

ONSITE GROUND/SURFACE WATER MONITORING QUESTIONNAIRE

Onsite Radiological Effluent/REMP Monitoring Program

Phase 1 (Near Term Response)

1. Does the licensee have radioactive groundwater monitoring wells onsite? Yes No

If YES: How many wells: McGuire has eight (8) onsite groundwater monitoring wells.

See Note 1.

Where are they located (e.g., distributed around/throughout the site, in a particular region of the site and/or near particular buildings/structures, etc.)

- (a) within the Protected Area Yes No
- (b) within the Radiologically Restricted Area Yes No
- (c) within the owner-controlled area Yes No
- (d) at what frequency does the licensee sample/analyze the wells Groundwater monitoring wells are sampled and analyzed quarterly.
- (e) for what radionuclides does the licensee monitor

- Gamma emitters (Gamma Spec) Yes No
If Yes - at what MDA See below.
- Tritium Yes No
If Yes - at what MDA See below.
- Gross Beta Yes No
If Yes - at what MDA See below.
- Other: _____ Yes No
If Yes - at what MDA _____

<u>Nuclide</u>	<u>Typical Minimum Detectable Activity (MDA) (pCi/l)</u>
Gross Beta	4
Tritium	250
Mn-54	6
Fe-59	17
Co-58, Co-60	9
Zn-65	4
Zr-95	8
Nb-95	3
I-131	6
Cs-134	6
Cs-137	9
Ba/La-140	11

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Response From McGuire Nuclear Station

Yes No

2. If the licensee does NOT have an onsite radioactive groundwater monitoring program:

(a) Does the licensee plan to implement a groundwater monitoring program? Yes No

If Yes, when and to what extent: _____

(b) Does the licensee plan to take other measures to assure they can identify radioactive groundwater contamination? Yes No

3. Does the licensee have a french drain system surrounding the main reactor facility and auxiliary structures? Yes No

(a) is the system analyzed for radionuclides? Yes No

(b) at what frequency does the licensee sample/analyze the wells

McGuire has a Ground Water Drainage System (WZ System). 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. SEE ATTACHMENT FOR CLARIFICATION

(c) for what radionuclides does the licensee monitor

Gamma emitters (Gamma Spec) Yes No

If Yes - at what MDA See below.

Tritium Yes No

If Yes - at what MDA See below.

Gross Beta Yes No

If Yes - at what MDA _____

Response From McGuire Nuclear Station

<u>Nuclide</u>	<u>Typical Minimum Detectable Activity (MDA) (pCi/l)</u>
Tritium	250
Mn-54	16
Fe-59	37
Co-58, Co-60	50
Zn-65	40
Zr-95	112
Nb-95	16
Mo-99	33
I-131	34
Xe-133	200
Xe-135	1,400
Cs-134	19
Cs-137	44
Ba/La-140	31
Ce-141	49
Ce-144	250

4. Does the licensee have a surveillance program to periodically:
- | | | |
|--|-------------------------------------|-------------------------------------|
| | Yes | No |
| (a) walkdown outside areas around the site to look for potential leaks and spills? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| (b) pressurize buried radwaste lines to evaluate structural integrity and evaluate potential for leaks and spills? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
5. Does the licensee perform any other onsite monitoring (e.g., soil sampling) to identify unexpected radioactive releases. See Note 2.
- | | | |
|--|-------------------------------------|--------------------------|
| | Yes | No |
| | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
6. Does the licensee's radioactive liquid discharge line traverse any non-licensee owned property (e.g., it is on a right-of-way surrounded by private properties)?
- | | | |
|--|--------------------------|-------------------------------------|
| | Yes | No |
| | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
7. If the licensee has a discharge pipe that runs underground or any underground piping that carries radioactive liquids, does the licensee perform monitoring along the discharge pathway to identify potential leakage.
- | | | |
|--|-------------------------------------|--------------------------|
| | Yes | No |
| | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

If YES,

How frequently is the sampling performed: See Note 3.

Response From McGuire Nuclear Station

Phase II (Longer Term Response)

8. Historical Onsite Radioactive Contamination: Yes No

- (a) Does the licensee have any history of radioactive spills and/or leaks outside of buildings/structures?
- Are they documented in 10 CFR 50.75g file?

- (b) Has the licensee identified onsite radioactive groundwater contamination?

See Note 4.
AND ATTACHMENT

If Yes:

⇒ When was it identified - If known:
Dates: _____

LER/Abnormal Event Report/Condition Report Nos:
_____ (If available)

⇒ To what extent - If known [square footage, estimated ground depth of the contamination, estimated quantity (volume / concentration), etc.]

⇒ Has the contamination moved outside the
Restricted area or the owner-controlled area

9. Comments: _____

Notes

- (1) The groundwater monitoring wells are located near the Reactor and Auxiliary Buildings and toward the site boundary.
- (2) Infrequent limited onsite sampling has been performed (*i.e.* soil and rain water).
- (3) In addition, some inspection has been performed on the Liquid Waste (WL) piping from the Solidification Pad to the Radwaste Facility. This is documented in PIPs M-05-0558 and M-06-0129.
- (4) Tritium is a naturally occurring radioactive isotope of hydrogen. It has the same chemical properties as hydrogen so it exists primarily in the form of water or water vapor in the air. When present in the environment, it does not pose an external radiation hazard but is an internal hazard because it can be ingested or inhaled. However, due to its low-energy beta particle and its quick clearance from the body, it must be ingested in very large quantities to pose any significant health risk.

Response From McGuire Nuclear Station

"Contamination" is not defined herein. For tritium, the relevant standard is typically the 40CFR141 Maximum Contaminant Level (MCL) of 20,000 pCi/l, which has been widely established as a level of consumption considered protective of human health, and would equate to a radiation dose of 4 mrem if an individual were to drink $\frac{1}{2}$ gallon of the water every day for a year. The radiation dose limit of 4 mrem is equivalent to about half of the dose received from a chest x-ray. Assuming "contamination" exists only when the MCL discussed above is exceeded, McGuire has not "identified onsite radioactive groundwater contamination". McGuire has, however, detected tritium in the groundwater onsite. The levels at which tritium has been detected has always been below the MCL. However, for purposes of completeness, each of the instances is described below.

Tritium was identified in the Ground Water (WZ) sump on June 26, 2003. This was identified in PIP M-03-2828. The tritium concentration in the WZ sump was 3.563 E-06 $\mu\text{Ci/ml}$ (3,563 pCi/l.) Following steps to arrest potential leakage, the concentration has trended down and current levels are about 1.3E-6 uCi/ml (1300 pCi/L). Monitoring is on-going. Tritium was also identified by sampling the groundwater near the Conventional Waste Water Treatment System (WC System) hold-up ponds on June 17, 2004. This was documented in PIP M-04-3183. Tritium has been detected in the groundwater near the WC pond with a range of 4.93 E-06 to 6.00E-06 $\mu\text{Ci/ml}$ (4,930 to 6,000 pCi/l). Monitoring is on-going. We have is no indication that tritium has moved outside the owner-controlled area.

SUPPLEMENTED IN ATTACHMENT



DRAFT - FOR DISCUSSION PURPOSES ONLY

**Attachment to:
Onsite Ground / Surface Water Monitoring Questionnaire**

Follow-Up Questions from the NRC

Where is the Groundwater Drainage System (WZ System) addressed in the USFAR, and what is the system's purpose?

The WZ system is addressed in UFSAR 9.5.8. The Groundwater Drainage System consists of three sumps located in the Auxiliary Building. It is designed to relieve hydrostatic pressure from the Reactor and Auxiliary Buildings by discharging groundwater collected in sumps to either the yard drains or the Turbine Building sumps.

Paragraph 3 of Note 4 of McGuire Nuclear Station's response to the above questionnaire identifies groundwater samples in which tritium was identified. Were other radionuclide identified in the referenced samples?

No.

What is the background tritium level in Lake Norman?

The background tritium concentration in Lake Norman is assumed to be less than the detection capability of $2.5E-7$ uCi/ml (250 pCi/l).

What are the average tritium levels detected in Lake Norman and downstream from the plant in 2005?

This information can be found in McGuire's Annual Radiological Environmental Operating report.

The average tritium concentration at sample location 101 (North Mecklenburg drinking water plant on Lake Norman) in 2005 was approximately $8E-7$ uCi/ml. (800 pCi/l) The average tritium concentration at sample location 132 (Charlotte drinking water plant on Mountain Island Lake) in 2005 was approximately $5E-7$ uCi/ml. (500 pCi/l)