Connecticut Yankee Atomic Power Company

Date of Distribution: 2-10-05

Notice of Receipt of Plant Procedure **License Terminiation Plan (LTP)**

Change No.: 05-01

To: NRC HQ Office (original)
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Please revise your controlled copy per instructions below:

INSERT: Revision 2A of the Haddam Neck Plant (HNP) License Termination Plan (LTP), dated January 2005, according to the directions provided

ATTACH:

REMOVE:

REPLACE

I have read and am aware of the provisions of the above listed documents.This acknowledges receipt of the revisions listed above. In addition, all superseded pages have been removed and destroyed.
Signature: _____ Date: _____

Please Return This Sheet to the Administrative Office, Connecticut Yankee 362 Injun Hollow Road, East Hampton, CT 06424 Within Thirty (30) Days.

NMSS01

Reference: (Emergency Plan Procedures)
10CFR50.4 (a) (5)

ACP 1.2-6.1
Rev. 20

Haddam Neck Plant License Termination Plan
Distribution of Revision 2A, January 2005
Insert Instruction for Revision 2A of the HNP LTP
Memo RACY-05-017

Please revise your controlled copy per instruction below:

Remove Page(s)	Effective Date	Insert Page(s)	Effective Date
Table of contents Page xi	August 2004	Table of Contents Page xi	January 2005
List of Effective Pages, LEP-1 through LEP-4	August 2004	List of Effective Pages, LEP-1 through LEP-4	January 2005
3-1	August 2004	3-1	January 2005
5-12	August 2004	5-12	January 2005
5-14 through 5-16	August 2004	5-14 through 5-16	January 2005
5-65 and 5-66	August 2004	5-65 and 5-66	January 2005
5-70	August 2004	5-70	January 2005
Figure 5-3 (Old)	Rev 1	New Figure 5-3	Rev 0
None		Insert Figure 5.3-1 after figure 5-3	Rev 0

LIST OF FIGURES

(All Figures Are Located at the End of the Associated Section)

LIST OF EFFECTIVE PAGES

Front Matter

Page	Revision	Date
i thru x	2	August 2004
xi	2A	January 2005
xii thru xiii	2	August 2004
LEP-1 thru LEP-4	2A	January 2005

1 GENERAL INFORMATION

Page	Revision	Date
1-1 thru 1-12	2	August 2004

2 SITE CHARACTERIZATION

Page	Revision	Date
2-1	1	August 2002
2-2 thru 2-3	2	August 2004
2-4 thru 2-5	1	August 2002
2-6	0	7/7/00
2-7 thru 2-8	1	August 2002
2-9 thru 2-10	2	August 2004
2-11 thru 2-12	1	August 2002
2-13	2	August 2004
2-14	1	August 2002
2-15 thru 2-16	2	August 2004
2-17 thru 2-18	1	August 2002
2-19 thru 2-98	2	August 2004

3 IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

Page	Revision	Date
3-1	2A	January 2005
3-2 thru 3-28	2	August 2004

4 SITE REMEDIATION PLANS

LIST OF EFFECTIVE PAGES

Page	Revision	Date
4-1	2	August 2004
4-2	1	August 2002
4-3 thru 4-4	2	August 2004
4-5 thru 4-6	1	August 2002

5 FINAL STATUS SURVEY PLAN

Page	Revision	Date
5-1	1	August 2002
5-2 thru 5-11	2	August 2004
5-12	2A	January 2005
5-13	2	August 2004
5-14 thru 5-16	2A	January 2005
5-17 thru 5-64	2	August 2004
5-65 thru 5-66	2A	January 2005
5-67 thru 5-69	2	August 2004
5-70	2A	January 2005

6 COMPLIANCE WITH THE RADIOLOGICAL CRITERIA FOR LICENSE TERMINATION

Page	Revision	Date
6-1 thru 6-18	2	August 2004
6-19	1	August 2002
6-20	2	August 2004
6-21 thru 6-22	1	August 2002

7 UPDATE OF SITE-SPECIFIC DECOMMISSIONING COSTS

Page	Revision	Date
7-1 thru 7-7	2	August 2004

8 SUPPLEMENT TO THE ENVIRONMENTAL REPORT

Page	Revision	Date
8-1 thru 8-22	2	August 2004

Figures

Figures 2-1 thru 2-9	2	August 2004

LIST OF EFFECTIVE PAGES

Figure 4-1	2	August 2004
Figures 5-1 and 5-2	0	7/7/00
Figure 5-3 and Figure 5.3-1	2A	January 2005
Figure 5-4	2	August 2004
Figure 6-1	0	7/7/00
Figure 6-2	0	7/7/00
Figures 6-3 thru 6-5	1	August 2002
Figure 6-6	2	August 2004

Appendix A

Page	Revision	Date
A-1 thru A-2	0	7/7/00

Appendix B

Page	Revision	Date
B-1 thru B-4	1	August 2002

Page	Revision	Date
C-1 thru C-36	0	7/7/00

Appendix D

Page	Revision	Date
D-1 thru D-31	1	August 2002

Appendix E

Page	Revision	Date
E-1 thru E-12	1	August 2002

Appendix F

Page	Revision	Date

LIST OF EFFECTIVE PAGES

F1 thru F-32	1	August 2002

Appendix G

Page	Revision	Date
G1 thru G-12	1	August 2002

Appendix H

Page	Revision	Date
H-1 thru H-47-	2	August 2004

3 IDENTIFICATION OF REMAINING SITE DISMANTLEMENT ACTIVITIES

3.1 Introduction

In accordance with 10CFR50.82 (a)(9)(ii)(B) (Reference 3-1), the LTP must identify the major dismantlement and decontamination activities that remain. The information includes those areas and equipment that need further remediation and an estimate of the radiological conditions that may be encountered. Included are estimates of associated occupational radiation dose and projected volumes of radioactive waste. These activities are undertaken pursuant to the current 10CFR50 license, are consistent with the PSDAR, and do not depend upon LTP approval to proceed.

CYAPCO's primary goals are to decommission the HNP safely and to maintain the continued safe storage of spent fuel. CYAPCO will decontaminate and dismantle the HNP in accordance with the DECON alternative, as described in the NRC's Final Generic Environmental Impact Statement. Completion of the DECON option is contingent upon continued access to one or more low level waste disposal sites. Currently, HNP has access to low-level waste disposal facilities including those in Barnwell, South Carolina.

CYAPCO is currently conducting active decontamination and dismantlement activities at the HNP site in accordance with the HNP PSDAR (Reference 3-2). Decommissioning activities are being coordinated with the appropriate Federal and State regulatory agencies in accordance with plant administrative procedures. In order to minimize the impact of ongoing decommissioning activities, a Spent Fuel Pool Island has been established to separate spent fuel storage functions from other plant functions and other decommissioning activities.

Decommissioning activities at Haddam Neck will be conducted in accordance with the Haddam Neck UFSAR, Technical Specifications, existing Part 50 License and the requirements of 10CFR50.82(a)(6) and (a)(7). If an activity requires prior NRC approval under 10CFR50.59(c)(2) or a change to the Haddam Neck Plant Technical Specifications or license, a submittal will be made to the NRC for review and approval before implementing the activity in question. Decommissioning activities are conducted under the scrutiny of the existing CYAPCO Radiation Protection Program, Industrial Safety Program, and Waste Management Program. Such activities will be conducted in accordance with these programs, which are well established and frequently inspected by the NRC. Activities conducted during decommissioning do not pose any greater radiological or safety risk than those conducted during operations, especially those during major maintenance and outage evolutions.

Decontamination and dismantlement activities continue to be performed, as described in Section 3.3, while taking into account the specific system considerations as discussed in Sections 3.4.1 and 3.4.2. These sections provide an overview and describe the major remaining components of contaminated plant systems and, as appropriate, a description of specific equipment remediation considerations. Table 3-1 contains a list of major systems and components that have been or are to be removed.

Demolition and removal activities will continue along with changes to the status of decommissioning support equipment (i.e., containment mat sump) throughout the decommissioning process. The LTP will generally not be updated to include these changes to the status of site buildings and equipment.

Measures to prevent against the introduction of plant-related radioactive material by persons entering an isolated area may include personnel frisking stations at the entry point, the use of "sticky pads", or other such routine methods. Isolation from airborne material may include sealing off openings, including doors and ventilation ducts. Although not likely to be encountered, if a potential for waterborne material is deemed to exist (e.g., floor drains or penetrations left by decommissioning activities), similar measures will be taken to ensure such sources are sealed off from the isolated area. In addition to these physical controls, access points to buildings will be posted with signs providing contact information for approval to conduct decommissioning and demolition activities in the area. An administrative process will be used to evaluate, approve (or deny), and document all plant related activities conducted in these areas during and following final status surveys.

Following the final status survey, and any regulatory confirmation, the excavations associated with the structures will be backfilled with bulk fill material. Any isolation and control measures needed at the restored surface will be implemented to protect the area from contamination.

5.4.6.2 Open Land Areas

For open land areas, access roads and trails will be posted (as well as informational notices) with signs providing contact information for approval to conduct plant-related activities in the area. An administrative process will be used to evaluate, approve (or deny), and document all plant related activities conducted in these open land areas during and following final status surveys. Land areas will be inspected semi-annually and any material that has been deposited since the last inspection will be investigated.

5.4.6.3 Excavation Land Areas Resulting from Radiological Remediation

These are land areas where there has been excavation for the purpose of radiological remediation of the soil. These areas will be posted with signs providing contact information for approval to conduct decommissioning and demolition activities in the area. An administrative process will be used to evaluate, approve (or deny), and document all plant related activities conducted in these excavations during and following final status surveys.

5.4.6.4 Bedrock

There are areas of the site where bedrock will be exposed as a result of building demolition and soil remediation. These areas include, but are not limited to, the Tank Farm area, the Spent Resin Facility and Ion Exchange Facility, and the RHR pit area of the Primary Auxiliary Building. Isolation and control of bedrock areas will be the same as for open land areas with added controls for deep excavation personnel safety requirements.

5.4.6.5 Excavations Resulting from the Removal of Piping Conduit

Areas that are excavated for the purposes of removing piping, conduit or other subsurface construction will be controlled to ensure personnel safety and to reduce the potential for plant-related activities to contaminate the area. These areas will be posted with signs providing contact information for approval to conduct decommissioning and demolition activities in the area. An administrative process will be used to evaluate and approve (or deny), and document all plant-related activities conducted in these excavations. Any isolation and control measures needed at the restored surface will be implemented to protect the area from contamination.

groundwater contamination may be present. This area represents approximately 15,600 m^2 and includes the industrial area of the site. For this area, the total dose from these sources, H_{Total} can be expressed as:

$$H_{Total} = H_{Soil} + H_{Existing\,GW} + H_{FutureGW} \qquad \text{(Equation 5-1)}$$

For these individual media, the dose from the residual radioactivity from radionuclide i is:

$$H^i = 25 * \frac{C^i}{DCGL^i} \qquad \text{(Equation 5-2)}$$

Since the limit for the total annual dose is 25 mrem from all media (and all pathways), a reduction to the soil and existing groundwater DCGLs in Chapter 6 is needed, since these are based on an annual dose of 25 mrem from each media. The DCGLs in Chapter 6 are therefore considered "Base-Case (Base)" values. The reduced DCGLs, or "Operational DCGLs" ($DCGL_{OP}$), can be related to the base case DCGLs using the principal relationship from:

$$H^i = 25 * \frac{DCGL^i_{OP}}{DCGL^i_{Base}} \qquad \text{(Equation 5-3)}$$

In the case of existing groundwater, the contamination concentration to be used for calculating dose is the highest measured at any point within the survey area or within the capture zone distance (largest capture zone radius as determined by the capture zone analysis described below) from the subject survey area at the time of notification of the NRC of intent to release the subject survey area from the license.

The following considerations may be included in determining if the results trend is sufficient to utilize the groundwater well sample results in the dose calculation for an affected survey unit:

- Fate and transport simulations will identify the projected area of highest groundwater concentration on site.
- The locations of existing wells will be examined in relation to the simulation results and additional wells constructed to ensure adequate monitoring of the area(s) of anticipated highest groundwater radionuclide Substances Of Concern (SOC) concentrations.
- Monitoring wells from which the sample results are to be used for the dose calculation for a survey unit will have been sampled quarterly for at least 18 months including two springtime high water table periods. In the case of areas where remediation (e.g., removal of contaminated soil below the average water table) has been conducted using groundwater depression, the 18 month monitoring period will begin. when use of the groundwater depression systems has ended. Prior to turning off the depression system, remediation will have been completed and excavation backfilled.
- Monitoring well results show groundwater contaminant concentrations to be below closure criteria as discussed in this section, and exhibit steady or decreasing trends.

The 18 month monitoring period is sufficient for the following reasons:

- Historical releases at HNP and subsequent migration of groundwater contaminants appear to have resulted in dispersion of SOCs in groundwater. Actions completed to date have removed primary contaminant sources (e.g., contaminated process solutions) and processes (e.g., bulk waste water processing with leaking tanks) that historically contributed to observed groundwater contamination. As a result, only secondary contaminant sources (which could include residual subsurface soil contamination, grossly-contaminated groundwater and contaminated subsurface structures) remain at the site. The highest concentrations generally remain near historical source areas in wells that are completed within the unconsolidated soil formation that is slated for remediation.

- For all areas where groundwater contamination has been detected, this duration (when two springtime periods are included) ensures that the effect of the high water table season is included twice. Seasonal high water table levels impacting contaminated soils above the average water table level is one of the factors that can cause a seasonal increase in groundwater radionuclide concentrations.

- For areas where remediation has been conducted below the normal water table for the purpose of removing media suspected of contributing to groundwater contamination, the 18 month period (after the area has been backfilled and returned to normal groundwater levels) is expected to provide sufficient time for groundwater to leach through the remediated and backfilled area and for sampling of nearby monitoring wells to ensure the effectiveness of the remediation. As stated above, this will be confirmed by ensuring that the groundwater activity levels are steady or decreasing during this 18 month monitoring period.

In the case of potential future groundwater contamination from buried site building subsurface foundations/basements or concrete debris containing residual radioactivity, the dose to the resident farmer is limited to the water dependent pathways from the buried concrete debris scenario as described in Chapter 6. Therefore for the concrete debris case, the dose component for each radionuclide i is modified by the fraction of the total dose delivered from the water dependent pathway, f_w, as calculated using the information in Appendix G, Table G-4. This is provided as:

$$H^i_{FutureGW} = 25 * f^i_w \frac{DCGL^i_{OP-ConcreteDebris}}{DCGL^i_{Base-ConcreteDebris}} \qquad \text{(Equation 5-4)}$$

The $H_{ExistingGW}$ term, from Equation 5-1, will be applied to survey areas in which the presence of groundwater contamination has been detected and survey areas that are within the capture zone, the influence boundary distance of detectable ground contamination. "Detected groundwater contamination" is defined as the presence of:

- Plant-related radionuclides, which are also present in background, at a concentration greater than two standard deviations over background, or

- Plant-related radionuclides, not present in background, at a concentration greater than the Minimum Detectable Concentration and greater than two times the standard deviation in the net concentration.

Table 5-3 provides the survey areas to which the $H_{ExistingGW}$ term would currently be applies. Table 5-3 is based upon as additional groundwater characterization and completion of the capture zone analysis. The

capture zone analysis determined a maximum zone of influence of 100 meters around a groundwater monitoring well, (see Figure 5-3 and 5-3.1) and reference 5-13, Estimated Zone of Influence/Capture Zone for Hypothetical Water Supply Wells in Post-Closure Dose Modeling, CH2MHILL, Technical Memorandum, dated January 11, 2005. These figures depict the capture zone around the wells which have shown detectable contamination at the perimeter of the industrial area and around peninsula wells.

It is noted, however, that characterization efforts for groundwater contamination are still ongoing and the survey areas to which the $H_{ExistingGW}$ term are applied may change. Those changes will be communicated to the NRC. This change may be caused by changes in the location of the capture zone or detection of groundwater contamination at locations outside the zone. The Phase 2 Hydrogeologic Work Plan, as described in Section 2.3.3.1.6, provides additional characterization of groundwater that was used to better define the groundwater contamination locations.

Prior to the request to release any portion of the site from the license, CYAPCO will prepare and make available for inspection a capture zone analysis (provided to the NRC in January 2005), based on data collected as part of the Phase 2 Hydrogeologic Work Plan, to better define the capture zone distance, Reference 5-13. The "capture zone" is the area surrounding a hypothetical well to be used by the resident farmer, from which existing groundwater contamination could be drawn into the resident farmer's well. The analysis used to determine this area used the hydrogeological conditions and parameters assumed in the Resident Farmer Scenario as described in Chapter 6 of the LTP.

Table 5-3
Survey Areas Affected by Groundwater Contamination
(All Survey Units Unless Otherwise Noted)

Survey Area		
1000	9306	9522
2000	9308	9527
3000	9310	9528 (Units 0,2&3)
4000	9312	9530 (Units 1,2,3,&4)
5000	9313	9801
6000	9502	9802
9102	9512	9803
9106	9514	9804
9226	9518	9805
9302	9520	
9304	9521	

The compliance formulation for these resident farmer exposure scenarios is re-written as:

$$1 \geq \frac{DCGL^{i}_{OP-Soil}}{DCGL^{i}_{Base-Soil}} + \frac{DCGL^{i}_{OP-ExistingGW}}{DCGL^{i}_{Base-ExistingGW}} + f^{i}_{w}\frac{DCGL^{i}_{OP-ConcreteDebris}}{DCGL^{i}_{Base-ConcreteDebris}} \qquad \text{(Equation 5-5)}$$

For simplicity Equation 5-5 may be re-written as:

- *Investigations and Results*;
- *Remediation* activities, both historic and resulting from the final status survey;
- *Changes from the Final Status Survey Plan* including field changes;
- *Data Quality Assessment*;
- *Anomalies* occurring during the survey or in the sample results;
- *Conclusion* as to whether or not the survey unit satisfied the specified release criteria, a discussion of ALARA evaluations performed, and whether or not sufficient power was achieved;
- *Attachments* and enclosures to include supporting maps, diagrams, and sample statistical data.

5.9.2 FSS Final Reports

The ultimate product of the Data Life Cycle is an FSS Final Report which will be, to the extent practical, a stand-alone document with minimal information incorporated by reference. To facilitate the data management process, as well as overall project management, FSS Final Reports will usually incorporate multiple FSS Survey Unit Release Records. To minimize the incorporation of redundant historical assessment and other FSS program information, and to facilitate potential partial site releases from the current license, FSS Final Reports will be prepared and submitted in a phased approach. The format and content of the FSS Final Report is as follows:

- Introduction, including a discussion on the phased approach for submittals;
- FSS Program Overview to include sub-sections on survey planning, survey design, survey implementation, survey data assessment, and Quality Assurance and Quality Control measures;
- Site Information to include sub-sections on site description, survey area/unit description (specific to current phase submittal), summary of historical radiological data, conditions at the time of survey, identification of potential contaminants, and radiological release criteria;
- Final Status Survey Protocol to include sub-sections on Data Quality Objectives, survey unit designation and classification, background determination, final status survey plans, survey design, instrumentation (detector efficiencies, detector sensitivities, instrument maintenance and control and instrument calibration), survey methodology, and quality control surveys;
- Survey Findings to include sub-sections on survey data conversion, survey data verification and validation, evaluation of number of sample/measurement locations, and comparison of findings with DCGLs
- Appendix A: Survey Unit Release Records (specific to each phased submittal);
- Additional appendices will be added as necessary e.g., Technical Basis Documents containing radiological assessment results., etc.

5.10 Quality Assurance and Quality Control Measures

Connecticut Yankee Atomic Power Company (CYAPCO) has developed and is implementing a comprehensive Quality Assurance Program to assure conformance with established regulatory requirements, set forth by the Nuclear Regulatory Commission (NRC), and accepted industry standards. The participants in the Connecticut Yankee Quality Assurance Program (CYQAP) assure that the design, procurement, construction, testing, operation, maintenance, repair, and modification of nuclear power plants are performed in a safe and effective manner.

The CYQAP complies with the requirements set forth in Appendix B, of 10 CFR Part 50, along with applicable sections of the Updated Final Safety Analysis Report (UFSAR) for the license application, and is responsive to Regulatory Guide 1.70, which describes the information presented in the Quality Assurance Section of the UFSAR for nuclear power plants. References to specific industry standards for quality assurance and quality control measures governing final status survey activities are reflected in supporting procedures, plans, and instructions.

These Quality Control (QC) and Quality Assurance (QA) measures are integrated into all decommissioning activities, including the development of the LTP and implementation of the final status survey. The CYQAP concepts, as defined in implementing procedures, adequately encompass the risk-significant decommissioning activities. All final status survey activities essential to data quality will be implemented and performed under approved procedures. Effective implementation of administrative controls will be verified through audit activities, with corrective actions being prescribed, implemented and verified in the event any deficiencies are identified. These measures apply to the related services provided by off-site vendors, in addition to on-site sub-contractors.

With regard to the final status survey effort, QA/QC activities will serve to ensure that surveys are performed by trained individuals using approved written procedures and properly calibrated instruments that are sensitive to the suspected contaminant. In addition, QC measures will be taken to obtain quantitative information to demonstrate that measurement results have the required precision and are sufficiently free of errors to accurately represent the site being investigated. QC checks will be performed as prescribed by the implementing procedures required by the CYQAP for both field measurements and laboratory analysis (both on-site and third party). For field measurements, replicate measurements will be made for randomly chosen survey units by a different technician at the same locations as the original measurements. Additionally, the CYAPCO Oversight Organization will be involved in assessing the performance of final status survey activities.

The concepts described in the CYQAP will be applied to the Final Status Survey activities. These activities include the following, as applicable:

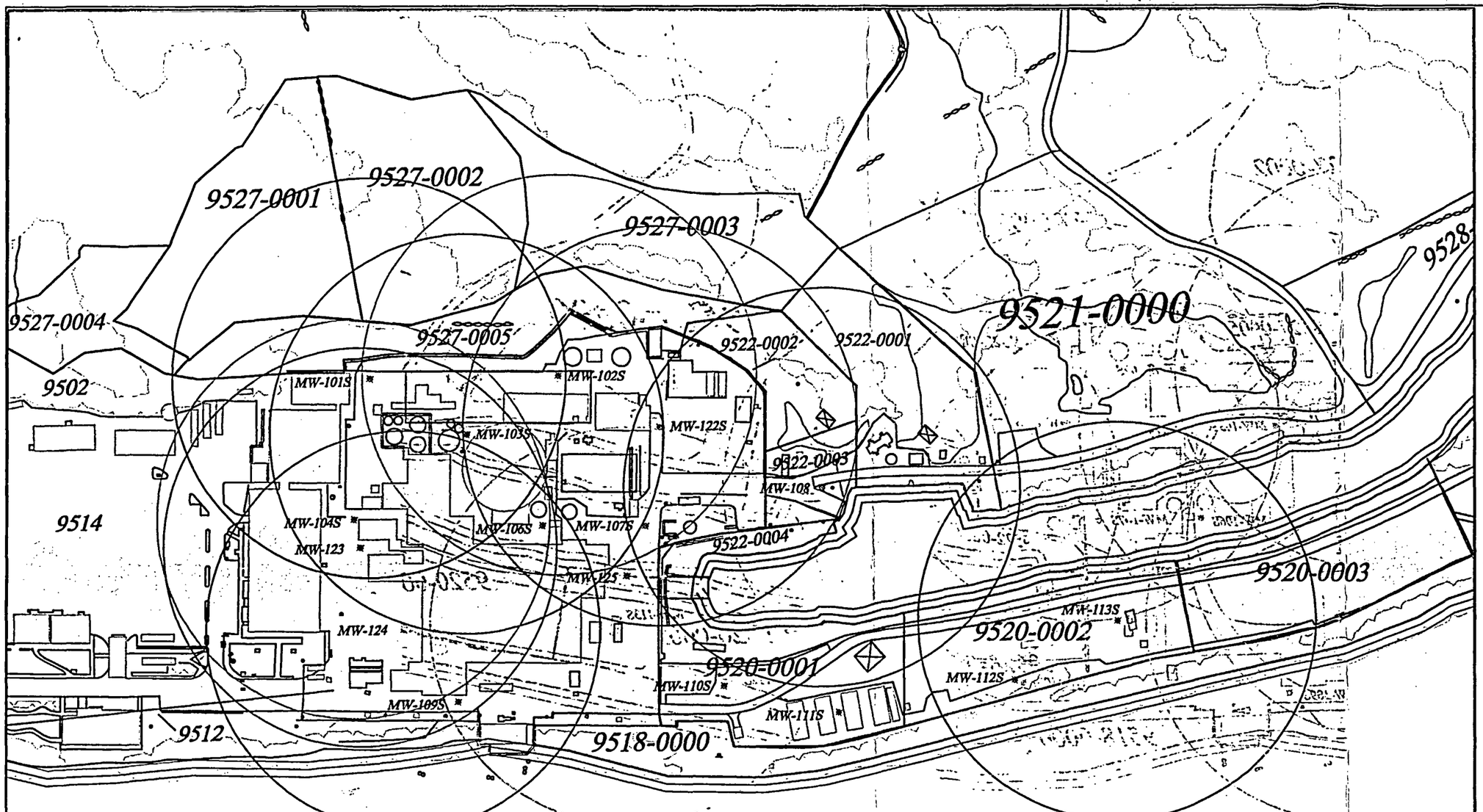
5-9 Technical Support Document, BCY-HP-114, Rev. 0, "Dose Comparison of Imbedded Pipe to Building Structures."

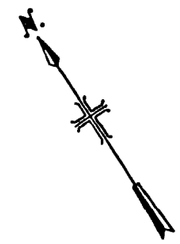
5-10 Information Notice 85-92, "Surveys of Wastes Before Disposal from Nuclear Reactor Facilities."

5-11 IE Circular 81-07, "Control of Radioactively Contaminated Material."

5-12 ISO 7503-1

5-13 Estimated zone of Influence/Capture Zone for Hypothetical Water Supply Wells in Post-Closure Dos Modeling, CH2MHILL, Technical Memorandum, dated January 11, 2005.





Legend

= Well Location

Notes

100 meter radius

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

January 2005

Connecticut Yankee Atomic Power Company
Capture Zone Perimeter for Affected Monitoring Wells
in the Industrial Area and Upper Peninsula

Figure Number	Rev
Figure 5-3	0

9528-0000

9528-0003

100 meter radius

9528-0002

MW-2

Supply Well B

9530-0002

9530-0003

9530-0004

MW-117S

9530-0001

MW-1

9520-0003

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)

N

Legend

= Well Location

Notes

January 2005	Connecticut Yankee Atomic Power Company Capture Zone Perimeter for Affected Monitoring Wells in the Central Peninsula	Figure Number	Rev
		Figure 5-3.1	0