VERMONT YANKEE NUCLEAR POWER STATION

ROUTINE PROCEDURE

RP 2616

REVISION 3

SAMPLING, TESTING AND TREATMENT OF PLANT POTABLE WATER SYSTEM

USE CLASSIFICATION: **INFORMATION**

RESPONSIBLE PROCEDURE OWNER: **Superintendent, Chemistry**

REQUIRED REVIEWS		Yes/No
E-Plan	10CFR50.54(q)	No
Security	10CFR50.54(p)	No
Probable Risk Analysis (PRA)		No
Reactivity Management		No

LPC No.	Effective Date	Affected Pages

Implementation Statement: N/A

Issue Date: 04/13/2004

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PURPOSE

To provide a method for personnel to sample, test and treat plant potable water systems in order to protect the health of Vermont Yankee employees, contractors and visitors.

There are no Technical Specifications applicable to potable water systems.

DISCUSSION

Potable water is supplied to various locations at the plant site from four drilled wells. The West Well supplies the Main Building complex as well as Gate House 1 & 2, South Warehouse and the Governor Hunt House. The COB well supplies the Containment Office Building. The Southwest Well provides a secondary/backup source of water for buildings normally supplied by the West Well. The New Engineering Office Building Well supplies water to that building only. Specific information on each of the four plant wells is given in Table 1.

The State of Vermont has classified the Vermont Yankee Plant as having three non-transient, non-community public water systems. The Main Plant System, supplied by the West/Southwest Wells, has the State Identification number WSID-8332. The COB System, supplied by the COB well, has the State Identification number WSID-20559. The New Engineering Office Building System has the State Identification number WSID-20738. However, all three of these systems are considered Class II by the State. At least one person at Vermont Yankee must be certified by the State of Vermont as a Class II public water system operator.

Water samples must be taken on a routine basis from drinking water outlets supplied by each of the three plant potable water systems to ensure that potable water is safe to drink and meets the State and Federal drinking water requirements. Water samples are also taken quarterly from each potable water system per OP 4605 and analyzed for the presence of radionuclides.

Annually the State of Vermont Water Supply Division personnel will provide Vermont Yankee with a schedule of what tests in addition to coliform are to be performed (if any).

If analytical data indicates that one of the potable water systems may contain a contaminant that exceeds one of the Maximum Concentration Limits (MCLs) listed in the Vermont Water Supply Rule - Chapter 21, the drinking water outlets supplied by that system may be required to be posted "DO NOT DRINK THE WATER" and the Vermont Water Supply Division must be notified within 24 hours.

50.59 Applicability Determination previously completed and showed 50.59 screening is not required.

Laboratories that perform tests on Vermont Yankee potable water samples to meet State compliance monitoring requirements must be listed on the "Table of Laboratories Acceptable to the Vermont Water Supply Division for Compliance Monitoring"; otherwise, the analytical results will not be acceptable for compliance monitoring purposes. All samples that are analyzed by contractor laboratories must be transported with a completed Chain of Custody Form.

ATTACHMENTS

1.	Figure 1	Bacteriological Sampling Plan
2.	Table 1	Plant Well Information
3.	Appendix A	Reporting Addresses and Telephone Numbers
4.	VYRPF 2616.01	Domestic Well Sampling Log

QA REQUIREMENTS CROSS REFERENCE

1. None

REFERENCES AND COMMITMENTS

1. Technical Specifications and Site Documents

   a. None

2. Codes, Standards, and Regulations

   a. Vermont Water Supply Rule, Chapter 21

3. Commitments

   a. None

4. Supplemental References

   a. Vermont Water Supply Rule, Chapter 21 (WSR)
   b. 40 CFR, Parts 141-143
   c. Total Coliforms, American Water Works Assoc., 1990
   d. State of Vermont, Water Supply Division Lead and Copper Monitoring Guidance Document
   e. State of Vermont Well Completion Reports
   f. Plant Drawing 5920-6992
   g. Wagner, Heindell, and Noyes, Inc. pump test data 9-4-86 & 11-14-86
   h. AP 0009, Condition Reports
   i. OP 4605, Environmental Radiation Sampling and Analysis
   j. RP 4615, Septage Certification and Indirect Discharge Permit Required Sampling, Analysis and Spreading
   k. AP 6807, Collection, Temporary Storage and Retrieval of Quality Assurance Records
   l. PP 7603, Environmental Program

PRECAUTIONS/LIMITATIONS

1. Ensure that all samples collected for laboratory analysis are maintained on ice immediately upon collection and during transport.

2. Bacteria samples must be transported to the laboratory within 24 hours.

3. Ensure that results of analyses are received and transmitted to appropriate State offices before the end of the quarter for which the sample is required.

PREREQUISITES

1. Recommended Equipment

   - Sterile 4 oz bottles for coliform bacteria sampling
   - 40 milliliter glass vials (VOA) for Volatile Organic Carbon (VOC) sampling
   - Sample bottles (as required) for nitrate, SOC, lead and copper samples
   - Sample bottle labels
   - Chain of custody form (generic or vendor specific)
   - VYRPF 2616.01 form

2. Recommended Chemicals

   - Isopropyl Alcohol or Germicidal Cloth
   - 65% Calcium Hypochlorite compound (well chlorination only)
   - 5% to 15% Sodium hypochlorite solution (bleach)

3. Personal Protective Equipment

   - Safety glasses
   - Gloves

4. Other

   - Pre-plan to transport samples to State of Vermont approved laboratory
   - Sample bottles may be labeled prior to collection
   - Chain-of-custody may be filled out prior to collection

1. Sampling for Coliform Bacteria (WSR 6.3 and 40 CFR 141.21)

NOTE

During each quarter of the year a sample of potable water must be taken from an outlet supplied by each of the potable water systems and analyzed for the presence of coliform bacteria per the Water Supply Rule. Sample locations should be varied each quarter per the bacteriological sampling plan (see Figure 1).

a. Proceed to one of the potable water outlets to be sampled.

b. Remove the faucet strainer/aerator using a clean paper towel to prevent finger contact.

c. Sanitize the outlet area of the faucet with isopropyl alcohol or germicidal cloth.

d. Turn the faucet on and let the water run at full flow for a total of 8-10 minutes before taking a sample. If sampling from a mixing faucet, run the hot water for 2 minutes, then the cold water for 6-8 minutes.

e. Note purge start time on VYRPF 2616.01 form.

CAUTION

1. **Do not touch the mouth of the sample bottle with your fingers**
2. **Do not rinse the sample bottle**
3. **Do not over flow the sample bottle**

f. Reduce the flow from the faucet and fill the sample bottle to slightly above the 100 ml line. (Coliform test requires 100 ml of sample)

g. Tighten the sample bottle cap firmly to prevent leakage.

h. Turn the faucet off.

i. Replace the faucet strainer/aerator.

j. Note purge finish time on VYRPF 2616.01.

k. Label or verify sample container labeling with the following information:

- Sample location ID (i.e., COB-2nd FL KITCHEN)
- Date and time of sample
- Name of person collecting the sample
- Sample type

l. Record information collected on VYRPF 2616.01 form.

m. Repeat steps a.-l. for each additional sample that is required.

n. Fill out a chain of custody form

o. Send the sample container(s) to a State of Vermont approved laboratory for analysis.

p. When test results are received from the analytical laboratory:

1) Review Section 6 for Reporting Requirements.

2) If test results indicate that coliform bacteria are present in the potable water, refer to Section 7.

2. Sampling for Volatile Organic Compounds (VOCs) and Synthetic Organic Compounds (SOCs)

NOTE

VOC and SOC samples should be taken from the same place each sampling period. For the COB system, use the cafeteria sink. For the Main system, use the Chemistry Office sink. (ER971533) For the New Engineering Office Building system, use the cafeteria sink.

a. Proceed to one of the potable water outlets to be sampled.

b. Remove the faucet strainer/aerator.

c. Turn the faucet on and let the cold water run for approximately 10 minutes.

d. Note purge start time on VYRPF 2616.01 form.

CAUTION

1. **Do not rinse the containers, sample containers may contain a preservative.**

2. **Do not over flow the sample bottles.**

e. Fill required vials for VOCs and/or SOCs to the point of overfilling, creating a convex menicus slightly above the top of the vial. When the Teflon cap is tightened onto each vial, there must not be any air bubbles present in the sample(s).

f. Turn off the faucet.

g. Note purge finish time on VYRPF 2616.01 form.

h. Replace faucet strainer/aerator.

i. Label or verify labeling of the sample container with the following information:

- Sample location ID (i.e., COB-2nd FL KITCHEN)
- Date and time of sample
- Name of person collecting the sample
- Sample type

j. Record information collected on VYRPF 2616.01 form.

k. Repeat steps a.-j. for each additional sample that is required.

l. Fill out a chain of custody form.

m. Send the sample vials to a State of Vermont approved laboratory for analysis.

n. When laboratory results are received from the analytical laboratory, review Section 6 for reporting and retest requirements.

3. Sampling for Lead and Copper

NOTE

Lead and copper sampling of potable water systems is normally requested by State personnel to be done once per year between June and September. The current program requires that fifteen locations be sampled, 5 from each potable water system.

COB System	Main Plant System	New Eng'g Office System
Cafeteria	Admin 1st floor kitchen	Cafeteria sink
1st floor kitchen	Control Room kitchen	2nd floor kitchen
2nd floor rest room	Admin 2nd floor kitchen	3rd floor kitchen
2nd floor kitchen	Chemistry Office sink	1st floor drinking fountain
1st floor rest room	ELF building washroom	2nd floor drinking fountain

CAUTION

Samples collected for lead and copper analysis must be the first draw following at least a 6 hour non-use period.

a. Proceed to the first potable water outlet to be sampled.

b. Place a one liter sample bottle under the sample point.

c. Turn on the cold water tap or water fountain cold water supply.

d. Fill the sample bottle with approximately first liter of water from the faucet or fountain.

e. Seal the sample container.

f. Secure the water flow.

g. Note sample time on VYRPF 2616.01 form.

h. Label or verify labeling of the sample container with the following information:

- Sample location ID (i.e., COB-2nd FL KITCHEN)
- Date and time of sample
- Name of person collecting the sample
- Sample type

i. Record information collected on VYRPF 2616.01 form.

j. Repeat steps a.-i. for each additional sample that is required.

k. Fill out a chain of custody form.

l. Send the containers to a State of Vermont approved laboratory for analysis.

m. When test results are received from the analytical laboratory, refer to Section 6 for reporting and retesting requirements.

4. Sampling for Nitrate and other Inorganic Compounds (IOC)

NOTE

Nitrate and IOC samples should be taken from the same place each sampling period. For the COB system, use the cafeteria sink. For the Main system, use the Chemistry Office sink. (ER971533) For the New Engineering Office Building, use the cafeteria sink.

a. Proceed to the potable water outlet to be sampled.

b. Turn the faucet on and let the cold water run for 10 minutes.

c. Fill a container with an appropriate volume of sample.

d. Seal the sample container.

e. Turn off the faucet.

f. Label or verify labeling of the sample container with the following information:

- Sample location ID (i.e., COB-2nd FL KITCHEN)
- Date and time of sample
- Name of person collecting the sample
- Sample type

g. Repeat steps a.-f. for each additional sample that is required.

h. Fill out a chain of custody form.

i. Send the sample containers to a State of Vermont approved laboratory for analysis.

j. When test results are received from the analytical laboratory, review Section 6 for reporting and retest requirements.

5. Chlorination of Plant Wells and Water System Components

NOTE

It may be necessary to chlorinate one or more of the plant wells if potable water analysis results indicate that coliform bacteria are present or there was a maintenance activity which would introduce coliform bacteria into the system.

CAUTION

Potable water outlets supplied by the well to be chlorinated must be posted "do not drink the water".

a. Issue a Work Order to Maintenance Department to chlorinate the well.

b. Determine total depth of well to be treated (Table 1).

c. Calculate the standing water column.

1) Using Solinst water level indicator determine depth to groundwater in well in feet.

2) Use following calculation to determine standing water column in well:

a) Total depth of well (feet) - depth to groundwater (feet) = standing water column (feet).

d. Calculate storage capacity.

1) Use the following information to determine storage capacity in gallons per foot of water column:

Diameter of well casing in inches	Storage capacity in gallons per foot of water column
6	1.47
8	2.62

e. Calculate volume of water in gallons.

1) Standing water column (feet)*1.47 or 2.62 = gallons requiring disinfection.

f. Calculate the disinfectant dose and contact time required to shock **100 gallons** using the following information:

Chlorine Dose	Required Contact Time	If using Bleach 5.25%, add	If using, HTH (solid) 65% (pool shock), add
50 mg/L	24 hours	1 pint	1 ounce or 2 teaspoons
100 mg/L	12 hours	1 quart	2 ounces or 4 teaspoons
200 mg/L	2 hours	2 quarts	4 ounces or 8 teaspoons

NOTE

For wells with a water column of more than 200 feet or a production that exceeds the submersible output, add a combination of HTH and bleach. Use enough bleach to disinfect the first 200 feet of water column and use HTH on the remainder of the column. Crushing the HTH tablets will give better mixing potential with the water column.

g. Chlorinate well by pouring the appropriate volume of disinfectant down the well casing.

h. Instruct Maintenance to recirculate the well until disinfectant can be smelled and the casing has been adequately washed down.

NOTE

Recirculation of the West well may not be possible due to its distance from the plant.

i. Allow shocked water to remain isolated for the required contact time.

j. Flush the chlorinated well by opening applicable potable water outlets.

CAUTION

Prior flushing activities, water meter readings should be recorded per RP 4615 to ensure proper accountability during reporting to the VTDEC.

k. Following flushing, Chemistry personnel will take a sample to ensure that the chlorine residual is <0.5 ppm.

l. Perform coliform bacteria sampling per Section 1.

m. Remove "Do Not Drink the Water" signs as instructed by a Chemistry Class II or III Public Water System Operator.

6. State Reporting Methods and Requirements

NOTE

Results of potable water tests which were done for compliance purposes, must be submitted to the address listed on Appendix A before the end of the quarter for which the test was required.

CAUTION

Any laboratory result which exceeds MCLs must be reported to the State of Vermont.

a. Coliform Bacteria Laboratory Results

1) For all negative laboratory results, forward the results to the agency listed on Appendix A.

2) Positive laboratory results require notification of the agency listed on Appendix A.

3) If results are positive, retest per Section 1.

b. Volatile Organic Carbon and Synthetic Organic Carbon Laboratory Results

1) For all laboratory results that are less than the minimum detection limit or less than the drinking water limit, forward the results to the agency listed on Appendix A.

2) Laboratory results indicating that VOCs and/or SOCs MCLs are exceeded, notify the agency listed on Appendix A.

3) If results exceed limits, retest per Section 2.

c. Lead and Copper Laboratory Results

1) Complete the State of Vermont reporting form.

2) Forward the results to the agency listed on Appendix A.

3) If the results indicate that the MCL has been exceeded for copper/lead, notify the agency listed on Appendix A and retest per Section 3.

d. Laboratory Results for Nitrate and Other Inorganic Compounds

1) Forward the results to the agency listed on Appendix A.

2) If the results indicate that the nitrate concentration is > 10 mg/ml or that other species (e.g., cyanide, arsenic) exceed the appropriate MCL, notify the agency listed on Appendix A.

3) If the results indicate that the nitrate concentration is ≥ 50% of the MCL, quarterly samples must be taken per 40 CFR 141.23(d)(2). (AUDITRPT972105)

4) If results exceed limits, notify the agency listed on Appendix A and retest the appropriate parameter per Section 4.

7. Coliform Positive Tests

a. Notify the agency listed on Appendix A within 24 hours of receiving positive test results.

b. Retest per Section 1 within 24 hours.

ACCEPTANCE CRITERIA

1.	Coliform Bacteria	None Present
2.	Nitrate	<10 mg/L
3.	Lead	<0.015 mg/L
4.	Copper	<1.3 mg/L
5.	VOCs, SOCs, heavy metals, other inorganics etc.	<MCL

FINAL CONDITIONS

1. All required test results, chain of custody forms and applicable State correspondence filed per AP 6807. (ER971533)

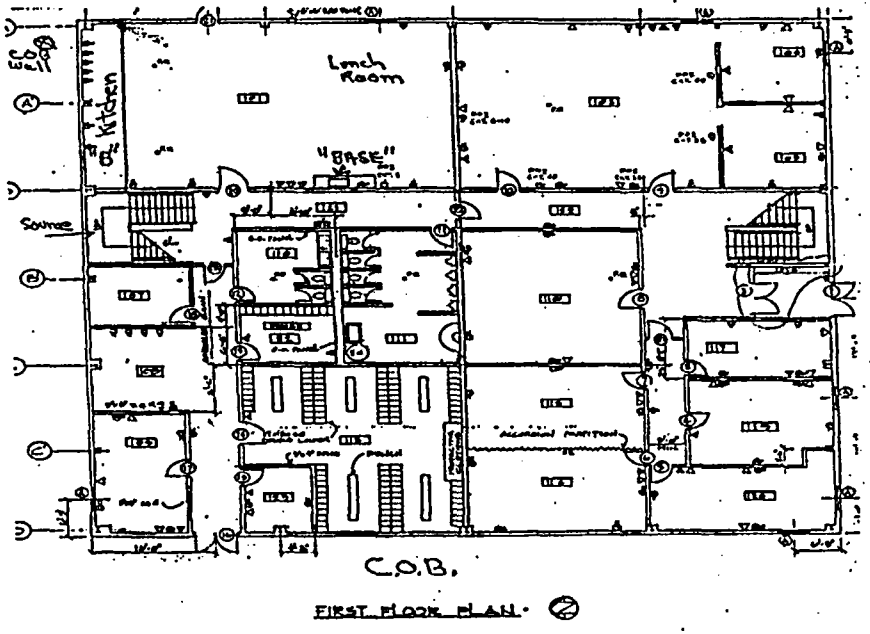
2. A Condition Report is issued per AP 0009 if plant drinking water does not meet the acceptance criteria.

FIGURE 1

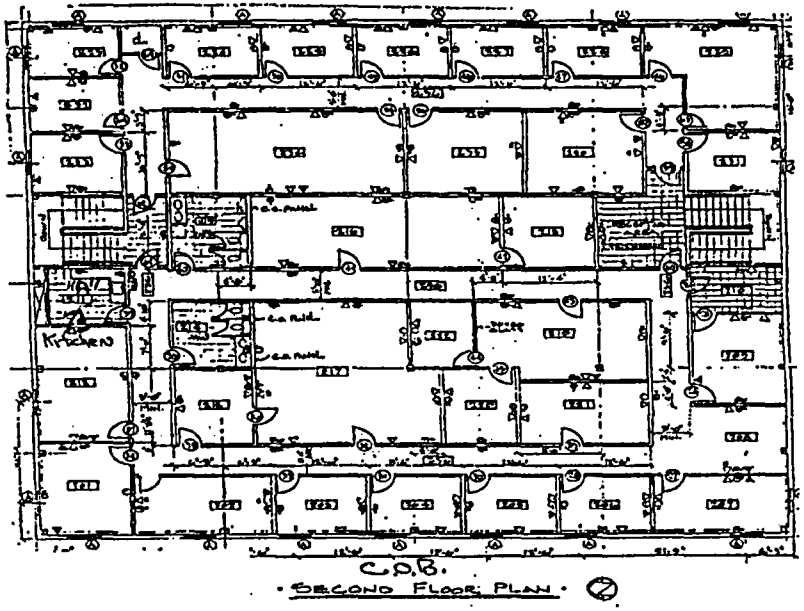
BACTERIOLOGICAL SAMPLING PLAN

Bacteriological Sampling Plan

Vermont Yankee Nuclear Power Corporation, C.O.B. System, WSID 20559



FIRST FLOOR PLAN

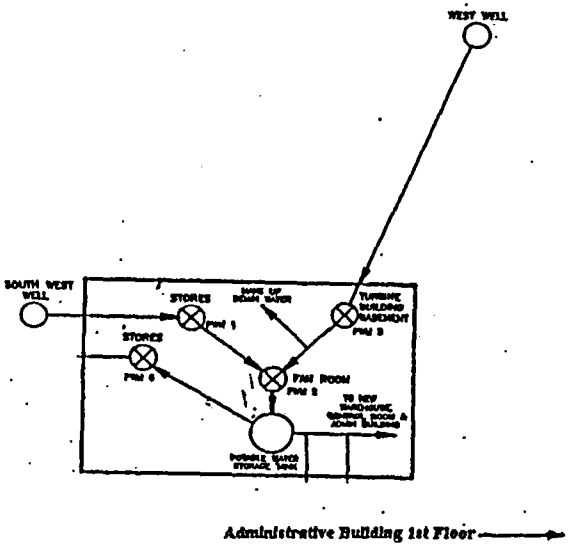


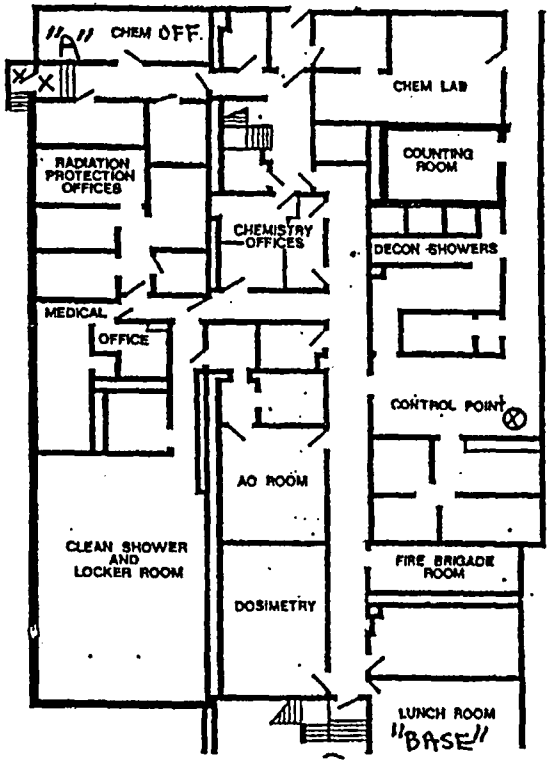
SECOND FLOOR PLAN

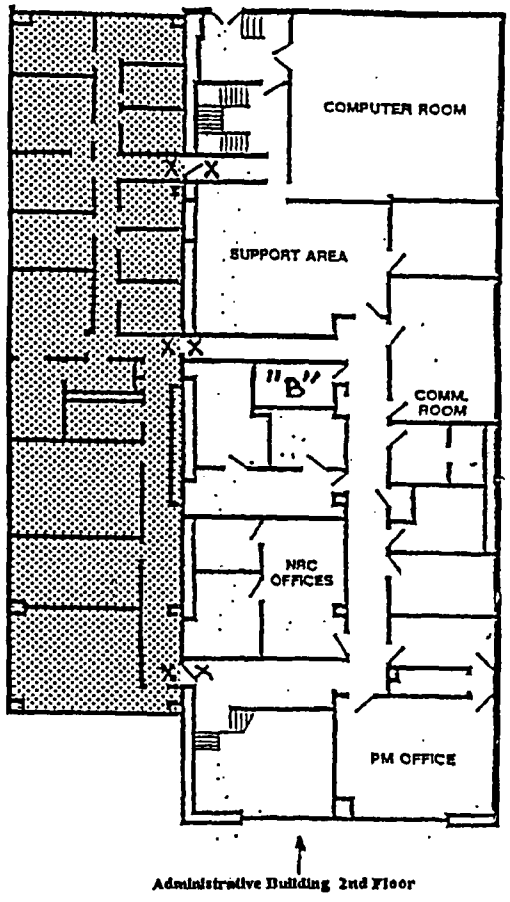
1st Quarter: Sample at "Base" (C.O.B. 1st Floor Lunchroom)
2nd Quarter: Sample at "A" (C.O.B. 2nd Floor Kitchen)
3rd Quarter: Sample at "Base" (C.O.B. 1st Floor Lunchroom)
4th Quarter: Sample at "B" (C.O.B. 1st Floor Kitchen)

Bacteriological Sampling Plan

Vermont Yankee Nuclear Power Corporation, Main Plant System, WSID 8332







1st Quarter: Sample at "Base" (Administrative Building 1st Floor Kitchen)
2nd Quarter: Sample at "A" (Chemistry Office)
3rd Quarter: Sample at "Base" (Administrative Building 1st Floor Kitchen)
4th Quarter: Sample at "B" (Administrative Building 2nd Floor Kitchen)

Bacteriological Sampling Plan
Vermont Yankee Nuclear Power Corporation
New Engineering Office Building
WSID # 20738

1st Quarter: Sample at "Base"	(1st Floor Cafeteria)
2nd Quarter: Sample at A	(2nd Floor Kitchen)
3rd Quarter: Sample at "Base"	(1st Floor Cafeteria)
4th Quarter: Sample at B	(3rd Floor Kitchen)

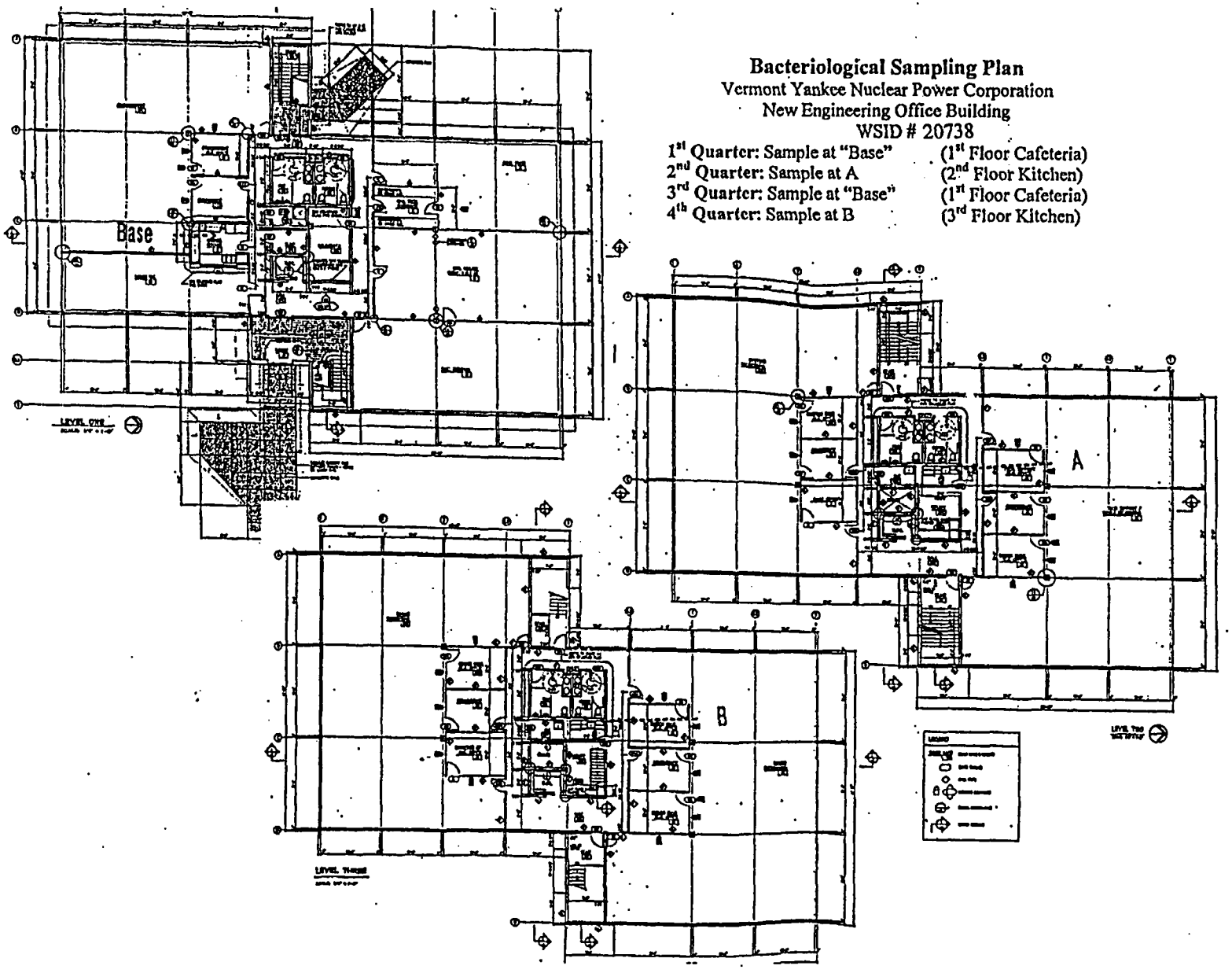


Figure 1
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TABLE 1

PLANT WELL INFORMATION

VERMONT YANKEE POTABLE WATER WELLS				
Well Designation	COB	Southwest	West	New Engineering Office Building
Date of Installation	August, 1986	June, 1986	July, 1987	July, 1998
Well Depth	362 feet	500 feet	555 feet	500 feet
Amount of Casing	80 feet	67 feet	51 feet	38 feet
Diameter of Casing	6 inches	6 inches	6 inches	6 inches
Static Water Level	31.4 feet	24.5 feet	*	4 feet
Pump Size	1 HP	1.5 HP	15 HP	1.5 HP
Pump Depth	350 feet	497 feet	400 feet	480 feet
Well Rating	9 gpm	10.5 gpm	73.7 gpm	30 gpm
WSID	20559 (1/96)	8332 (9/96)		20738 (4/99)

* Data is currently not available.

NOTES:

- The COB and Southwest wells were approved by the State on 12/10/86.
- The West well was approved by the State on 11/19/87.
- The New Engineering Office Building well was approved by the State on 4/22/98.

APPENDIX A

REPORTING ADDRESSES AND TELEPHONE NUMBERS

Water Supply Compliance Specialist
Agency of Natural Resources
Department of Environmental Conservation
The Old Pantry Building
103 South Main Street
Waterbury, VT 05671-0403

The telephone number is 1-800-823-6500 or 1-802-241-3400

Public notification of drinking water problems must include the EPA mandatory health effects language required by 40 CFR 141.

Vermont Yankee Nuclear Power Station

320 Governor Hunt Road, Vernon, Vermont 05354
(802) 258-5525 FAX (802) 258-5509

DOMESTIC WELL SAMPLING LOG

Sheet _____ of _____

Sampling Period:_____ Collected for:_____

Location:_____ Date:_____

Personnel:_____ Weather Conditions:_____

Location	Purge Start Time	Purge Finish Time	Odors (Y/N)	Comments

Field Instrumentation	I.D. Number	Calibration	Notes

Notes: