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August 3, 2006

Mr. Stuart A. Richards, Deputy Director
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Groundwater Protection – Data Collection Questionnaire
Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC
Docket Nos: 50-269, 50-270, 50-287, 50-369, 50-370, 50-413, 50-414

Dear Mr. Richards:

The nuclear industry, in conjunction with the Nuclear Energy Institute, has developed a questionnaire to facilitate the collection of groundwater data at commercial nuclear reactor sites. The objective of the questionnaire is to compile baseline information about the current status of site programs for monitoring and protecting groundwater and to share that information with the NRC. The completed questionnaire for Oconee, McGuire, and Catawba Nuclear Stations is enclosed.

This submittal contains no new regulatory commitments.

Please contact S. E. Le Roy at (704) 382-0471 if you have questions about the enclosed information.

Very truly yours,

James R. Morris

Attachments

xc:

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Industry Groundwater Protection Initiative
Voluntary Data Collection Questionnaire

1. **Briefly describe the program and/or methods used for detection of leakage or spills from plant systems, structures, and components that have a potential for an inadvertent release of radioactivity from plant operations into groundwater.**

   - All personnel working at the site are responsible for notifying Maintenance SPOC (Single Point of Contact) or initiating a Work Request upon discovery of a leaking component.
   - Equipment owners (Operations, Radwaste/Chemistry, and Maintenance) maintain ultimate responsibility for the identification of leaking components as part of daily plant rounds.
   - Operations personnel perform routine surveillance rounds each shift. These rounds include the requirement to identify and report leaks and spills. Leaks and spills are addressed through: immediate clean-up, notifying supervision for assistance, writing a work request or initiating a PIP (Problem Investigation Process).

2. **Briefly describe the program and/or methods for monitoring onsite groundwater for the presence of radioactivity released from plant operations.**

   - Oconee has twenty-four (24) groundwater monitoring wells.
     - Approximately half of the groundwater monitoring wells are located around Chemical Treatment Ponds 1, 2 and 3 (CTPs).
     - The remaining onsite wells are located near the site landfill, the site landfarm, and at various locations around the site.
     - One offsite residential well is included in the sampling program.

   - The groundwater monitoring wells are sampled and analyzed either quarterly, semi-annually, or annually, as scheduled.
     - The samples are analyzed for radionuclides, including tritium.
     - Typical minimum detectable activity (MDA) for groundwater samples are listed below. These values represent the detection capability of environmental laboratory instrumentation.

Nuclide	Typical Minimum Detectable Activity (MDA) (pCi/l)
Gross Beta	2
Tritium	250
Mn-54	6
Fe-59	12
Co-58, Co-60	9
Zn-65	10
Zr-95	8
Nb-95	7
I-131	6
Cs-134	6
Cs-137	7
Ba/La-140	11

3. **If applicable, briefly summarize any occurrences of inadvertent releases of *radioactive liquids that had the potential to reach groundwater and have been* documented in accordance with 10 CFR 50.75(g).**

Events listed below are those which have been documented in accordance with 10 CFR 50.75(g) and had potential to reach groundwater; however, an actual release to groundwater may not have occurred.

- 9/10/1973.
  While filling Chem-Nuclear tank truck, approximately 20 gallons of water spilled to ground when tanker overflowed. Waste had been pumped from "B" Miscellaneous Waste Hold-up Tank (MWHUT) and line was being flushed with demineralized water.

- 11/12/1974
  Spill occurred when vent line from inservice letdown filter (HP-F2B) was removed in error. Approximately 3500 gallons of water spilled into Letdown Filter Room and adjacent hallways.

- 12/18/1974
  Approximately 50 gallons of water overflowed Chem-Nuclear transport tanker during fill. Tanker was located at loading area adjacent to Unit 1

- 1/18/1977
  Discharge of Turbine Building Sump, following a primary to secondary leak, resulted in liquid release in excess of 10 CFR 20, Appendix B, Table II, Column 2. Sump contents were pumped to Upper Settling Basin, Lower Setting Basin, and Waste Oil Collection Basin (CTP-2, CTP-1, CTP-3) A spill occurred when contents overflowed the Waste Oil Collection Basin. Note: currently these are only referred to as the Chemical Treatment Ponds.

- 7/04/1977
  2B Low Pressure Injection (LPI) pump was placed in service after maintenance on LP valves. Pump drain and vent valves were left open and approximately 11,500 gallons of water was spilled from the Spent Fuel Pool and Unit 2 Fuel Transfer Canal to the LPI sump. Spillage was transferred to the High Activity Waste Tank (HAWT). Water eventually backed up from the HAWT through floor drains in the High Pressure Injection (HPI) pump room. Approximately 10 inches of water was found in the HPI pump room.

- 12/05/1978
  Small cask used for transferring incore material inside the protected area fell off back of truck outside Unit 2 Reactor Building Equipment Hatch. Approximately 1 gallon of water spilled from cask onto pavement.

- 5/16/1979
  Overflow of Unit 3 Borated Water Storage Tank (BWST) occurred during drain down of fuel transfer canal. Canal water flooded back through vent (3LP-59) to a West Penetration Room floor drain. Water flowed under the door and reached the ground outside.

- 10/16/1979
  LPI water spilled into West Penetration Room through Gaseous Waste Disposal (GWD) system valve 3GWD-152. Approximately 130 gallons of water spilled on to the ground near Unit 3 BWST.

- 11/10/1979
  Once-through-Steam-Generator (OTSG) sample line was drained to onsite sewage treatment plant. OTSG sampling point in Unit 3 primary sample hood was connected by tygon tubing to an adjacent restroom sink. Sink drained to sewage treatment plant and water was eventually discharged through the Waste Oil Collection Basin (CTP-3).

- 5/29/1980
  Unit 2 Tendon Gallery found flooded to a depth of approximately 2 feet. Source of water concluded to be from Decon Tank Room through the Reactor Building-Auxiliary Building interface.

- 7/16/1980
  Approximately 5 gallons of evaporator concentrates spilled during transfer to a liner in the mobile solidification area south of the Interim Radwaste Building. Leak was noticed from spillage from an inspection hole in the cask containing the liner.

- 7/21/1980
  Approximately 1 quart of water spilled on asphalt from shielded cask containing a letdown filter when the cask fell over.

- 9/18/1981
  Large volume of secondary system water was contaminated as a result of a steam generator tube leak on Unit 2. Much of the water processed through portable demineralizers was routed from the Turbine Building Sumps to CTP-2 for release.

- 2/24/1982
  Leak in Liquid Waste Disposal (LWD) system (valves LWD-686 and LWD-668) discovered in trench during transfer of concentrates from Interim Radwaste Facility to Chem-Nuclear Solidification unit

- 7/09/1982
  A spill occurred near the Unit 3 solidification area while filling a portable demineralizer.

- 11/13/1982
  During a resin transfer, approximately 2-3 gallons leaked from the cask dewatering pump to the ground outside the Hot Machine Shop.

- 9/06/1984
  Valve misalignment resulted in transfer of spent Powdex resin from cells 2D and 2E to CTP-1 instead of the Powdex backwash tank.

- 3/31/1985
  LPI leak into Unit 2 East Penetration Room (2GWD-153), down the outside Unit 2 Auxiliary Building to an area near Unit 2 Reactor Building equipment hatch. Approximately 50 gallons of water entered the yard drain to CTP-3.

- 4/25/1985
  Batch of used resin from Powdex cells 1A and 1D was transferred to CTP-2 instead of the Powdex Backwash Tank.

- 6/10/1985
  Approximately 517 gallons of water containing Powdex resin was released to the Yard Drain System and CTP-3.

- 10/07/1987
  A spill occurred from Unit 1 BWST when freeze plug melted. Nitrogen supply to freeze plug depleted and approximately 30,000 gallons leaked at welds (East Penetration Room) between BWST and 1LP41. A portion of the water drained to the BWST pipe chase/pit and then to the Yard Drain System and CTP-3.

- 5/17/1990
  Unit 1 and 2 Spent Fuel Pool overflowed resulting in a spill of about 10,000 gallons of water. Most of the water entered the cask decon pit and other areas of the Auxiliary Building. An estimated 60 gallons of the spilled water were released through a floor drain in the Spent Fuel Pool change room to the Sanitary Waste Lagoon. Another estimated 50 gallons spilled on asphalt outside the Fuel Receiving Bay roll up door and the Cask Decon Pump Room door.

- 4/25/1998
  Flange leak on 2LPI-IV-0007 resulted in 6.5 liters of water spillage under 2BWST siding.

- 11/29/2000
  A spill occurred at Treatment Storage Disposal Facility (TSDF) Pad 5 (oil collection storage at south end of Auxiliary Building) resulting in contaminated soil.

- 5/17/2003
  Contamination occurred at the Unit 3 equipment hatch as a result of moving the contaminated Unit 3 head during a rain event.

4. **If applicable, briefly summarize the circumstances associated with any <u>onsite</u> or <u>offsite</u> groundwater monitoring result indicating a concentration in groundwater of radioactivity released from plant operations that exceeds the maximum contaminant level (MCL) established by the USEPA for drinking water.**

   All groundwater sample results collected from groundwater monitoring wells have been below the USEPA MCL for drinking water for radionuclides.

5. **Briefly describe any remediation efforts undertaken or planned to reduce or eliminate *levels of radioactivity resulting from plant operations in soil or groundwater onsite or* offsite.**

   - Low levels of tritium (below the USEPA MCL for drinking water) have been observed in groundwater around Chemical Treatment Ponds #1 and #2 (CTP1 and CTP2). A project is underway to stabilize the sludge and to add a synthetic liner to each pond.

   - Corrugated metal storm pipes between the chemical treatment ponds were slip lined.

Industry Groundwater Protection Initiative
Voluntary Data Collection Questionnaire

1. **Briefly describe the program and/or methods used for detection of leakage or spills from plant systems, structures, and components that have a potential for an inadvertent release of radioactivity from plant operations into groundwater.**

   - The McGuire plant has a groundwater drainage system (WZ) to prevent the buildup of hydrostatic pressure on plant structures. Groundwater collected from this system is sampled and analyzed for radionuclides.
   - All personnel working at the site are responsible for notifying Maintenance SPOC (Single Point of Contact) or initiating a Work Request upon discovery of a leaking component.
   - Equipment owners (Operations, Radwaste/Chemistry, and Maintenance) maintain ultimate responsibility for the identification of leaking components as part of daily plant rounds.
   - Operations personnel perform routine surveillance rounds each shift. These rounds include the requirement to identify and report leaks and spills. Leaks and spills are addressed through: immediate clean-up, notifying supervision for assistance, writing a work request or initiating a PIP (Problem Investigation Process).

2. **Briefly describe the program and/or methods for monitoring onsite groundwater for the presence of radioactivity released from plant operations.**

   - McGuire has eight (8) onsite groundwater monitoring wells. These groundwater monitoring wells are located near the Reactor and Auxiliary Buildings and toward the site boundary.
   - The groundwater monitoring wells are sampled and analyzed quarterly.
   - The samples are analyzed for radionuclides, including tritium.
   - Typical minimum detectable activity (MDA) for groundwater samples are listed below. These values represent the detection capability of environmental laboratory instrumentation.

Nuclide	Typical Minimum Detectable Activity (MDA) (pCi/l)
Gross Beta	2
Tritium	250
Mn-54	6
Fe-59	12
Co-58, Co-60	9
Zn-65	10
Zr-95	8
Nb-95	7
I-131	6
Cs-134	6
Cs-137	7
Ba/La-140	11

3. **If applicable, briefly summarize any occurrences of inadvertent releases of radioactive liquids that had the potential to reach groundwater and have been documented in accordance with 10 CFR 50.75(g).**

   Events listed below are those which have been documented in accordance with 10 CFR 50.75(g) and had potential to reach groundwater; however, an actual release to groundwater may not have occurred.

   - March 1987
     Contaminated soil was recovered from a Unit 1 reactor make-up water storage tank (RMWST) rupture.

   - 7/10/1992
     Soil and sludge was recovered as a result of a spill of water in the area between Unit 2 refueling water storage tank (FWST) and the shield wall. The water was discharged into a spillway between standby nuclear service water pond (SNSWP) and the waste water collection basin (WWCB).

   - 9/14/1998
     A leak occurred from Unit 1 reactor coolant drain tank (NCDT) through hydrogen storage (GB) instrument lines (1GB-9) into Unit 1 turbine building basement.

   - 6/26/2003
     Tritium was identified in the Groundwater Drainage System (WZ) sump. This system collects the groundwater drainage from under the site and channels it into the WZ sumps. The effluent from these sumps is composited and analyzed monthly.

   - 6/17/2004
     Documentation of tritium concentration which was greater than baseline values in two (2) temporary monitoring wells west of conventional waste (WC) holdup ponds.

   - 6/7/2004
     Contamination was discovered in the pipe trench between the radwaste facility and the solidification pad.

4. **If applicable, briefly summarize the circumstances associated with any onsite or offsite groundwater monitoring result indicating a concentration in groundwater of radioactivity released from plant operations that exceeds the maximum contaminant level (MCL) established by the USEPA for drinking water.**

   All groundwater sample results collected from groundwater monitoring wells have been below the USEPA MCL for drinking water for radionuclides. However, as described below, some limited samples from groundwater level monitoring equipment which is part of the Groundwater Drainage (WZ) system, have exceeded the MCL for tritium in drinking water. Samples from the level monitoring equipment have not historically been considered to indicate concentrations of radioactivity in groundwater. These sample results and their significance for purposes of assessing radioactivity released to the groundwater due to plant operations are under evaluation. Once that evaluation is complete, Duke will determine how

sample results from the various points of the WZ system will be treated for reporting purposes on a going-forward basis.

The WZ system was designed and built during plant construction to lower the water table where needed, and it is currently used to maintain the groundwater level below the structural distress limits of the Auxiliary Building and the Reactor Buildings. The WZ system consists of a grid of interconnected flow channels located beneath the Auxiliary and Reactor Buildings above rock and fill concrete and below the foundation slabs. Drilled holes through the fill concrete into rock permit groundwater to flow from beneath the fill concrete into the flow channels. All channels in the grid gravity drain to three WZ sumps. Once water is contained within the WZ system sumps, it has been considered to be part of the plant, and therefore, not groundwater per the Groundwater Protection Initiative. The WZ system drains the Auxiliary and Reactor Building foundations and maintains a normal groundwater level at or near the base of the foundation mat and basement walls.

An exterior groundwater drain system extends around the foundation perimeter and drains directly into WZ system sump C. The exterior groundwater drain system consists of two separate flow mediums of zoned sand and stone filter, with a metal perforated pipe. The filter extends around the foundation perimeter except for the side of the Auxiliary Building that is adjacent to the Turbine Building which will prevent a rise in groundwater.

There is groundwater level monitoring equipment located at or near the sand and stone filters around the Auxiliary, Reactor and Fuel Pool Buildings that contain instrumentation to provide indication of the groundwater level. This equipment is used to ensure that the WZ system is working properly to keep groundwater levels in the filter at acceptable levels and does not exceed the structural distress limits of the building structures.

Water level varies in these sand and stone filters. However, based on known field measurements, water elevations in the sand and stone filter are significantly below the normal groundwater elevations around the McGuire Nuclear Station. This situation coupled with the design of the system indicates that groundwater is constantly entering the WZ System through the filter. This also indicates that because of the difference of water elevation between the normal groundwater and sand and stone filter water, minor leakage from a plant system that exited the plant would be collected in the WZ system and would not enter the groundwater. Water discharged through the WZ system is monitored through the normal plant effluent program.

While the composite samples collected from WZ system sump C are deemed to be the most reliable samples provided by this system and are the only samples collected from this system on a regular basis, other samples have at times been collected from groundwater level monitoring equipment and analyzed. There have been some instances of samples collected from the groundwater level monitoring equipment that have exceeded the USEPA MCL for tritium in drinking water. On 5/20/05, a sample was collected from groundwater level monitoring equipment WZLS5070 (Unit 2 Equipment Staging Building). This sample indicated 138,000 pCi/l. A subsequent sample collection was attempted on 4/18/06 but could not be collected due to no water in the instrumentation. There has also been one grab sample from WZ sump A that was obtained on 10/14/05 that indicated 26,500 pCi/l. This sample is being noted for completeness; however, while this sump receives groundwater, it also receives water from plant systems within the Auxiliary Building that are known to contain tritium. Most of the water in this sump is coming from these plant systems. Several

samples collected from groundwater level monitoring instrumentation 2WZLP5100 have indicated results above the USEPA MCL for tritium in drinking water. This instrumentation is located in the northeast corner of the Auxiliary Building. The results of all samples collected from this instrumentation are set forth below:

Date	Sample result (pCi/l)
2/14/2006	35,200
2/15/2006	33,800
3/10/2006	33,100
5/1/2006	31,900
6/1/2006	33,200
6/21/2006	30,000
7/2/2006	30,000
7/17/2006	26,300
7/26/2006	31,700

No conclusion has been drawn about the source of the activity and an investigation is ongoing.

5. **Briefly describe any remediation efforts undertaken or planned to reduce or eliminate levels of radioactivity resulting from plant operations in soil or groundwater onsite or offsite.**

   - Low levels of tritium (below the USEPA MCL for drinking water) have been observed in groundwater around the Conventional Waste Water (WC) hold-up ponds. Lining of the ponds is being evaluated as a possible remediation action to reduce tritium concentrations in the groundwater near the pond.

Industry Groundwater Protection Initiative
Voluntary Data Collection Questionnaire

1. Briefly describe the program and/or methods used for detection of leakage or spills from plant systems, structures, and components that have a potential for an inadvertent release of radioactivity from plant operations into groundwater.

- The Catawba plant has a groundwater drainage system (WZ) to prevent the buildup of hydrostatic pressure on plant structures. Groundwater collected from this system is sampled and analyzed for radionuclides.
- All personnel working at the site are responsible for notifying Maintenance SPOC (Single Point of Contact) or initiating a Work Request upon discovery of a leaking component.
- Equipment owners (Operations, Radwaste/Chemistry, and Maintenance) maintain ultimate responsibility for the identification of leaking components as part of daily plant rounds.
- Operations personnel perform routine surveillance rounds each shift. These rounds include the requirement to identify and report leaks and spills. Leaks and spills are addressed through: immediate clean-up, notifying supervision for assistance, writing a work request or initiating a PIP (Problem Investigation Process).

2. Briefly describe the program and/or methods for monitoring onsite groundwater for the presence of radioactivity released from plant operations.

- Catawba has ten (10) onsite groundwater monitoring wells, including:
  - Six (6) onsite wells are for monitoring the Catawba landfill
  - Four (4) onsite wells for chemical monitoring near the Conventional Waste Water (WC) hold-up ponds.
  - The groundwater monitoring wells are sampled and analyzed semi-annually.
- There are additional groundwater level monitoring wells near the reactor building and spent fuel pools that have been dry when sampled.
- Two offsite residential groundwater wells are sampled quarterly as part of the Radiological Environmental Monitoring Program.
- The samples are analyzed for radionuclides, including tritium.
- Typical minimum detectable activity (MDA) for groundwater samples are listed below. These values represent the detection capability of environmental laboratory instrumentation.

Nuclide	Typical Minimum Detectable Activity (MDA) (pCi/l)
Gross Beta	2
Tritium	250
Mn-54	6
Fe-59	12
Co-58, Co-60	9
Zn-65	10
Zr-95	8
Nb-95	7
I-131	6
Cs-134	6
Cs-137	7
Ba/La-140	11

3. **If applicable, briefly summarize any occurrences of inadvertent releases of radioactive liquids that had the potential to reach groundwater and have been documented in accordance with 10 CFR 50.75(g).**

   Events listed below are those which have been documented in accordance with 10 CFR 50.75(g) and had potential to reach groundwater; however, an actual release to groundwater may not have occurred.

   - 3/28/1992
     A small drip leak from Steam Generator Drain Tank-A (SGDT-A) outlet piping at valve 1WL314 to the ground near the RMWST trench.

   - 10/22/2000
     A small leak (approximately 2 gal.) from a tanker containing Unit 1 Ice melt to the asphalt near the south side roll-up door to the Monitor Tank Building.

   - 5/6/2002
     A small leak (drip) was identified on the manway of Unit 1 Reactor Makeup Water Storage Tank (RMWST) onto the gravel in the yard. Some water leaked to the ground as a result.

   - 9/6/2005
     Wet soil was noticed around the bottom of the Unit 1 Reactor Make-up Water Storage Tank near a small diameter pipe and its associated insulation. The insulation was removed from the piping and the area was inspected, but there were no identified leaks noted at that time. The soil was still damp and it is currently unknown where the source of moisture is coming from.

   - 6/28/2006
     Water was found in a pipe trench where WL (Liquid Waste) piping enters the Monitoring Tank Building (MTB). The trench sump pump discharge piping created a siphon causing sump water to back up into the trench.

4. **If applicable, briefly summarize the circumstances associated with any <u>onsite</u> or <u>offsite</u> groundwater monitoring result indicating a concentration in groundwater of radioactivity released from plant operations that exceeds the maximum contaminant level (MCL) established by the USEPA for drinking water.**

   All groundwater sample results collected from groundwater monitoring wells have been below the USEPA MCL for drinking water for radionuclides. However, as described below, limited samples from a sump in the Groundwater Drainage (WZ) system have exceeded the MCL for tritium in drinking water. These samples have not historically been considered to indicate concentrations of radioactivity in groundwater. These sample results and their significance for purposes of assessing concentration in groundwater of radioactivity released from plant operations are under evaluation. Once that evaluation is complete, Duke will determine how sample results from the various points of the WZ system will be treated for reporting purposes on a going-forward basis.

The Groundwater Drainage (WZ) system was designed and built to maintain the groundwater level below the structural distress limits of the Auxiliary Building and the Reactor Buildings. The WZ system consists of a grid of interconnected flow channels located beneath the Auxiliary and Reactor Buildings above rock and fill concrete, and below the foundation slabs. Drilled holes through the fill concrete into rock allow groundwater to flow from beneath the fill concrete into the flow channels. All channels in the grid gravity drain to three WZ sumps. The WZ system drains the Auxiliary and Reactor Building foundations and maintains a normal groundwater level at or near the base of the foundation mat and basement walls. An exterior groundwater drain system, consisting of two separate flow mediums of sand and stone filter, with a metal perforated pipe extending around the foundation perimeter, drains directly into the three WZ sumps. The A and B sumps are located along the west exterior wall of the Auxiliary Building. The C sump is located on the east interior wall of the Auxiliary Building on the 543 foot elevation. Once water is contained within the WZ system sumps, it is considered part of the plant and not groundwater per the Groundwater Protection Initiative. The WZ sump water is pumped to the site's yard drains which are routed to collection sumps which are pumped to the Conventional Waste Water (WC) system, which is monitored by RP monthly for tritium activity and gamma emitting radionuclides.

There is groundwater level monitoring equipment located at or near the sand and stone filters around the Auxiliary, Reactor and Fuel Pool Buildings that contain instrumentation to provide indication of the groundwater level. This equipment is used to ensure that the WZ system is working properly to keep groundwater levels in the filter at acceptable levels and does not exceed the structural distress limits of the building structures.

Based on indication provided by the permanent level instrumentation installed in six of these wells, there is rarely any accumulated quantity of groundwater present in the wells. Therefore, any minor leakage from a plant system that exited the plant would be collected in the filter and be transported to the sumps of the WZ system and would not enter the groundwater.

A composite sample is collected from the WC system discharge which is analyzed for tritium and gamma emitters monthly. Activity identified in the WC system discharge is accounted for through the normal effluent program. A monthly grab sample is obtained from WZ sump C and analyzed for tritium and gamma emitters. Since 2000, there have been three instances in which the WZ sump C monthly grab sample result was greater than the EPA MCL from tritium. The results are listed below.

Date	Sample Result (pCi/l)
12/7/2000	22,100
11/3/2003	30,600
3/1/2005	24,700

No conclusion has been drawn about the source of the activity and an investigation is ongoing. However, as stated above, this is water captured by the WZ drainage system that is ultimately routed to the WC system for analysis and discharge. All WC system discharges have met NRC authorized station release limits for radioactivity.

5. **Briefly describe any remediation efforts undertaken or planned to reduce or eliminate levels of radioactivity resulting from plant operations in soil or groundwater onsite or offsite.**

   - Low levels of tritium (below the USEPA MCL for drinking water) have recently been observed in groundwater near the WC ponds. The need for remediation of potential leakage from the WC ponds will be evaluated as part of the Groundwater Protection Initiative.