products in Reactor Materials," J. C. Evans et, al., August, 1984.

6) "Summary Results for the JPDR Activation Analysis Benchmark Using Vitamin-B6 and BUGLE-96 Data," J. R. White, UMass-Lowell, July, 1997.

7) Calculation MYC-1666, "Refined DORT Model and Dosimetry Comparisons," Yankee Atomic Electric Company, March 1, 1996

8) Calculation MYC-2032, "Maine Yankee Activation Analysis," Duke Engineering & Services, Bolton, MA, April 3, 1998

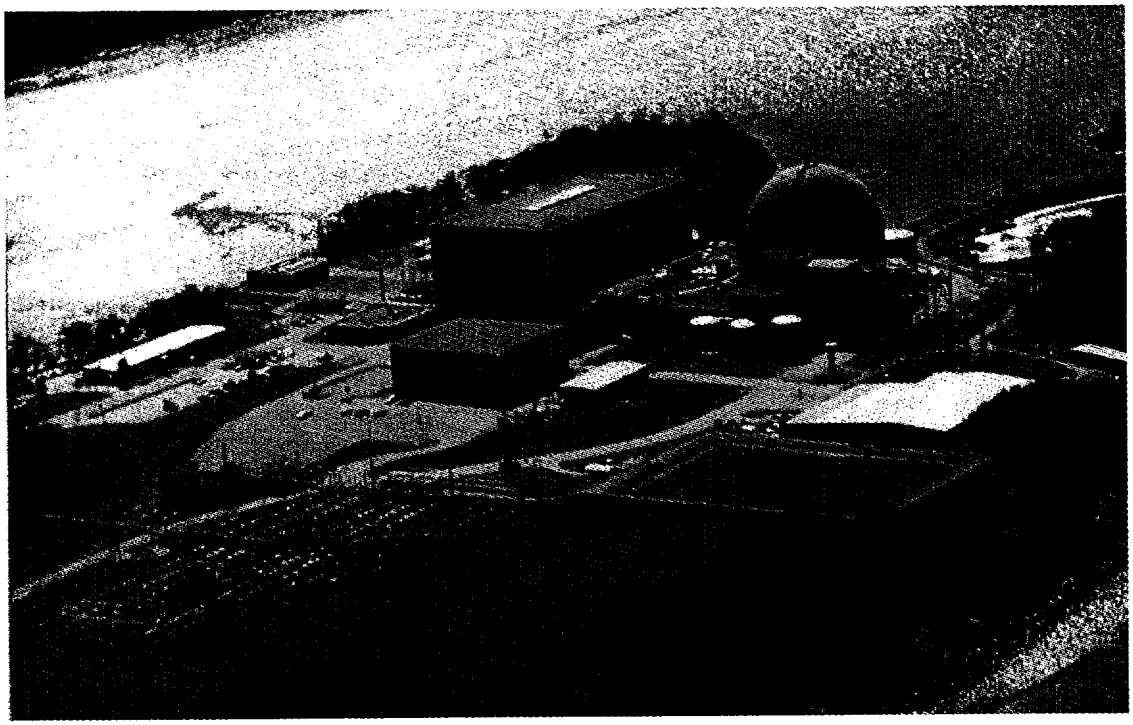
9) Calculation MYC-2038, "Maine Yankee Activation Analysis for the Upper and Lower Vessel Regions," Duke Engineering & Services, Bolton, MA, May 21, 1998

10) Calculation MYC-2037, "MY RV Classification," Duke Engineering & Services, Bolton, MA, May 22, 1998

DURATEK

CHARACTERIZATION SURVEY REPORT
for the
MAINE YANKEE ATOMIC POWER PLANT

VOLUME 9
ASBESTOS QUANTITY SURVEY



APRIL 1998
REVISION 0

Prepared By:

Team Associates
5935 Buford Highway, Suite 200
Norcross, GA 30071

GTS DURATEK

CHARACTERIZATION SURVEY REPORT

for the

MAINE YANKEE ATOMIC POWER PLANT

APRIL 1998

REVISION 0

VOLUME 9: ASBESTOS QUANTITY SURVEY

Prepared by: GTS Duratek, Inc. Date 4-28-98

Reviewed by: Signature on File Date 4-28-98
Dave Lovett
Project Manager

Reviewed by: Date 4-28-98
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Manager, RE&DS Technical Department

Approved by: Harvey F. Story Date 4-28-98
Harvey F. Story
Director, Radiological Engineering
and Decommissioning Services

ASBESTOS QUANTITY SURVEY

SUMMARY

COMPUTER TAKE - OFF DATA

FOR

MAINE YANKEE NUCLEAR POWER PLANT

BY

GTS / DURATEK

DECEMBER 22, 1997

PERFORMED BY

TEAM ASSOCIATES
5935 BUFORD HIGHWAY, SUITE 200
NORCROSS, GEORGIA 30071

ASBESTOS QUANTITY SURVEY

SUMMARY
COMPUTER TAKE - OFF DATA

INDEX

ENCLOSURES

1- *COMPUTER DISK WITH CALCULATION / DATA PROGRAM FOR ASBESTOS QUANTITY SURVEY*

1- *COMPUTER DISK WITH ALL NARRATIVE PAGES , FORMATTING , AND WASTE CONTAINERS CALCULATIONS*

EXECUTIVE SUMMARY

The asbestos survey of Maine Yankee Nuclear Power Plant consists of walkdown data gathered by Dennis Pryor (Team Associates & GTS / Duratek) and Al Burnham (Maine Yankee), and computer data / summary data. The walkdowns were conducted in order to obtain information as to the approximate quantities (by areas) and types of asbestos containing material (ACM) present at Maine Yankee as an addition to the characterization study being performed before decommissioning activities start. During these walkdowns other hazardous materials were noted as to their existance and location (area) but not their specific quantity. Attached in Table 1 is the summary of the asbestos survey. A subsequent table shows the areas in the plant of the other hazardous material present.

A field walkdown data manual is included and is an audit trail from the actual walkdown notes to the color coded drawings (available as backup to this report) to the computer data entry which finally is accumulated into the summary in Table 1. The methodology used to determine the existance and the quantities of the ACM and other hazardous materials is explained in the methodology section of the computer take-off data manual.

The summary table represents the best approximation of the quantities of asbestos still remaining to be abated at Maine Yankee using only visual walk throughs, knowledable personnel, and historical data. However, there are still suspect areas of asbestos and other hazardous material that only sampling and analysis can confirm as being present that this summary can not address. The bulk of the asbestos in the Maine Yankee Nuclear Power Plant is addressed in this report.

TABLE 1

ASBESTOS QUANTITY SURVEY
(In Situ Quantities)
SUMMARY REPORT
GTS / DURATEK
MAINE YANKEE

Area	*DESCRIPTION*	QUANTITY (In CUBIC FEET)														
		Pipe Insulation	Pipe Fitting Insulation	Pipe Gaskets	Floor Tile	Ceiling Tile	Wall Transite	Wall Cemestos	HVAC - Duct Insulation		Equipment Insulation	Vessels & Tanks Insultion	Ropes	Electrical Cables	Other ACM	TOTAL
									Exterior	Interior						
A	CONTAINMENT BUILDING	3,220.20	733.64		0.00	0.00	2,816.18	0.00			612.60	3,705.99	6.28	36.00	66.70	11,197.59
B	SPRAY BUILDING & TANKS	1,273.93	852.42		0.00	0.00	0.00	0.00			0.00	69.09	30.63		3.33	2,229.40
C	PRIMARY AUXILIARY BUILDING	504.53	101.43		0.00	0.00	0.00	0.00	2.09		0.00	807.66			1.00	1,416.72
D	FUEL POOL & ASSOCIATED BUILDINGS	26.39	2.09		0.00	0.00	0.00	0.00			0.00	0.00			0.00	28.49
E	SERVICE BUILDING - HOT SIDE	20.72	1.59		0.00	0.00	0.00	0.00			0.00	0.00			0.00	22.31
F	SERVICE BUILDING - COLD SIDE	1,542.50	99.91		0.00	12.50	0.00	0.00			0.00	73.39	24.03		9.42	1,761.75
G	TURBINE BUILDING	6,382.73	2,251.99		0.00	0.00	0.00	0.00			0.00	2,117.81	3.93		523.76	11,280.22
H	CIRCULATING WATER PUMPHOUSE	73.17	13.86			0.00									38.43	125.46
I	OTHER BUILDINGS / PROTECTED AREA	39.25	4.80			0.00									6.75	50.79
J	BUILDINGS OUTSIDE PROTECTED AREA													10.00	151.67	161.67
K	UNDERGROUND LINES & TUNNELS															0.00
L	FIRE PUMP HOUSE	30.75	63.63													94.38
M	OTHER AREAS NOT COVERED															0.00
	TOTAL	13,114.17	4,125.35	0.00	0.00	12.50	2,816.18	0.00	2.09	0.00	612.60	6,773.94	64.87	46.00	801.06	**28,368.77**

METHODOLOGY

ASBESTOS CONTAINING MATERIAL

In order to best detremine the quantity of asbestos containing material (ACM) at the Maine Yankee Nuclear Power Plant, a physical walkdown of the site was performed and recorded in the "Field Walkdown Take-off Data" volume of this survey.

Dennis Pryor of Team Associates (subcontractor to GTS / Duratek) and Al Burnham of Maine Yankee initially walked the site with the asbestos contractors bidding on the insulation asbestos abatement contract. This first walkdown was performed between November 3, 1997 and November 5, 1997. A second walkdown was performed in much greater detail than the first and was started December 2, 1997 and completed on December 21, 1997. Each area of the plant was visited by both Al Burnham and Dennis Pryor together. During the second series of walkdowns each pipe system, vessel / tank, and general equipment configuration was visually inspected, measured, and recorded as to size, insulation type and thickness, length, covering type, possible dose rate problems, and any special conditions unique to the abatement of the specific asbestos inspected.

No physical sampling or laboratory analysis was performed on the asbestos in question. Acceptance of the fact that a pipe line being inspected was asbestos insulated is based on Al Burnham's knowledge of the Maine Yankee Nuclear Power Plant and his professional knowledge of asbestos. Al Burnham has been an asbestos worker for 20 years, of which, the last 13 years have been at Maine Yankee (either as a contractor or an employee). Al Burnham is classification qualified in 4 of the 5 possible catagories for an asbestos worker. Al Burnham has personally performed asbestos removal in the past, both at Maine Yankee and elsewhere, and is still performing those activities presently as an employee for Maine Yankee. He has personally abated asbestos on the specific lines, tanks, and vessels being visually inspected by both Dennis Pryor an himself.

As determined in these walkdowns, the statment that "only those lines or equipment with blue markings are non-asbestos" is not 100% accurate. In each area of the plant there are exceptions to this rule, either lines painted (or taped) blue were asbestos insulated or non-painted was not ACM. For this reason each line was visually inspected reguardless of color coding and was reviewed by Al Burnham as to his personal knowledge of previous asbestos abatement activities or by inspecting closely the materials in sections where it was easily visible. Also, the "Maine Yankee Air Contaminants Database - Chemical Sampling for Asbestos O & M : Bulk Sampling" report dated 06-oct-97 (for periods between 1/1/82 and 1/1/96) was reviewed by the inspection team in to confirm the designation of the insulation type or for further clarification of the section or area. However, this database was not always updated in the past, thus some of the areas were revisited by the inspection team in order to verify the "as is" conditions.

The walkdown take-offs were performed by areas (as designated in the summary report), by the building, by the floor (or level), and by the system or line. For example: Area C - Primary Auxiliary Building, Level 11' 0", pipe tunnel, ACD line - 1" pipe with 1 1/2" asbestos insulation (aluminum jacket) - 60' long (ascertained by physically counting the jacketing joints), with 1-90 degree elbow, 3-45 degree elbows, and 1- gate valve (in a high dosage RCA, conjested, and with a low head room factor). This type of information, recorded in the walkdown take-off data volume, was then inputted into a computer program that calculates the "in situ" volume of the asbestos and then prints a summary by types of asbestos insulation and the areas in which the abatement needs to occur.

Other types of asbestos and their representative quantities were determined using a similar approach as listed above. However sometimes tape measures and referencing existing plant drawings were used in

order to better determine quantities. This methodology was use specifically on equipment, vessels, and tanks.

At the present time, pipe gasket properties (i.e., asbestos) associated with any process line can not be determined (with any degree of accuracy) as to whether or not it is asbestos. Many of the valves have been changed, but not all of the existing valves (or flanged gaskets) were asbestos gasketed. Thus, determining the presence of asbestos without disassembling the component would not be suggested. The decommissioning stage would be the best place to address this issue and is totally dependent on the methodology of the decommissioning contractor as to disposition of the valves and flanges. This would dictate how the asbestos, if present, would be diposed of.

No asbestos floor tile (signature as a 9" x 9" tile) was encountered during the walkdown. Ceiling tile with ACM (similar to ACM ceiling tile previously removed from the women's locker room by Al Burnham) was encountered in the men's locker room and was measured by tape measure.

Wall transite material exist in the containment building. It encompasses the exterior wall of the annulus between levels -2' 0" and +36' 0". This material is very visable and is supported by bolts to the exterior wall. Al Burnham has performed work on this material previously at the equipment hatch passage. Materials at the small building next to the antenna tower is suspect asbestos, but it will need to be sampled first.

The only visable duct insulation (externally) with asbestos is in the PAB and is chipped at the joint, thus easily verifing it is ACM.

Asbestos rope was used in the past in Maine Yankee to insulate passes (chases) used by electrical cabling or some process piping. A majority of these penetrations have been replaced with a safer compound (cerafiber) and then resealed with a black foam compound cover. Al Burnham performed some of the replacements in the past. Those not changed can be detected by visual inspection as to the color, if covered, (gray mastic) or by seeing the actual asbestos rope (1" diameter - white braided) in the penetration space. Those recorded are those actually seen as rope or of mastic color.

Electrical cables with asbestos insulation were found by Dennis Pryor in the containment building under the pressurizer leading to the MCC room. Dennis Pryor has 20+ years in electrical construction and is a licenced electrical contractor. Further examination of rubber insulated cables can be done by obtaining the insulation markings on the cable. But it appears no other cable is ACM. There are however 2 rolls of "Rockbestos" cable in warehouse # 2. A MSDS should be checked on this item to eliminate it from the asbestos inventory.

Other asbestos material was observed in the containment building and spray building in the form of asbestos blankets used around the valves in the loop systems.

According to plant records and confirmed by Al Burnham, the paint on the interior and exterior surfaces of the exterior wall of the Turbine Hall is asbestos paint. Subsequent coats used over the initial coat are lead based. This surface type is similar at the Circulating Water Pumphouse as observed by both parties on the walkdown team

Asbestos gasket material is also present in the "jelly jar" type vaportite incandescent fixtures used in the both the Diesel Generator Rooms and Containment Building. Al Burnham has previous tested this material and it is ACM.

Most of the large cranes still have asbestos brakes according to maintenance data obtained by Al Burnham.

OTHER HAZARDOUS MATERIALS

As part of the walkdowns, an approximation as to the area, location, and amounts of existing "other hazardous materials" was performed. As previously stated, the prior knowledge of the plant along with years of experience shared on the walkdown team was invaluable for visual inspections for such things as electrical items (transformers with PCB, lighting fixture ballast (PCB), lighting fixture lamps (phospherous gas & mercury)), mercury temperature guages, and lead based items such as batteries, shielding, and lead based paints. Some tanks still have volumes or residuals.of corrosives, irratants, fuels, or oxidizers. These have been noted and presented in a location table and an approximation of amounts table in the summary section of this report.

One particular item will still need to be sampled and analysed, and that is PCB paint. Al Burnham has indicated that the plant is in the process of performing that step specifically on the transit wall in the Containment Building.

The above is a account of how the asbestos and other hazardous materials survey was performed, recorded, verified, and reported.

Dennis C. Pryor
DENNIS C. PRYOR

12/22/97
DATE

A. L. Burnham
AL BURNHAM

12-23-97
DATE

BREAKDOWN OF WORK AREA

AREA	DESCRIPTION	BUILDINGS OR AREAS INCLUDED IN THE AREA DESCRIPTION
A	CONTAINMENT BUILDING	CONTAINMENT BUILDING ONLY (ALL LEVELS)
B	SPRAY BUILDING AND OTHER BUILDINGS AND TANKS ASSOCIATED WITH THE CONTAINMENT BUILDING	SPRAY BUILDING ; PERSONNEL HATCH ; STEAM VALVE BUILDING ; AUX MCC BUILDING ; PVS BUILDING ; FW PUMP ROOM ; TANK # 14A ; TANK # 14B ; STEAM BUILDING ; EQUIPMENT HATCH ; GAS HOUSE ; DWST TANK # TK - 21 ; RWST TANK # TK - 4 ; SCAT TANK # TK - 54 .
C	PRIMARY AUXILIARY BUILDING	PRIMARY AUXILIARY BUILDING ONLY (ALL LEVELS)
D	FUEL POOL BUILDING AND ASSOCIATED BUILDINGS AND TANKS	FUEL POOL BUILDING ; RCA BUILDING ; LSA BUILDING ; BWST TANK # TK - 13A ; BWST TANK # TK - 13B ; PWST TANK # TK - 16 .
E	SERVICE BUILDING - HOT SIDE	SERVICE BUILDING - HOT SIDE ONLY (confirm with AL BURNHAM)
F	SERVICE BUILDING - COLD SIDE	SERVICE BUILDING - COLD SIDE ONLY (confirm with AL BURNHAM)
G	TURBINE BUILDING	TURBINE BUILDING ONLY (ALL LEVELS)
H	CIRCULATING WATER PUMPHOUSE	CIRCULATING WATER PUMPHOUSE ONLY
I	OTHER BUILDINGS IN THE PROTECTED AREA NOT LISTED ABOVE (in A thru H)	
J	BUILDINGS OUTSIDE THE PROTECTED AREA (ON MAINE YANKEE PROPERTY)	STAFF BUILDING ; DRUG SCREENING ; TRAINING ANNEX BUILDING ; WAREHOUSE # 2 ; SWITCHYARD ; etc.(ANY OTHER STRUCTURES OR AREAS NOT IN THE PROTECTED AREA .
K	UNDERGROUND LINES OR TUNNELS	ALL UNDERGROUND PIPING THAT DOES NOT NEED EXCAVATION TO ABATE THE ASBESTOS AND ANY TUNNEL ACCESSABLE BEFORE DECOMMISSIONING ACTIVITIES COMMENCE .
L	FIRE PUMP HOUSE	FIRE PUMP HOUSE ONLY
M	OTHER AREAS NOT COVERED ABOVE	ALL OTHER AREAS NOT COVERED IN ANY OF THE ABOVE LISTED AREAS DESCRIBED IN THIS COLUMN.

TABLE 1

ASBESTOS QUANTITY SURVEY
(In Situ Quantities)
SUMMARY REPORT
GTS / DURATEK
MAINE YANKEE

Area	DESCRIPTION	QUANTITY (in CUBIC FEET)														
		Pipe Insulation	Pipe Fitting Insulation	Pipe Gaskets	Floor Tile	Ceiling Tile	Wall Transite	Wall Cemestos	HVAC - Duct Insulation		Equipment Insulation	Vessels & Tanks Insultion	Ropes	Electrical Cables	Other ACM	TOTAL
									Exterior	Interior						
A	CONTAINMENT BUILDING	3,220.20	733.64		0.00	0.00	2,816.18	0.00			612.60	3,705.99	6.28	36.00	66.70	11,197.59
B	SPRAY BUILDING & TANKS	1,273.93	852.42		0.00	0.00	0.00	0.00			0.00	69.09	30.63		3.33	2,229.40
C	PRIMARY AUXILIARY BUILDING	504.53	101.43		0.00	0.00	0.00	0.00	2.09		0.00	807.66			1.00	1,416.72
D	FUEL POOL & ASSOCIATED BUILDINGS	26.39	2.09		0.00	0.00	0.00	0.00			0.00	0.00			0.00	28.49
E	SERVICE BUILDING - HOT SIDE	20.72	1.59		0.00	0.00	0.00	0.00			0.00	0.00			0.00	22.31
F	SERVICE BUILDING - COLD SIDE	1,542.50	99.91		0.00	12.50	0.00	0.00			0.00	73.39	24.03		9.42	1,761.75
G	TURBINE BUILDING	6,382.73	2,251.99		0.00	0.00	0.00	0.00			0.00	2,117.81	3.93		523.76	11,280.22
H	CIRCULATING WATER PUMPHOUSE	73.17	13.86			0.00									38.43	125.46
I	OTHER BUILDINGS / PROTECTED AREA	39.25	4.80			0.00									6.75	50.79
J	BUILDINGS OUTSIDE PROTECTED AREA													10.00	151.67	161.67
K	UNDERGROUND LINES & TUNNELS															0.00
L	FIRE PUMP HOUSE	30.75	63.63													94.38
M	OTHER AREAS NOT COVERED															0.00
	TOTAL	13,114.17	4,125.35	0.00	0.00	12.50	2,816.18	0.00	2.09	0.00	612.60	6,773.94	64.87	46.00	801.06	**28,368.77**

HAZARDOUS WASTE OBSERVATIONS

SUMMARY REPORT

GTS / DURATEK
MAINE YANKEE

Area	DESCRIPTION	QUANTITY											
		Flourescent		Battery Light (Lead)	HID		Transformer PCBs	Copper Pipe (Lead solder)	Lead Based Paint	Lead Shielding	Lead Battery	Mercury	Storage Tanks (Hazardous Liquids)
		Fixture (Ballast PCB)	Lamp (phopherous Gas)		Fixture (Ballast PCB)	Lamp (Mercury)							
A	CONTAINMENT BUILDING	X	X	X	X	X	X	X	X	X		X	X
B	SPRAY BUILDING & TANKS			X	X	X			X	X			
C	PRIMARY AUXILIARY BUILDING	X	X	X	X	X	X	X	X	X		X	X
D	FUEL POOL & ASSOCIATED BUILDINGS	X	X	X	X	X	X		X				
E	SERVICE BUILDING - HOT SIDE	X	X						X				
F	SERVICE BUILDING - COLD SIDE	X	X	X	X	X	X	X	X		X		X
G	TURBINE BUILDING	X	X	X	X	X	X	X	X		X	X	X
H	CIRCULATING WATER PUMPHOUSE			X			X		X				
I	OTHER BUILDINGS / PROTECTED AREA	X	X	X					X				
J	BUILDINGS OUTSIDE PROTECTED AREA	X	X	X	X	X	X	X	X				X
K	UNDERGROUND LINES & TUNNELS	X	X	X					X				
L	FIRE PUMP HOUSE	X	X				X		X				X
M	OTHER AREAS NOT COVERED												

HAZARDOUS WASTE OBSERVATIONS
APPROXIMATE AMOUNTS
SUMMARY REPORT
GTS / DURATEK
MAINE YANKEE

Area	DESCRIPTION	QUANTITY											
		Flourescent		Battery Light (Lead)	HID		Transformer PCBs	Copper Pipe (Lead solder)	Lead Based Paint	Lead Shielding	Lead Battery	Mercury	Storage Tanks (Hazardous Liquids)
		Fixture (Ballast PCB)	Lamp (phopherous Gas)		Fixture (Ballast PCB)	Lamp (mercury gas)							
		each	each	each	each		each	lf	sf	sf	ea	guage	gal
A	CONTAINMENT BUILDING	10	20	4	30	30	3	100		2,640		2	
B	SPRAY BUILDING & TANKS			3	81	81				192			
C	PRIMARY AUXILIARY BUILDING	58	116	7	86	86	5	100		18		2	
D	FUEL POOL & ASSOCIATED BUILDINGS	16	32	2	36	36	2						
E	SERVICE BUILDING - HOT SIDE	48	156										
F	SERVICE BUILDING - COLD SIDE	140	384	8	30	30	9	100			306		1,500
G	TURBINE BUILDING	388	776	16	333	333	5	1,060			138	2	1,000
H	CIRCULATING WATER PUMPHOUSE			2			1		18,200				
I	OTHER BUILDINGS / PROTECTED AREA	170	340	16									
J	BUILDINGS OUTSIDE PROTECTED AREA	1,355	4,586	39	68	68	12	10	X				1,500
K	UNDERGROUND LINES & TUNNELS	30	60										
L	FIRE PUMP HOUSE	12	24	1			1		X				100
M	OTHER AREAS NOT COVERED												
Total		2,227	6,494	98	664	664	38	1,370	18,200	2,850	444	6	4,100

AREA A CONTAINMENT BUILDING

AREA A CONTAINMENT BUILDING

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	25			45	70
1 1 / 2	546	200			746
2	125	70		230	425
3 1 / 2	200			20	220
4		500		65	565
5					0
6				15	15
8				90	90
10				370	370
12			40	60	100
14			1350	30	1380
16					0
18					0
20					0
22					0
24					0
30				300	300
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	896	770	1390	1225	4,281

AREA ***A*** **CONTAINMENT BUILDING**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	6.5	0	0	11.7	18.2
1 1 / 2	283.92	104	0	0	387.92
2	98.75	55.3	0	181.7	335.75
3 1 / 2	210	0	0	21	231
4	0	655	0	85.15	740.15
5	0	0	0	0	0
6	0	0	0	31.5	31.5
8	0	0	0	235.8	235.8
10	0	0	0	1161.8	1161.8
12	0	0	146.8	220.2	367
14	0	0	5670	126	5796
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	2592	2592
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	599.17	814.3	5816.8	4666.85	11,897

AREA ***A*** **CONTAINMENT BUILDING**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0.8125	0	0	3.9015	4.714
1 1 / 2	35.49	17.34	0	0	52.83
2	12.35	9.219	0	60.559	82.128
3 1 / 2	26.26	0	0	6.9	33.16
4	0	109.15	0	28.3855	137.5355
5	0	0	0	0	0
6	0	0	0	10.5	10.5
8	0	0	0	78.597	78.597
10	0	0	0	387.279	387.279
12	0	0	36.652	73.302	109.954
14	0	0	1417.5	42	1459.5
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	864	864
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	74.9125	135.709	1454.152	1555.424	3,220.20

AREA B SPRAY BUILDING & TANKS

AREA ***B*** **SPRAY BUILDING & TANKS**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	40	156			196
1 1 / 2		95			95
2	36	261			297
3 1 / 2		40			40
4	52	43			95
5					0
6	2				2
8		8			8
10	40	80			120
12		212			212
14			180		180
16		4			4
18		15			15
20		20			20
22					0
24					0
30			360		360
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	170	934	540	0	1,644

AREA *B* SPRAY BUILDING & TANKS

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	10.4	40.56	0	0	50.96
1 1 / 2	0	49.4	0	0	49.4
2	28.44	206.19	0	0	234.63
3 1 / 2	0	42	0	0	42
4	68.12	56.33	0	0	124.45
5	0	0	0	0	0
6	4.2	0	0	0	4.2
8	0	20.96	0	0	20.96
10	125.6	251.2	0	0	376.8
12	0	778.04	0	0	778.04
14	0	0	756	0	756
16	0	18.84	0	0	18.84
18	0	78.6	0	0	78.6
20	0	125.6	0	0	125.6
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	3110.4	0	3110.4
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	236.76	1667.72	3866.4	0	5,771

AREA *B* SPRAY BUILDING & TANKS

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	1.3	6.7548	0	0	8.0548
1 1 / 2	0	8.2365	0	0	8.2365
2	3.5568	34.3737	0	0	37.9305
3 1 / 2	0	7	0	0	7
4	8.5176	9.3869	0	0	17.9045
5	0	0	0	0	0
6	0.525	0	0	0	0.525
8	0	3.4936	0	0	3.4936
10	15.7	41.864	0	0	57.564
12	0	129.5108	0	0	129.5108
14	0	0	189	0	189
16	0	3.1416	0	0	3.1416
18	0	13.0995	0	0	13.0995
20	0	20.94	0	0	20.94
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	777.528	0	777.528
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	29.5994	277.8014	966.528	0	1,273.93

AREA C PRIMARY AUXILIARY BUILDING

AREA C PRIMARY AUXILIARY BUILDING

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

PIPE SIZE	INSULATION THICKNESS				SUBTOTAL
	1 1/2"	2"	3"	4"	
(in INCHES)	(in INCHES)				
1	760	129			889
1 1 / 2	333	114			447
2	689	625			1314
3 1 / 2	260	224			484
4	187	122			309
5					0
6		70			70
8		70			70
10	105				105
12					0
14					0
16		30			30
18					0
20					0
22					0
24					0
30					0
36	32				32
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	2366	1384	0	0	3,750

AREA ***C*** **PRIMARY AUXILIARY BUILDING**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	197.6	33.54	0	0	231.14
1 1 / 2	173.16	59.28	0	0	232.44
2	544.31	493.75	0	0	1038.06
3 1 / 2	273	235.2	0	0	508.2
4	244.97	159.82	0	0	404.79
5	0	0	0	0	0
6	0	147	0	0	147
8	0	183.4	0	0	183.4
10	329.7	0	0	0	329.7
12	0	0	0	0	0
14	0	0	0	0	0
16	0	141.3	0	0	141.3
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	335.04	0	0	0	335.04
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	2097.78	1453.29	0	0	3,551

AREA *C* PRIMARY AUXILIARY BUILDING

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	24.7	5.5857	0	0	30.2857
1 1 / 2	21.645	9.8838	0	0	31.5288
2	68.0732	82.3125	0	0	150.3857
3 1 / 2	34.138	39.2	0	0	73.338
4	30.6306	26.6326	0	0	57.2632
5	0	0	0	0	0
6	0	24.5	0	0	24.5
8	0	30.569	0	0	30.569
10	41.2125	0	0	0	41.2125
12	0	0	0	0	0
14	0	0	0	0	0
16	0	23.562	0	0	23.562
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	41.888	0	0	0	41.888
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	262.2873	242.2456	0	0	504.53

AREA D FUEL POOL & ASSOCIATED BUILDINGS

AREA *D* FUEL POOL & ASSOCIATED BUILDINGS

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	184				184
1 1 / 2					0
2		155			155
3 1 / 2					0
4					0
5					0
6					0
8					0
10					0
12					0
14					0
16					0
18					0
20					0
22					0
24					0
30					0
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	184	155	0	0	339

AREA ***D*** **FUEL POOL & ASSOCIATED BUILDINGS**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	47.84	0	0	0	47.84
1 1 / 2	0	0	0	0	0
2	0	122.45	0	0	122.45
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	47.84	122.45	0	0	170

AREA *D* FUEL POOL & ASSOCIATED BUILDINGS

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	5.98	0	0	0	5.98
1 1 / 2	0	0	0	0	0
2	0	20.4135	0	0	20.4135
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	5.98	20.4135	0	0	26.39

AREA E SERVICE BUILDING - HOT SIDE

AREA ***E*** **SERVICE BUILDING - HOT SIDE**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

PIPE SIZE	INSULATION THICKNESS				SUBTOTAL
	1 1/2"	2"	3"	4"	
(in INCHES)	(in INCHES)				
1	130				130
1 1 / 2	20				20
2					0
3 1 / 2					0
4	50				50
5					0
6		20			20
8					0
10					0
12					0
14					0
16					0
18					0
20					0
22					0
24					0
30					0
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	200	20	0	0	220

AREA *E* SERVICE BUILDING - HOT SIDE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	33.8	0	0	0	33.8
1 1 / 2	10.4	0	0	0	10.4
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	65.5	0	0	0	65.5
5	0	0	0	0	0
6	0	42	0	0	42
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	109.7	42	0	0	152

AREA *E* SERVICE BUILDING - HOT SIDE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	4.225	0	0	0	4.225
1 1 / 2	1.3	0	0	0	1.3
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	8.19	0	0	0	8.19
5	0	0	0	0	0
6	0	7	0	0	7
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	13.715	7	0	0	20.72

AREA F SERVICE BUILDING - COLD SIDE

AREA *F* SERVICE BUILDING - COLD SIDE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

PIPE SIZE	INSULATION THICKNESS				SUBTOTAL
	1 1/2"	2"	3"	4"	
(in INCHES)	(in INCHES)				
1	37				37
1 1 / 2					0
2	2				2
3 1 / 2					0
4					0
5					0
6	32				32
8					0
10					0
12					0
14			390		390
16					0
18					0
20					0
22					0
24					0
30				390	390
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	71	0	390	390	851

AREA *F* SERVICE BUILDING - COLD SIDE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	9.62	0	0	0	9.62
1 1 / 2	0	0	0	0	0
2	1.58	0	0	0	1.58
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	67.2	0	0	0	67.2
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	1638	0	1638
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	3369.6	3369.6
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	78.4	0	1638	3369.6	5,086

AREA *F* SERVICE BUILDING - COLD SIDE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	1.2025	0	0	0	1.2025
1 1 / 2	0	0	0	0	0
2	0.1976	0	0	0	0.1976
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	8.4	0	0	0	8.4
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	409.5	0	409.5
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	1123.2	1123.2
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	9.8001	0	409.5	1123.2	1,542.50

AREA G TURBINE BUILDING

AREA *G* TURBINE BUILDING

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

PIPE SIZE (in INCHES)	INSULATION THICKNESS 1 1/2" (in INCHES)	2"	3"	4"	SUBTOTAL
1	213	614	90	12	929
1 1 / 2	91				91
2	738	1334			2072
3 1 / 2					0
4	45	567			612
5					0
6		1581			1581
8		734			734
10	105	603	70		778
12		345			345
14			120		120
16		230			230
18		55			55
20		731			731
22		30			30
24		129			129
30		365		401	766
36		10		416	426
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	1192	7328	280	829	9,629

AREA ***G*** **TURBINE BUILDING**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	**1 1/2"**	**2"**	**3"**	**4"**	**SUBTOTAL**
(in INCHES)	(in INCHES)				
1	55.38	159.64	23.4	3.12	241.54
1 1 / 2	47.32	0	0	0	47.32
2	583.02	1053.86	0	0	1636.88
3 1 / 2	0	0	0	0	0
4	58.95	742.77	0	0	801.72
5	0	0	0	0	0
6	0	3320.1	0	0	3320.1
8	0	1923.08	0	0	1923.08
10	329.7	1893.42	219.8	0	2442.92
12	0	1266.15	0	0	1266.15
14	0	0	504	0	504
16	0	1083.3	0	0	1083.3
18	0	288.2	0	0	288.2
20	0	4590.68	0	0	4590.68
22	0	196.5	0	0	196.5
24	0	945.57	0	0	945.57
30	0	3153.6	0	3464.64	6618.24
36	0	104.7	0	4355.52	4460.22
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	1074.37	20721.57	747.2	7823.28	30,366

AREA ***G*** **TURBINE BUILDING**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	6.9225	26.5862	5.85	1.0404	40.3991
1 1 / 2	5.915	0	0	0	5.915
2	72.9144	175.6878	0	0	248.6022
3 1 / 2	0	0	0	0	0
4	7.371	123.7761	0	0	131.1471
5	0	0	0	0	0
6	0	553.35	0	0	553.35
8	0	320.5378	0	0	320.5378
10	41.2125	315.5499	54.95	0	411.7124
12	0	210.7605	0	0	210.7605
14	0	0	126	0	126
16	0	180.642	0	0	180.642
18	0	48.0315	0	0	48.0315
20	0	765.357	0	0	765.357
22	0	32.724	0	0	32.724
24	0	157.5993	0	0	157.5993
30	0	525.527	0	1154.88	1680.407
36	0	17.453	0	1452.0896	1469.5426
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	134.3354	3453.5821	186.8	2608.01	6,382.73

AREA H CIRCULATING WATER PUMPHOUSE

AREA ***H*** **CIRCULATING WATER PUMPHOUSE**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

	INSULATION THICKNESS				
PIPE SIZE	**1/2"**	**2"**	**3"**	**4"**	**SUBTOTAL**
(in INCHES)	(in INCHES)				
1					0
1 1 / 2					0
2					0
3 1 / 2					0
4					0
5					0
6					0
8	50				50
10	56				56
12					0
14					0
16					0
18					0
20					0
22					0
24	38				38
30					0
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	144	0	0	0	144

AREA *H* CIRCULATING WATER PUMPHOUSE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1 / 2	0	0	0	0	0
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	131.00	0	0	0	131.00
10	175.84	0	0	0	175.84
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	278.54	0	0	0	278.54
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	585.38	0.00	0.00	0.00	585.38

AREA *H* CIRCULATING WATER PUMPHOUSE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1/2	0	0	0	0	0
2	0	0	0	0	0
3 1/2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	16.38	0	0	0	16.38
10	21.98	0	0	0	21.98
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	34.82	0	0	0	34.82
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	73.17	0.00	0.00	0.00	73.17

AREA I OTHER BUILDINGS / PROTECTED AREA

AREA I ***OTHER BUILDINGS / PROTECTED AREA***

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

	INSULATION THICKNESS				
PIPE SIZE	**1 1/2"**	**2"**	**3"**	**4"**	**SUBTOTAL**
(in INCHES)	(in INCHES)				
1					0
1 1 / 2					0
2					0
3 1 / 2					0
4					0
5					0
6					0
8					0
10		75			75
12					0
14					0
16					0
18					0
20					0
22					0
24					0
30					0
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	0	75	0	0	75

AREA ***I*** **OTHER BUILDINGS / PROTECTED AREA**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1 / 2	0	0	0	0	0
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	235.5	0	0	235.5
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	0	235.5	0	0	236

AREA *I* OTHER BUILDINGS / PROTECTED AREA

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1 / 2	0	0	0	0	0
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	39.2475	0	0	39.2475
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	0	39.2475	0	0	39.25

AREA J BUILDINGS OUTSIDE PROTECTED AREA

AREA K UNDERGROUND LINES & TUNNELS

AREA L FIRE PUMP HOUSE

AREA L FIRE PUMP HOUSE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

QUANTITY TAKE - OFF of PIPE in FEET

	INSULATION THICKNESS				SUBTOTAL
PIPE SIZE	1 1/2"	2"	3"	4"	
(in INCHES)	(in INCHES)				
1					0
1 1 / 2					0
2					0
3 1 / 2					0
4					0
5					0
6					0
8					0
10					0
12					0
14					0
16	2				2
18					0
20	26				26
22					0
24	10				10
30					0
36					0
40					0
44					0
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	38	0	0	0	38

AREA *L* FIRE PUMP HOUSE

ASBESTOS PIPING INSULATION QUANTITY SURVEY

SQUARE FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1/2	0	0	0	0	0
2	0	0	0	0	0
3 1/2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	9.42	0	0	0	9.42
18	0	0	0	0	0
20	163.28	0	0	0	163.28
22	0	0	0	0	0
24	73.3	0	0	0	73.3
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	246	0	0	0	246

AREA ***L*** **FIRE PUMP HOUSE**

ASBESTOS PIPING INSULATION QUANTITY SURVEY

CUBIC FEET of PIPE INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
PIPE SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1 / 2	0	0	0	0	0
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	1.178	0	0	0	1.178
18	0	0	0	0	0
20	20.41	0	0	0	20.41
22	0	0	0	0	0
24	9.163	0	0	0	9.163
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	30.751	0	0	0	30.75

AREA M OTHER AREAS NOT COVERED

AREA A **CONTAINMENT BUILDING**

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

ROOM #	ROOM DESCRIPTION	THICKNESS of TILE (")	AREA DEMENSIONS LENGTH	AREA DEMENSIONS WIDTH	*SQ. FT. AREA*	**CU. FT. ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA B

SPRAY BUILDING & TANKS

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA C PRIMARY AUXILIARY BUILDING

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA D FUEL POOL & ASSOCIATED BUILDINGS

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

		THICKNESS	AREA DEMENSIONS		SQ. FT.	CU. FT.
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	WIDTH	AREA	ASBESTOS
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					0	0.00

AREA *E* SERVICE BUILDING - HOT SIDE

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

ROOM #	ROOM DESCRIPTION	THICKNESS of TILE (")	AREA DEMENSIONS LENGTH	WIDTH	*SQ. FT. AREA*	CU. FT. ASBESTOS
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA F **SERVICE BUILDING - COLD SIDE**

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

		THICKNESS	AREA DEMENSIONS		SQ. FT.	CU. FT.
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
					0	0.00
MEN'S	SHOWER ROOM	0.5	30	10	300	12.50
LOCKER					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**300**	**12.50**

AREA ***G*** **TURBINE BUILDING**

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA *H* **CIRCULATING WATER PUMPHOUSE**

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA **/** **OTHER BUILDINGS / PROTECTED AREA**

ASBESTOS - CEILING TILE

QUANTITY TAKE-OFF of CEILING TILE

ROOM #	ROOM DESCRIPTION	THICKNESS of TILE (")	AREA DEMENSIONS LENGTH	WIDTH	*SQ. FT. AREA*	CU. FT. ASBESTOS
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA A CONTAINMENT BUILDING

ASBESTOS - WALL (TRANSITE)

QUANTITY TAKE-OFF of WALL (TRANSITE)

		THICKNESS	AREA DEMENSIONS		SQ. FT.	CU. FT.
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	HEIGHT	AREA	ASBESTOS
					0	0.00
Annulus	Exterior wall	1			31756	2,646.33
	(Level -2' 0" to 36' 0")				0	0.00
					0	0.00
					0	0.00
Equipment	Interior to 6'	2			754.94	125.82
Hatch	(2 - layers @ 2" ea)				0	0.00
	(1 - layer @ 1")	1			377.47	31.46
					0	0.00
Personnel	Inside around lid only	1			150.79	12.57
Hatch					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**33,039**	**2,816.18**

AREA **B** **SPRAY BUILDING & TANKS**

ASBESTOS - WALL (TRANSITE)

QUANTITY TAKE-OFF of WALL (TRANSITE)

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	CU. FT.
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	HEIGHT	*AREA*	ASBESTOS
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA ***C*** **PRIMARY AUXILIARY BUILDING**

ASBESTOS - WALL (TRANSITE)

QUANTITY TAKE-OFF of WALL (TRANSITE)

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	HEIGHT	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA *D* FUEL POOL & ASSOCIATED BUILDINGS

ASBESTOS - WALL (TRANSITE)

QUANTITY TAKE-OFF of WALL (TRANSITE)

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	HEIGHT	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA E SERVICE BUILDING - HOT SIDE

ASBESTOS - WALL (TRANSITE)

QUANTITY TAKE-OFF of WALL (TRANSITE)

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	HEIGHT	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA ***F*** **SERVICE BUILDING - COLD SIDE**

ASBESTOS - WALL (TRANSITE)

QUANTITY TAKE-OFF of WALL (TRANSITE)

		THICKNESS	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	HEIGHT	*AREA*	**ASBESTOS**
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					**0**	**0.00**

AREA G TURBINE BUILDING

ASBESTOS - WALL (TRANSITE)

QUANTITY TAKE-OFF of WALL (TRANSITE)

		THICKNESS	AREA DEMENSIONS		SQ. FT.	CU. FT.
ROOM #	ROOM DESCRIPTION	of TILE (")	LENGTH	HEIGHT	AREA	ASBESTOS
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
					0	0.00
SUBTOTALS					0	0.00

AREA ***C*** ***PRIMARY AUXILIARY BUILDING***

ASBESTOS INSULATION on EXTERIOR SURFACES of HVAC DUCT WORK QUANTITY SURVEY

QUANTITY TAKE - OFF of EXTERIOR DUCTWORK INSULATION in FEET

	INSULATION THICKNESS				
DUCT SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1					0
1 1 / 2					0
2					0
3 1 / 2					0
4					0
5					0
6					0
8					0
10					0
12					0
14					0
16					0
18					0
20					0
22					0
24					0
30					0
36					0
40					0
44		1			1
48					0
50					0
60					0
72					0
84					0
96					0
120					0
SUBTOTAL	0	1	0	0	1

AREA ***C*** **PRIMARY AUXILIARY BUILDING**

ASBESTOS INSULATION on EXTERIOR SURFACES of HVAC DUCT WORK QUANTITY SURVEY

SQUARE FEET of DUCT INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
DUCT SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1 / 2	0	0	0	0	0
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	12.57	0	0	12.57
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	0	12.57	0	0	13

AREA *C* PRIMARY AUXILIARY BUILDING

ASBESTOS INSULATION on EXTERIOR SURFACES of HVAC DUCT WORK QUANTITY SURVEY

CUBIC FEET of DUCT INSULATION

(SEE CALCULATION NOTES for FORMULA VERIFICATIONS)

	INSULATION THICKNESS				
DUCT SIZE	1 1/2"	2"	3"	4"	SUBTOTAL
(in INCHES)	(in INCHES)				
1	0	0	0	0	0
1 1 / 2	0	0	0	0	0
2	0	0	0	0	0
3 1 / 2	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	0	0	0	0	0
16	0	0	0	0	0
18	0	0	0	0	0
20	0	0	0	0	0
22	0	0	0	0	0
24	0	0	0	0	0
30	0	0	0	0	0
36	0	0	0	0	0
40	0	0	0	0	0
44	0	2.0944	0	0	2.0944
48	0	0	0	0	0
50	0	0	0	0	0
60	0	0	0	0	0
72	0	0	0	0	0
84	0	0	0	0	0
96	0	0	0	0	0
120	0	0	0	0	0
SUBTOTAL	0	2.0944	0	0	2.09

AREA A CONTAINMENT BUILDING

ASBESTOS INSULATION - EQUIPMENT QUANTITY SURVEY

QUANTITY TAKE - OFF of EQUIPMENT INSULATION in FEET

LINE #	EQUIP #	EQUIPMENT Description	LENGTH (in Feet)	HEIGHT (in Feet)	WIDTH (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1	P-1-1	RC Pump				612.60	4	204.20
2	P-1-2	RC Pump				612.60	4	204.20
3	P-1-3	RC Pump				612.60	4	204.20
4						0.00		0.00
5						0.00		0.00
6						0.00		0.00
7						0.00		0.00
8						0.00		0.00
9						0.00		0.00
10						0.00		0.00
11						0.00		0.00
12						0.00		0.00
13						0.00		0.00
14						0.00		0.00
15						0.00		0.00
16						0.00		0.00
17						0.00		0.00
18						0.00		0.00
19						0.00		0.00
20						0.00		0.00
21						0.00		0.00
22						0.00		0.00
23						0.00		0.00
24						0.00		0.00
25						0.00		0.00
26						0.00		0.00
27						0.00		0.00
28						0.00		0.00
29						0.00		0.00
30						0.00		0.00
31						0.00		0.00
32						0.00		0.00
33						0.00		0.00
34						0.00		0.00
35						0.00		0.00
36						0.00		0.00
37						0.00		0.00
38						0.00		0.00
39						0.00		0.00
40						0.00		0.00
SUBTOTAL						1,837.80		612.60

AREA B **SPRAY BUILDING & TANKS**

ASBESTOS INSULATION - EQUIPMENT QUANTITY SURVEY

QUANTITY TAKE - OFF of EQUIPMENT INSULATION in FEET

LINE #	EQUIP #	EQUIPMENT Description	LENGTH (in Feet)	HEIGHT (in Feet)	WIDTH (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1						0.00		0.00
2						0.00		0.00
3						0.00		0.00
4						0.00		0.00
5						0.00		0.00
6						0.00		0.00
7						0.00		0.00
8						0.00		0.00
9						0.00		0.00
10						0.00		0.00
11						0.00		0.00
12						0.00		0.00
13						0.00		0.00
14						0.00		0.00
15						0.00		0.00
16						0.00		0.00
17						0.00		0.00
18						0.00		0.00
19						0.00		0.00
20						0.00		0.00
21						0.00		0.00
22						0.00		0.00
23						0.00		0.00
24						0.00		0.00
25						0.00		0.00
26						0.00		0.00
27						0.00		0.00
28						0.00		0.00
29						0.00		0.00
30						0.00		0.00
31						0.00		0.00
32						0.00		0.00
33						0.00		0.00
34						0.00		0.00
35						0.00		0.00
36						0.00		0.00
37						0.00		0.00
38						0.00		0.00
39						0.00		0.00
40						0.00		0.00
SUBTOTAL						0.00		0.00

AREA C PRIMARY AUXILIARY BUILDING

ASBESTOS INSULATION - EQUIPMENT QUANTITY SURVEY

QUANTITY TAKE - OFF of EQUIPMENT INSULATION in FEET

LINE #	EQUIP #	EQUIPMENT Description	LENGTH (in Feet)	HEIGHT (in Feet)	WIDTH (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1						0.00		0.00
2						0.00		0.00
3						0.00		0.00
4						0.00		0.00
5						0.00		0.00
6						0.00		0.00
7						0.00		0.00
8						0.00		0.00
9						0.00		0.00
10						0.00		0.00
11						0.00		0.00
12						0.00		0.00
13						0.00		0.00
14						0.00		0.00
15						0.00		0.00
16						0.00		0.00
17						0.00		0.00
18						0.00		0.00
19						0.00		0.00
20						0.00		0.00
21						0.00		0.00
22						0.00		0.00
23						0.00		0.00
24						0.00		0.00
25						0.00		0.00
26						0.00		0.00
27						0.00		0.00
28						0.00		0.00
29						0.00		0.00
30						0.00		0.00
31						0.00		0.00
32						0.00		0.00
33						0.00		0.00
34						0.00		0.00
35						0.00		0.00
36						0.00		0.00
37						0.00		0.00
38						0.00		0.00
39						0.00		0.00
40						0.00		0.00
SUBTOTAL						0.00		0.00

AREA D FUEL POOL & ASSOCIATED BUILDINGS

ASBESTOS INSULATION - EQUIPMENT QUANTITY SURVEY

QUANTITY TAKE - OFF of EQUIPMENT INSULATION in FEET

LINE #	EQUIP #	EQUIPMENT Description	LENGTH (in Feet)	HEIGHT (in Feet)	WIDTH (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1						0.00		0.00
2						0.00		0.00
3						0.00		0.00
4						0.00		0.00
5						0.00		0.00
6						0.00		0.00
7						0.00		0.00
8						0.00		0.00
9						0.00		0.00
10						0.00		0.00
11						0.00		0.00
12						0.00		0.00
13						0.00		0.00
14						0.00		0.00
15						0.00		0.00
16						0.00		0.00
17						0.00		0.00
18						0.00		0.00
19						0.00		0.00
20						0.00		0.00
21						0.00		0.00
22						0.00		0.00
23						0.00		0.00
24						0.00		0.00
25						0.00		0.00
26						0.00		0.00
27						0.00		0.00
28						0.00		0.00
29						0.00		0.00
30						0.00		0.00
31						0.00		0.00
32						0.00		0.00
33						0.00		0.00
34						0.00		0.00
35						0.00		0.00
36						0.00		0.00
37						0.00		0.00
38						0.00		0.00
39						0.00		0.00
40						0.00		0.00
SUBTOTAL						0.00		0.00

AREA E **SERVICE BUILDING - HOT SIDE**

ASBESTOS INSULATION - EQUIPMENT QUANTITY SURVEY

QUANTITY TAKE - OFF of EQUIPMENT INSULATION in FEET

LINE #	EQUIP #	EQUIPMENT Description	LENGTH (in Feet)	HEIGHT (in Feet)	WIDTH (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1						0.00		0.00
2						0.00		0.00
3						0.00		0.00
4						0.00		0.00
5						0.00		0.00
6						0.00		0.00
7						0.00		0.00
8						0.00		0.00
9						0.00		0.00
10						0.00		0.00
11						0.00		0.00
12						0.00		0.00
13						0.00		0.00
14						0.00		0.00
15						0.00		0.00
16						0.00		0.00
17						0.00		0.00
18						0.00		0.00
19						0.00		0.00
20						0.00		0.00
21						0.00		0.00
22						0.00		0.00
23						0.00		0.00
24						0.00		0.00
25						0.00		0.00
26						0.00		0.00
27						0.00		0.00
28						0.00		0.00
29						0.00		0.00
30						0.00		0.00
31						0.00		0.00
32						0.00		0.00
33						0.00		0.00
34						0.00		0.00
35						0.00		0.00
36						0.00		0.00
37						0.00		0.00
38						0.00		0.00
39						0.00		0.00
40						0.00		0.00
SUBTOTAL						0.00		0.00

AREA F SERVICE BUILDING - COLD SIDE

ASBESTOS INSULATION - EQUIPMENT QUANTITY SURVEY

QUANTITY TAKE - OFF of EQUIPMENT INSULATION in FEET

LINE #	EQUIP #	EQUIPMENT Description	LENGTH (in Feet)	HEIGHT (in Feet)	WIDTH (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1						0.00		0.00
2						0.00		0.00
3						0.00		0.00
4						0.00		0.00
5						0.00		0.00
6						0.00		0.00
7						0.00		0.00
8						0.00		0.00
9						0.00		0.00
10						0.00		0.00
11						0.00		0.00
12						0.00		0.00
13						0.00		0.00
14						0.00		0.00
15						0.00		0.00
16						0.00		0.00
17						0.00		0.00
18						0.00		0.00
19						0.00		0.00
20						0.00		0.00
21						0.00		0.00
22						0.00		0.00
23						0.00		0.00
24						0.00		0.00
25						0.00		0.00
26						0.00		0.00
27						0.00		0.00
28						0.00		0.00
29						0.00		0.00
30						0.00		0.00
31						0.00		0.00
32						0.00		0.00
33						0.00		0.00
34						0.00		0.00
35						0.00		0.00
36						0.00		0.00
37						0.00		0.00
38						0.00		0.00
39						0.00		0.00
40						0.00		0.00
SUBTOTAL						0.00		0.00

AREA G **TURBINE BUILDING**

ASBESTOS INSULATION - EQUIPMENT QUANTITY SURVEY

QUANTITY TAKE - OFF of EQUIPMENT INSULATION in FEET

LINE #	EQUIP #	EQUIPMENT Description	LENGTH (in Feet)	HEIGHT (in Feet)	WIDTH (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1						0.00		0.00
2						0.00		0.00
3						0.00		0.00
4						0.00		0.00
5						0.00		0.00
6						0.00		0.00
7						0.00		0.00
8						0.00		0.00
9						0.00		0.00
10						0.00		0.00
11						0.00		0.00
12						0.00		0.00
13						0.00		0.00
14						0.00		0.00
15						0.00		0.00
16						0.00		0.00
17						0.00		0.00
18						0.00		0.00
19						0.00		0.00
20						0.00		0.00
21						0.00		0.00
22						0.00		0.00
23						0.00		0.00
24						0.00		0.00
25						0.00		0.00
26						0.00		0.00
27						0.00		0.00
28						0.00		0.00
29						0.00		0.00
30						0.00		0.00
31						0.00		0.00
32						0.00		0.00
33						0.00		0.00
34						0.00		0.00
35						0.00		0.00
36						0.00		0.00
37						0.00		0.00
38						0.00		0.00
39						0.00		0.00
40						0.00		0.00
SUBTOTAL						0.00		0.00

AREA A CONTAINMENT BUILDING

ASBESTOS INSULATION - VESSEL & TANK QUANTITY SURVEY

QUANTITY TAKE - OFF VESSEL & TANK INSULATION / FEET

LINE #	VESSEL #	VESSEL DESCRIPTION	DIAMETER (in Feet)	HEIGHT (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1	E-1-1	Steam Generator	18	49	3,279.79	4	1,093.26
2	E-1-2	Steam Generator	18	49	3,279.79	4	1,093.26
3	E-1-3	Steam Generator	18	49	3,279.79	4	1,093.26
4	E-2	Pressurizer	10	26.5	989.59	4	329.86
5	TK-38	Shield Surge Tnk	4	10	150.79	3	37.70
6	E-67	Regen Heat Exch	2	10	69.11	4	23.04
7		Heat Exchanger	2	16	106.81	4	35.60
8					0.00		0.00
9					0.00		0.00
10					0.00		0.00
11					0.00		0.00
12					0.00		0.00
13					0.00		0.00
14					0.00		0.00
15					0.00		0.00
16					0.00		0.00
17					0.00		0.00
18					0.00		0.00
19					0.00		0.00
20					0.00		0.00
21					0.00		0.00
22					0.00		0.00
23					0.00		0.00
24					0.00		0.00
25					0.00		0.00
26					0.00		0.00
27					0.00		0.00
28					0.00		0.00
29					0.00		0.00
30					0.00		0.00
31					0.00		0.00
32					0.00		0.00
33					0.00		0.00
34					0.00		0.00
35					0.00		0.00
36					0.00		0.00
37					0.00		0.00
38					0.00		0.00
39					0.00		0.00
40					0.00		0.00
SUBTOTAL					11,155.68		3,705.99

AREA B **SPRAY BUILDING & TANKS**

ASBESTOS INSULATION - VESSEL & TANK QUANTITY SURVEY

QUANTITY TAKE - OFF VESSEL & TANK INSULATION / FEET

LINE #	VESSEL #	VESSEL DESCRIPTION	DIAMETER (in Feet)	HEIGHT (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1	TK-142	Tank	1.17	16	60.96	1	5.08
2	E-1A		4	7	113.10	2	18.85
3	P-12A		2.5	7	64.79	2	10.80
4	P-12B		2.5	12	104.06	2	17.34
5	E-3B		4	5	87.96	2	14.66
6	TK-141		3		14.14	2	2.36
7					0.00		0.00
8					0.00		0.00
9					0.00		0.00
10					0.00		0.00
11					0.00		0.00
12					0.00		0.00
13					0.00		0.00
14					0.00		0.00
15					0.00		0.00
16					0.00		0.00
17					0.00		0.00
18					0.00		0.00
19					0.00		0.00
20					0.00		0.00
21					0.00		0.00
22					0.00		0.00
23					0.00		0.00
24					0.00		0.00
25					0.00		0.00
26					0.00		0.00
27					0.00		0.00
28					0.00		0.00
29					0.00		0.00
30					0.00		0.00
31					0.00		0.00
32					0.00		0.00
33					0.00		0.00
34					0.00		0.00
35					0.00		0.00
36					0.00		0.00
37					0.00		0.00
38					0.00		0.00
39					0.00		0.00
40					0.00		0.00
SUBTOTAL					445.02		69.09

AREA C PRIMARY AUXILIARY BUILDING

ASBESTOS INSULATION - VESSEL & TANK QUANTITY SURVEY

QUANTITY TAKE - OFF VESSEL & TANK INSULATION / FEET

LINE #	VESSEL #	VESSEL DESCRIPTION	DIAMETER (in Feet)	HEIGHT (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1	TK-2	Boric Acid	16	18	1,306.89	2	217.81
2	TK-3	Boric Acid	10	6	345.57	2	57.60
3		Aux Steam Exch	1	0.5	3.14	2	0.52
4		Exchanger	1	6	20.42	2	3.40
5		Fluid Heater	3	4	51.84	2	8.64
6	DA1A		6	10	245.04	2	40.84
7	DA1B		6	10	245.04	2	40.84
8		Heat Exchanger	1	9	29.84	2	4.97
9	E-47A		1.17	15	57.28	2	9.55
10	E-47B		1.17	15	57.28	2	9.55
11	E-47C		1.17	15	57.28	2	9.55
12	E-47D		1.17	15	57.28	2	9.55
13		Tank	5	18	322.01	2	53.67
14		Evaporator Tank	8	8	301.59	2	50.26
15	EV-2		0.67	7	15.44	2	2.57
16		Flanch	0.67	0.5	1.76	2	0.29
17		ACD Heat Exch	1.5	6	31.81	2	5.30
18		Scat Tank	12	39	1,696.44	2	282.74
19					0.00		0.00
20					0.00		0.00
21					0.00		0.00
22					0.00		0.00
23					0.00		0.00
24					0.00		0.00
25					0.00		0.00
26					0.00		0.00
27					0.00		0.00
28					0.00		0.00
29					0.00		0.00
30					0.00		0.00
31					0.00		0.00
32					0.00		0.00
33					0.00		0.00
34					0.00		0.00
35					0.00		0.00
36					0.00		0.00
37					0.00		0.00
38					0.00		0.00
39					0.00		0.00
40					0.00		0.00
SUBTOTAL					4,845.97		807.66

AREA D FUEL POOL & ASSOCIATED BUILDINGS

ASBESTOS INSULATION - VESSEL & TANK QUANTITY SURVEY

QUANTITY TAKE - OFF VESSEL & TANK INSULATION / FEET

LINE #	VESSEL #	VESSEL DESCRIPTION	DIAMETER (in Feet)	HEIGHT (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1					0.00		0.00
2					0.00		0.00
3					0.00		0.00
4					0.00		0.00
5					0.00		0.00
6					0.00		0.00
7					0.00		0.00
8					0.00		0.00
9					0.00		0.00
10					0.00		0.00
11					0.00		0.00
12					0.00		0.00
13					0.00		0.00
14					0.00		0.00
15					0.00		0.00
16					0.00		0.00
17					0.00		0.00
18					0.00		0.00
19					0.00		0.00
20					0.00		0.00
21					0.00		0.00
22					0.00		0.00
23					0.00		0.00
24					0.00		0.00
25					0.00		0.00
26					0.00		0.00
27					0.00		0.00
28					0.00		0.00
29					0.00		0.00
30					0.00		0.00
31					0.00		0.00
32					0.00		0.00
33					0.00		0.00
34					0.00		0.00
35					0.00		0.00
36					0.00		0.00
37					0.00		0.00
38					0.00		0.00
39					0.00		0.00
40					0.00		0.00
SUBTOTAL					0.00		0.00

AREA E SERVICE BUILDING - HOT SIDE

ASBESTOS INSULATION - VESSEL & TANK QUANTITY SURVEY

QUANTITY TAKE - OFF VESSEL & TANK INSULATION / FEET

LINE #	VESSEL #	VESSEL DESCRIPTION	DIAMETER (in Feet)	HEIGHT (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1					0.00		0.00
2					0.00		0.00
3					0.00		0.00
4					0.00		0.00
5					0.00		0.00
6					0.00		0.00
7					0.00		0.00
8					0.00		0.00
9					0.00		0.00
10					0.00		0.00
11					0.00		0.00
12					0.00		0.00
13					0.00		0.00
14					0.00		0.00
15					0.00		0.00
16					0.00		0.00
17					0.00		0.00
18					0.00		0.00
19					0.00		0.00
20					0.00		0.00
21					0.00		0.00
22					0.00		0.00
23					0.00		0.00
24					0.00		0.00
25					0.00		0.00
26					0.00		0.00
27					0.00		0.00
28					0.00		0.00
29					0.00		0.00
30					0.00		0.00
31					0.00		0.00
32					0.00		0.00
33					0.00		0.00
34					0.00		0.00
35					0.00		0.00
36					0.00		0.00
37					0.00		0.00
38					0.00		0.00
39					0.00		0.00
40					0.00		0.00
SUBTOTAL					0.00		0.00

AREA F SERVICE BUILDING - COLD SIDE

ASBESTOS INSULATION - VESSEL & TANK QUANTITY SURVEY

QUANTITY TAKE - OFF VESSEL & TANK INSULATION / FEET

LINE #	VESSEL #	VESSEL DESCRIPTION	DIAMETER (in Feet)	HEIGHT (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1	B1A	BOILER - TOP			200.00	2	33.33
2	B1B	BOILER - TOP			200.00	2	33.33
3	B1A	MUD DRUMS			40.00	1	3.33
4	B1B	MUD DRUMS			40.00	1	3.33
5		MANWAYS			5.00	0.125	0.05
6					0.00		0.00
7					0.00		0.00
8					0.00		0.00
9					0.00		0.00
10					0.00		0.00
11					0.00		0.00
12					0.00		0.00
13					0.00		0.00
14					0.00		0.00
15					0.00		0.00
16					0.00		0.00
17					0.00		0.00
18					0.00		0.00
19					0.00		0.00
20					0.00		0.00
21					0.00		0.00
22					0.00		0.00
23					0.00		0.00
24					0.00		0.00
25					0.00		0.00
26					0.00		0.00
27					0.00		0.00
28					0.00		0.00
29					0.00		0.00
30					0.00		0.00
31					0.00		0.00
32					0.00		0.00
33					0.00		0.00
34					0.00		0.00
35					0.00		0.00
36					0.00		0.00
37					0.00		0.00
38					0.00		0.00
39					0.00		0.00
40					0.00		0.00
SUBTOTAL					485.00		73.39

AREA G TURBINE BUILDING

ASBESTOS INSULATION - VESSEL & TANK QUANTITY SURVEY

QUANTITY TAKE - OFF VESSEL & TANK INSULATION / FEET

LINE #	VESSEL #	VESSEL DESCRIPTION	DIAMETER (in Feet)	HEIGHT (in Feet)	SQ. FT. of Insulation	THICKNESS (in Inches)	CU. FT. Insulation
1	DA-2	Deareator Tank	5	12	227.76	0.25	4.75
2	E-18A	Moister Seperatr	10	38	1,350.87	4	450.29
3	E-18B	Moister Seperatr	10	38	1,350.87	4	450.29
4	E-18C	Moister Seperatr	10	38	1,350.87	4	450.29
5	E-18D	Moister Seperatr	10	38	1,350.87	4	450.29
6		Exciter Housing			680.00	1	56.67
7	TK-27	Domestic Wtr tnk	5	12	227.76	1	18.98
8	TK-64	Well water	4	11	163.36	1	13.61
9	TK-77	Well water	3	6	70.69	1	5.89
10	TK-19		12	20	980.17	2	163.36
11		Heat Exchanger	1.33	6	27.85	2	4.64
12		Heat Exchanger	1.33	6	27.85	2	4.64
13	E4B	Exchanger	5	5	117.81	0.25	2.45
14	E4B	Exchanger	5	5	117.81	0.25	2.45
15	E5A	Exchanger	5	5	117.81	0.25	2.45
16	E5A	Exchanger	5	5	117.81	0.25	2.45
17	TK-104A	Heater Drain tnk	4	5	87.96	0.25	1.83
18	TK-104B	Heater Drain tnk	4	5	87.96	0.25	1.83
19	TK-58	Clarifier Tank	24	7.5	1,470.25	0.25	30.63
20					0.00		0.00
21					0.00		0.00
22					0.00		0.00
23					0.00		0.00
24					0.00		0.00
25					0.00		0.00
26					0.00		0.00
27					0.00		0.00
28					0.00		0.00
29					0.00		0.00
30					0.00		0.00
31					0.00		0.00
32					0.00		0.00
33					0.00		0.00
34					0.00		0.00
35					0.00		0.00
36					0.00		0.00
37					0.00		0.00
38					0.00		0.00
39					0.00		0.00
40					0.00		0.00
SUBTOTAL					9,926.33		2,117.81

GTS / DURATEK
MAINE YANKEE

TEAM ASSOCIATES
D.C. PRYOR

AREA *A* CONTAINMENT BUILDING
ASBESTOS ROPES (ELECTRICAL & MECHANICAL PENETRATIONS)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	DIAMETER ASBESTOS (")	PENETRATION LENGTH	PENETRATION WIDTH		CU. FT. ASBESTOS
							0.00
	LEVEL 20' 0"	Asbestos Rope	1	32	0.5		6.28
		(Electrical Pen.)					0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
SUBTOTALS							**6.28**

AREA B SPRAY BUILDING & TANKS

ASBESTOS ROPES (ELECTRICAL & MECHANICAL PENETRATIONS)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	DIAMETER ASBESTOS (")	PENTRATION LENGTH	PENTRATION WIDTH		CU. FT. ASBESTOS
							0.00
MCC	LEVEL 1	Asbestos Rope	1	10	0.5		1.96
		(Electrical Pen.)					0.00
							0.00
MCC	LEVEL 2	Asbestos Rope	1	12	0.5		2.36
		(Electrical Pen.)					0.00
							0.00
MCC	LEVEL 3	Asbestos Rope	1	6	0.5		1.18
		(Electrical Pen.)					0.00
							0.00
							0.00
PAB	Level 21' 0"	Asbestos Rope	1	16	0.5		3.14
		(Electrical Pen.)					0.00
							0.00
							0.00
PAB	Level 11' 0"	Asbestos Rope	1	20	0.5		3.93
		(Electrical Pen.)					0.00
							0.00
							0.00
	Spray Building	Asbestos Rope	1	12	0.5		2.36
		(Electrical Pen.)					0.00
							0.00
							0.00
	Spray Building	Asbestos Rope	1	20	1		15.71
		(Mechanical Pen)					0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
SUBTOTALS							30.63

GTS / DURATEK
MAINE YANKEE

TEAM ASSOCIATES
D.C. PRYOR

AREA F SERVICE BUILDING - COLD SIDE
ASBESTOS ROPES (ELECTRICAL & MECHANICAL PENETRATIONS)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	DIAMETER ASBESTOS (")	PENETRATION LENGTH	PENETRATION WIDTH		CU. FT. ASBESTOS
							0.00
Mezz	PROTECTED SWITCHGEAR	Asbestos Rope	1	6	0.25		0.29
		(Electrical Pen.)	1	32	0.33		2.74
							0.00
							0.00
Mezz	PROTECTED CABLE TRAY	Asbestos Rope	1	16	0.33		1.37
		(Electrical Pen.)	1	100	0.5		19.63
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
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							0.00
							0.00
							0.00
							0.00
SUBTOTALS							**24.03**

GTS / DURATEK
MAINE YANKEE

TEAM ASSOCIATES
D.C. PRYOR

AREA *G* TURBINE BUILDING

ASBESTOS ROPES (ELECTRICAL & MECHANICAL PENETRATIONS)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	DIAMETER ASBESTOS (")	PENETRATION LENGTH	PENETRATION WIDTH		CU. FT. ASBESTOS
							0.00
	MEZZANINE	Asbestos Rope	1	20	0.5		3.93
		(Electrical Pen.)					0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
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							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
SUBTOTALS							3.93

GTS / DURATEK
MAINE YANKEE

TEAM ASSOCIATES
D.C. PRYOR

AREA *A* **CONTAINMENT BUILDING**

ELECTRICAL CABLES WITH ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	CABLE SIZE	CABLE LENGTH	CU. FT. ASBESTOS
					0.00
	PRESSURIZER to MCC	Asbestos	# 10	12,000	36.00
		Heater Type			0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
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					0.00
					0.00
					0.00
					0.00
SUBTOTALS					**36.00**

GTS / DURATEK
MAINE YANKEE

TEAM ASSOCIATES
D.C. PRYOR

AREA J BUILDINGS OUTSIDE PROTECTED AREA
ELECTRICAL CABLES WITH ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	CABLE SIZE	CABLE LENGTH (in FEET)	CU. FT. ASBESTOS
	WAREHOUSE # 2	Rockbestos	Multi-conductor	2,000	10.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
					0.00
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					0.00
					0.00
					0.00
					0.00
					0.00
SUBTOTALS					10.00

AREA A CONTAINMENT BUILDING

OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	THICKNESS of ASBESTOS (")	AREA DEMENSIONS LENGTH	WIDTH	*SQ. FT. AREA*	CU. FT. ASBESTOS
						0	0.00
Generator	Asbestos Blankets		2			90	15.00
	(30 sf @ each Steam G)					0	0.00
						0	0.00
Valves	Asbestos Blankets		2			250	41.67
	(in different loops)					0	0.00
						0	0.00
						0	0.00
Pumps	Asbestos Blankets		2			60	10.00
						0	0.00
						0	0.00
Annulus	Incandescent Light		0.0625			5.58	0.03
	Fixture - Gasket					0	0.00
						0	0.00
						0	0.00
Crane	Asbestos Brakes					0	0.00
	(2 - sets)					0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
SUBTOTALS						**406**	**66.70**

AREA ***B*** **SPRAY BUILDING & TANKS**
OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

		TYPE OF	THICKNESS of	AREA DEMENSIONS		*SQ. FT.*	CU. FT.
ROOM #	ROOM DESCRIPTION	ACM	ASBESTOS (")	LENGTH	WIDTH	*AREA*	ASBESTOS
						0	0.00
LSI	Spray Building	Asbestos	2			20	3.33
Valve		Blankets				0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
						0	0.00
SUBTOTALS						20	3.33

AREA *C* **PRIMARY AUXILIARY BUILDING**
OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	THICKNESS of ASBESTOS (")	AREA DEMENSIONS LENGTH	WIDTH	*SQ. FT. AREA*	CU. FT. ASBESTOS
						0	0.00
	Level 21'0"	Asbestos	2	3	2	6	1.00
		Board				0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
		SUBTOTALS				6	1.00

AREA *D* **FUEL POOL & ASSOCIATED BUILDINGS**
OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

		TYPE OF	THICKNESS of	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	ACM	ASBESTOS (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
						0	0.00
SUBTOTALS						0	**0.00**

AREA E SERVICE BUILDING - HOT SIDE
OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

		TYPE OF	THICKNESS of	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	ACM	ASBESTOS (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
SUBTOTALS						0	**0.00**

AREA *F* **SERVICE BUILDING - COLD SIDE**
OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	THICKNESS of ASBESTOS (")	AREA DEMENSIONS LENGTH	WIDTH	SQ. FT. AREA	CU. FT. ASBESTOS
						0	0.00
	AUXILIARY BOILER	ASBESTOS	0.03125	104	14	1456	3.79
	(EXTERIOR WALLS)	PAINT				0	0.00
						0	0.00
						0	0.00
	DIESEL GENERATOR RMS	Aluminum Clad	0.75	30	3	90	5.63
		ASBESTOS				0	0.00
		BLANKET				0	0.00
						0	0.00
						0	0.00
	DIESEL GENERATOR RMS	ASBESTOS	0.125			0.7	0.01
		GASKET @				0	0.00
		INCANDESCENT				0	0.00
		LIGHT				0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
		SUBTOTALS				1,547	9.42

AREA G TURBINE BUILDING

OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

		TYPE OF	THICKNESS of	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	ACM	ASBESTOS (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
						0	0.00
DECK	CRANE	ASBESTOS				0	0.00
		BRAKES				0	0.00
		(2 - SETS)				0	0.00
						0	0.00
						0	0.00
Exterior	All exterior walls	ASBESTOS	0.03125	820	100	82000	213.54
		PAINT				0	0.00
						0	0.00
						0	0.00
Interior	All surfaces on the interior	ASBESTOS	0.03125	820	100	82000	213.54
	of the exterior walls	PAINT				0	0.00
						0	0.00
						0	0.00
Interior	Roof Surface inside	ASBESTOS	0.03125	275	135	37125	96.68
		PAINT				0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
SUBTOTALS						**201,125**	**523.76**

AREA ***H*** **CIRCULATING WATER PUMPHOUSE**
OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

ROOM #	ROOM DESCRIPTION	TYPE OF ACM	THICKNESS of ASBESTOS (")	AREA DEMENSIONS LENGTH	WIDTH	*SQ. FT. AREA*	CU. FT. ASBESTOS
						0	0.00
Exterior	All exterior walls	Asbestos Paint	0.0625	263.5	14	3689	19.21
						0	0.00
						0	0.00
Interior	All inside surfaces of the	Asbestos Paint	0.0625	263.5	14	3689	19.21
	Exterior walls					0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
SUBTOTALS						**7,378**	**38.43**

GTS / DURATEK
MAINE YANKEE

TEAM ASSOCIATES
D.C. PRYOR

AREA / OTHER BUILDINGS / PROTECTED AREA
OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

		TYPE OF	THICKNESS of	AREA DEMENSIONS		*SQ. FT.*	**CU. FT.**
ROOM #	ROOM DESCRIPTION	ACM	ASBESTOS (")	LENGTH	WIDTH	*AREA*	**ASBESTOS**
						0	0.00
Wart	INSIDE SURFACE OF	ASBESTOS	0.03	60	45	2700	6.75
Bldg.	EXTERIOR WALLS	PAINT				0	0.00
	ADJACENT TO TURBINE					0	0.00
	HALL					0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
SUBTOTALS						**2,700**	**6.75**

AREA J BUILDINGS OUTSIDE PROTECTED AREA

OTHER ASBESTOS CONTAINING MATERIALS (ACM)

QUANTITY TAKE-OFF

		TYPE OF	THICKNESS of	AREA DEMENSIONS		SQ. FT.	CU. FT.
ROOM #	ROOM DESCRIPTION	ACM	ASBESTOS (")	LENGTH	WIDTH	AREA	ASBESTOS
						0	0.00
1	DEFUSER PUMPHOUSE	ASBESTOS	1	62	0.5	31	2.58
		ROOF FLASHING				0	0.00
						0	0.00
						0	0.00
1	DEFUSER PUMPHOUSE	ASBESTOS	0.5	17.5	13.6	238	9.92
		ROOF FELTING				0	0.00
						0	0.00
						0	0.00
2	WAREHOUSE # 2	GARLOCK	0.25	100	2	200	4.17
		GASKET MATERIAL ON ROLLS				0	0.00
						0	0.00
						0	0.00
3	WAREHOUSE # 5	ASBESTOS	0.75	90	24	2160	135.00
		SPRAY-ON				0	0.00
		CEILING INSULATION				0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
						0	0.00
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						0	0.00
						0	0.00
						0	0.00
						0	0.00
		SUBTOTALS				2,629	151.67

						DESCRIPTION OF WASTE	WEIGHT	PERCENTAGE						VOLUME IN CUBIC FEET				
line	input	unit	cuft	lb/ft3 densit	packing density		(TONS)	CLEAN	LLW	MIXED WASTE	HAZ	TRU	TOTAL	CLEAN	LLW	MIXED WASTE	HAZ	TRU
1		sf		200	80%	ASBESTOS FLOOR TILES			100%				100%					
2		sf	2,816.18	153	70%	TRANSITE PANEL	215		100%				100%		4,023			
3	10	cf	10.00	153	70%	GASKET MATERIAL	1		100%				100%		14			
4	17,240	cf	17,239.52	22	85%	ASBESTOS (BAGGED) PIPE	190		100%				100%		28,522			
5	7,387	cf	7,386.54	153	80%	ASBESTOS EQUIP. / VESSEL	565		100%				100%		12,311			
6	910	cf	910.28	50	85%	ASBESTOS (OTHER)	23		100%				100%		1,400			
7	300	sf	6.25	100	80%	ASBESTOS CEILING TILES	0		100%				100%		8			
8		cf		710	50%	LEAD MATERIAL												
9		ton		25	20%	METAL STUDS												
10		ton		40	30%	STRUCTURAL STEEL												
11		cf		150	50%	STACK CONCRETE												
12		cy		150	50%	CONCRETE RUBBLE												
13		cf		300	60%	MECHANICAL EQUIPMENT												
14		cf		710	50%	STACK LEAD BRICK												
15		ton		504	60%	STAINLESS STEEL LINERS												
16		cf		250	95%	LEAD PAINT CHIPS												
17		ton		490	80%	HVAC DUCT (SHEET METAL)												
18		ton		20	70%	MECHANICAL PIPING												
19		cf		40	70%	CONDUIT - GRC to 3"												
20		cf		40	70%	CONDUIT - GRC 3" TO 6"												
21		ton		40	80%	ELECTRICAL COAX CABLE												
22		cf		50	70%	ELECTRICAL EQUIPMENT												
23		sf		40	33%	WOOD (TEMP.STRUCTURE)												
24		sf		90	75%	POLYETHYLENE												
25		set		10	95%	P.P.E.												
26		gal		62	95%	SUMP WATER												
27		sf		90	75%	RAGS, ETC.												
28		cf		323	64%	BUILDING INTERNALS												
			28,369	115	70%	TOTAL	984								44,279			
				avg. asbestos only	avg.													

Total volume before packing:	
44,279	Total boxes:
44,279	Total cf in boxes:
	Packing increased vol X:
	Total box disposal cf

							# OF SEA / LAND (8X8X20) BOXES (37,000# cap.)				# OF B25 (4X4X6) BOXES 8000# capacity				# OF B12 (4X2X6) BOXES 5000# capacity				# OF 55 GALLON DRUM BOXES 500# capacity			
line	input	unit	cuft	lb/ft3 densit	packing density	DESCRIPTION OF WASTE	LLW	MIX	HAZ	TRU	LLW	MIX	HAZ	TRU	LLW	MIX	HAZ	TRU	LLW	MIX	HAZ	TRU
1		sf		200	80%	ASBESTOS FLOOR TILES																
2		sf	2,816.18	153	70%	TRANSITE PANEL	17				77				128				1,232			
3	10	cf	10.00	153	70%	GASKET MATERIAL	1				1				1				5			
4	17,240	cf	17,239.52	22	65%	ASBESTOS (BAGGED) PIPE	38				454				907				5,552			
5	7,387	cf	7,386.54	153	60%	ASBESTOS EQUIP. / VESSEL	51				236				456				3,768			
6	910	cf	910.28	50	65%	ASBESTOS (OTHER)	2				24				48				294			
7	300	sf	6.25	100	80%	ASBESTOS CEILING TILES	1				1				1				2			
8		cf		710	50%	LEAD MATERIAL																
9		ton		25	20%	METAL STUDS																
10		ton		40	30%	STRUCTURAL STEEL																
11		cf		150	50%	STACK CONCRETE																
12		cy		150	50%	CONCRETE RUBBLE																
13		cf		300	60%	MECHANICAL EQUIPMENT																
14		cf		710	50%	STACK LEAD BRICK																
15		ton		504	60%	STAINLESS STEEL LINERS																
16		cf		250	95%	LEAD PAINT CHIPS																
17		ton		490	80%	HVAC DUCT (SHEET METAL)																
18		ton		20	70%	MECHANICAL PIPING																
19		cf		40	70%	CONDUIT - GRC to 3 "																
20		cf		40	70%	CONDUIT - GRC 3" TO 6"																
21		ton		40	80%	ELECTRICAL COAX CABLE																
22		cf		50	70%	ELECTRICAL EQUIPMENT																
23		sf		40	33%	WOOD (TEMP.STRUCTURE)																
24		sf		90	75%	POLYETHYLENE																
25		set		10	95%	P.P.E.																
26		gal		62	95%	SUMP WATER																
27		sf		90	75%	RAGS, ETC.																
28		cf		323	64%	BUILDING INTERNALS																
			28,369	115 avg.	70% avg. asbestos only	TOTAL	110				793				1,541				10,853			

132737						81679					110182					119383						
132737						81679					110182					119383						
132737		OR				81679		OR			110182		OR			119383						
110.00		Total boxes:				793.00		Total boxes:			1541.00		Total boxes:			10,853.00						
120,670		Total cf in boxes:				71,370		Total cf in boxes:			69,345		Total cf in boxes:			79,770						
2.73	Packing increased vol X:					1.61	Packing increased vol X:				1.57	Packing increased vol X:				1.80						
140,800	Total box disposal cf					76,128	Total box disposal cf				73,966	Total box disposal cf				81,398						