

## **Leaks and Spills At U.S. Commercial Nuclear Power Plants**

**June, 2016**

### **Introduction**

This is a list of reactor sites that experienced a leak or spill to the environment at some time since initial startup. The list only includes leaks or spills where the concentration of tritium in the leak source or groundwater sample was greater than 20,000 picocuries per liter (pCi/L). The term “leaks and spills” includes all types of non-routine releases in which tritium from reactor operation contacted the soil in an unintended fashion.

### **Source of Information**

Recent information was compiled by NRC staff based on input from the nuclear power plant staff, whereas historical information is based on Annual Radioactive Effluent Release Reports, Annual Radiological Environmental Operating Reports, Groundwater Questionnaires, Preliminary Notifications, Event Notifications, Licensee Event Reports, NRC Inspection Reports, Special Reports, and other documents submitted by the licensees to the NRC.

### **Contents**

The tritium concentrations listed include (1) the approximate historical maximums and (2) the “current” concentrations. The values shown provide a reasonable indication of the magnitude and extent of the historical leaks and spills as well as the current conditions at these sites.

The value listed as the “current concentration of tritium” is the highest tritium concentration found in the environment as a result of a leak or spill from the site. The current concentrations listed below provide a reasonable approximation of the tritium concentration currently on each site. If a value has not been updated within the past year, it indicates the value listed is a good approximation of the current site conditions. The current status of these sites reflects the most recently available information as of the date shown at the top of this page. This list will be revised semi-annually.

Samples are collected from onsite and offsite locations. Samples are collected from both drinking water wells and non-drinking water sample points (e.g., storm drains, man holes, bore holes, piezometer tubes, monitoring wells, surface water, puddles, and rain water). All of these samples are evaluated for inclusion in this list. Although some values in the list exceed 20,000 pCi/L, none of those samples were from a drinking water well or from a municipal drinking water system. In fact, although samples are collected from drinking water wells and municipal drinking water systems, none of those samples have ever exceeded 20,000 pCi/L. As a result, a value of 20,000 pCi/L in this list does not imply the drinking water standard in EPA’s Safe Drinking Water Act has been exceeded.

After a radioactive leak or spill, tritium is generally the first radionuclide to be identified in groundwater. This is because tritium travels through the soil faster than other radionuclides. Leaks and spills at some sites (e.g., Indian Point, Braidwood) involved nuclides other than tritium (e.g., Cobalt-60, Cobalt-58, Cesium-134, Cesium-137, Strontium-90, Nickel-63), but those radionuclides are not included in this list.

## **Summary**

There are 65 locations in the United States where commercial nuclear power plants are or have been recently operating. Records indicate 46 of these sites have had leaks or spills that involved tritium concentrations greater than or equal to 20,000 pCi/L at some time during their operating history. Nine sites are currently reporting tritium, from a leak or spill, in excess of 20,000 pCi/L. Although many sites have had leaks or spills involving tritium, no site is currently detecting tritium in the offsite environment, or in drinking water, in excess of 20,000 pCi/L.

Tritium rapidly disperses and dissipates in the environment, and as a result, tritium from leaks and spills is typically not detected outside the facility boundary. The historical data indicates in only one instance, at Braidwood, was tritium from a leak or spill found in the offsite environment in excess of 20,000 pCi/L. All samples from Braidwood since 2008 indicate tritium is no longer present in excess of 20,000 pCi/L in either the onsite or the offsite environment.

### **List of Historical Leaks and Spills At U.S. Commercial Nuclear Power Plants**

It is imperative that the preceding paragraphs accompany any reproduction of this list so that the information is communicated in the proper context.

June, 2016 updates

Plant	Historical Maximum Tritium Concentration, pCi/l	Date of Historical Maximum Tritium	Current Concentration of Tritium, pCi/l
Beaver Valley	25,583	September, 2010	10,888
Braidwood	247,000	1998	3,200
Browns Ferry	7,520,000	January, 2015	22,400
Brunswick	19,000,000	December, 2010	3,060,000
Byron	82,000	February, 2006	474
Callaway	1,600,000	July, 2014	1,957
Catawba	47,500	October, 2007	4,450
Columbia	270,000	March, 1993	1,300
Crystal River	360,000	April, 1998	Not detectable
Davis-Besse	37,500	October, 2008	4,591
Dresden	10,312,000	July, 2004	477,400
Duane Arnold	2,150,000	October, 2012	16,000
Fitzpatrick, J.A.	105,000	April, 2010	3,620
Ginna, R.E.	20,000	1995	Not detectable
Grand Gulf	2,240,000	March, 2014	2,240,000
Hatch, E.I.	6,840,000	September, 2011	60,000
Indian Point	938,500	February, 2015	3,500,000
Limerick	3,950,000	February, 2009	323
LaSalle	1,230,000	July, 2010	18,600
Millstone	4,000,000	November, 2007	10,600
Monticello	21,300	September, 2009	6,490
Nine Mile Point	44,000	August, 2012	Not detectable
North Anna	79,559	August, 2013	5,500
Oconee	45,000	December, 2011	7,830
Oyster Creek	10,000,000	2009	7,040
Palisades	217,351	December, 2009	13,560
Palo Verde	4,200,000	March, 1993	Not detectable
Peach Bottom	196,000	March, 2010	8,030
Perry	59,900	2006	231
Pilgrim	69,000	December, 2013	6,260

Quad Cities	7,500,000	2008	150,000
River Bend	1,135,000	February, 2013	577,000
Salem	15,000,000	April, 2003	47,900
San Onofre	330,000	August, 2006	3,700
Seabrook	750,000	1999	1,730
Sequoyah	25,060	2015	15,924
St. Lucie	161,000	2000	4,880
Summer	23,000	July, 2011	1,500
Surry	31,900	October, 2007	9,000
Susquehanna	>20,000	1995	Not detected
Three Mile Island	900,000	1981	10,888
Turkey Point	>20,000	1979	3,816
Vermont Yankee	2,500,000	February, 2010	19,000
Vogtle	>20,000	1990s	1,100
Waterford	22,000	1997	Not detectable
Watts Bar	550,000	February, 2005	3,362