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AR 00922841 Report

Aff Fac:	Oyster Creek	**AR Type:**	CR	**Status:**	APPROVED
Aff Unit:	NA	**Owed To:**	A5332CAP	**Due Date:**	06/21/2009
Aff System:	180			**Event Date:**	05/22/2009
CR Level/Class:	4/D			**Disc Date:**	05/22/2009
How Discovered:	H02			**Orig Date:**	05/22/2009
WR/PIMS AR:		**Component #:**			

Action Request Details

Subject: PRESENCE OF XENON IN SAMPLE AT COND. EXCAVATION SITE

Description:

Originator: ROBERT J ARTZ Supv Contacted: M. Nixon

Condition Description:
In routine sampling of water from the excavation site on 04/14/09, a sample was found to have positive activity for tritium and xenon-135 (Xe-135). The State of New Jersey asked for an evaluation why other fission products were not found.

In Oyster Creek's steam-water cycle, steam containing various radionuclides passes from the reactor pressure vessel through the various turbine stages and after condensing becomes condensate. This condensate is pumped to the condensate demineralizer vessels where impurities, including radionuclides are removed. Thus almost all fission products are removed by the condensate demineralizers therefore they are not normally seen in the CSt samples. However, tritium and noble gases are not removed in the condensate demineralizers. Since January 01, 2009, for the weekly and most recently daily sampling of the CST, Xe-135 has been found in the CST three times out of 23 samples.

Tritium, being an isotope of hydrogen is incorporated in the water molecule, which can exist as steam or liquid water. The condensate demineralizers do not remove water, and therefore do not remove tritium. The condensate demineralizers do not remove noble gases either. While the steam-jet air ejectors remove most noble gases and other non-condensable gases prior to the condensate demineralizers, the SJAEs are not 100% efficient at removing all the noble gases. In the steam-water cycle, downstream of the condensate demineralizers, the condensate can be directed to either feedwater or the condensate storage tank (CST).

The noble gas, xenon-135 (Xe-135) has several unique characteristics:

1. It is a fission product having a half-life of 9.10 hours. Significantly, Xe-135's fission yield from U-235 is rather high - on the order of 6.54%.
2. It is formed via Isomeric Transition (IT) from Xe-135m (another fission product), which has a half-life of 15.3 minutes.
3. It is also formed from Xe-134 via a neutron, gamma reaction. Xe-134 is one of those fission products that is stable and its fission yield is 7.87% which is even higher than Xe-135's
4. Xe-135 is also produced by the decay of iodine-135 (I-135), which has a half-life of 6.57 hours although most I-135 would be removed by the condensate demineralizers so the contribution of I-135 to produce Xe-135

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would be expected to be quite small.

As stated above, the condensate demineralizers do not remove noble gases such as Xe-135. Some condensate is automatically transferred to the CST via a level control system and hence, Xe-135 can be placed into the CST as well.

The Xe-135 was correctly identified because of a decay study that was performed in which the radionuclide followed the decay rate according to its half-life.

Therefore the water found in the pit containing tritium and xenon-135 is not an unexpected result. The condensate demineralizers remove the vast majority of fission products and activation products.

Immediate actions taken:
Accelerated sampling of intake, discharge and various wells around the site.

Recommended Actions:
Close to trend. IR submitted to document why only tritium and xenon-135 were found in the water sample.

What activities, processes, or procedures were involved?
Routine sampling of electrical cable vault.

Why did the condition happen?
Leak from underground piping carrying condensate transfer water.

What are the consequences?
Discharge of tritiated water to the environment.

Were any procedural requirements impacted?
None

List of knowledgeable individuals:
J. Vouglitois, J. Kandasamy, M. Nixon, R. Wiebenga, D. Odell

Repeat or similar condition?
No

Operable Basis:
N/A

Reportable Basis:
N/A

SOC Reviewed by: LYNDA FILEPPI 05/27/2009 10:24:11 CDT
SOC Comments:
CCT 5-22-09: Discussed with originator regarding ESW cable vault. Originator erroneously wrote ESW cable vault sample when he meant to say excavation pit sample. According to sample data, no gamma has been detected in ESW cable vault above LLD.

05/27/09 SOC: Close to trend and actions taken.

Reviewed by: HERBERT G TRITT II 05/22/2009 10:31:39 CDT
Reviewer Comments:
none

Dynamic AR Attributes

KEYWORD:	ENV

Assignments

Assign #:	01	**Assigned To:**		**Status:**	COMPLETE
Aff Fac:	Oyster Creek	**Prim Grp:**	ACAPALL	**Due Date:**	05/27/2009
Assign Type:	TRKG	**Sec Grp:**		**Orig Due Date:**	µµ/µµ/µµµµ
Priority:					
Schedule Ref:					
Unit Condition:					
Subject/Description:	PRESENCE OF XENON IN SAMPLE AT COND. EXCAVATION SITE				