

List of Leaks and Spills at U.S. Commercial Nuclear Power Plants

September, 2017

Introduction

This is a list of reactor sites that experienced a radioactive leak or spill to the onsite owner controlled area at some time since initial startup. The term “leaks and spills” includes all types of non-routine releases in which tritium from reactor operations contacted the soil. The list only includes leaks or spills where the concentration of tritium in the leak source, or in a groundwater sample was greater than 20,000 picocuries per liter (pCi/L). A tritium concentration of 20,000 pCi/L is used as the threshold for inclusion in the list because it is the drinking water standard in EPA’s Safe Drinking Water Act. This version updates the June 2016 list of leaks and spills.

Source of Information

Recent information was compiled by NRC staff based on input from the nuclear power plant staff, Annual Radioactive Effluent Release Reports and Annual Radiological Environmental Operating Reports (see the NRC’s web site for each site’s detailed annual reports at <https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html>). 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 for each plant documented in the list below consist of (1) the historical maximum concentration and (2) the “current” concentration. These values provide a reasonable approximation of the magnitude and extent of the historical leaks and spills as well as the current conditions.

The value listed as the “Historical Maximum Concentration of Tritium” is an approximate historical maximum tritium concentration from abnormal releases in which tritium from reactor operations contacted the soil in an unintended fashion since initial startup. The timeframe in which the historical maximum tritium releases occurred is listed next to the maximum concentration value.

The value listed as the “Current Concentration of Tritium” is a reasonable approximation of the current tritium concentrations based on samples that have been collected and analyzed by the licensee. If a value has not been updated from the one listed in the previous version, it indicates the value continues to be a good approximation of the current conditions.

As documented in the licensee annual reports, samples were collected from onsite locations and analyzed including both drinking water wells and non-drinking water sample points (e.g., ground water monitoring wells, storm drains, man holes, bore holes, piezometer tubes, surface water, puddles, and rain water). Although some values in the list exceed 20,000 pCi/L, none of those samples were collected from a drinking water well or from a municipal drinking water system. None of the samples collected from drinking water wells and municipal drinking water systems have ever exceeded the EPA drinking water standard of 20,000 pCi/L.

After a radioactive leak or spill, tritium is generally the first radionuclide to be identified in groundwater. This is because tritium travels as a form of water through the soil faster than other radionuclides.

Summary

There are 61 nuclear power plant sites in the United States that are currently operating. Records indicate 43 of these sites at one time or another have had leaks or spills that involved tritium concentrations greater than or equal to 20,000 pCi/L. Six 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.

List of Historical Leaks and Spills at U.S. Commercial Nuclear Power Plants

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

September, 2017 updates

Plant	Historical Maximum Concentration of Tritium, pCi/l	Timeframe of Historical Maximum Concentration of Tritium	Current Concentration of Tritium, pCi/l
Beaver Valley	25,583	September, 2010	8,809
Braidwood	247,000	1998	1,690
Browns Ferry	7,520,000	January, 2015	3,493
Brunswick	19,000,000	December, 2010	280,943
Byron	82,000	February, 2006	623
Callaway	1,600,000	July, 2014	1,944
Catawba	47,500	October, 2007	3,840
Columbia	270,000	March, 1993	14,600
Davis-Besse	37,500	October, 2008	2,200
Dresden	10,312,000	July, 2004	251,000
Duane Arnold	2,150,000	October, 2012	2,700
Fitzpatrick, J.A.	105,000	April, 2010	4,136
Ginna, R.E.	20,000	1995	Not detectable
Grand Gulf	2,240,000	March, 2014	3,200
Hatch, E.I.	6,840,000	September, 2011	22,000
Indian Point	14,800,000	February, 2016	200,000
Limerick	3,950,000	February, 2009	369
LaSalle	1,230,000	July, 2010	11,000
Millstone	4,000,000	November, 2007	7,690
Monticello	21,300	September, 2009	451
Nine Mile Point	44,000	August, 2012	251
North Anna	79,559	August, 2013	4,933
Oconee	45,000	December, 2011	7,150
Oyster Creek	10,000,000	2009	2,250
Palisades	217,351	December, 2009	13,560
Palo Verde	4,200,000	March, 1993	Not detectable
Peach Bottom	196,000	March, 2010	9,010
Perry	59,900	2006	Not detectable
Pilgrim	69,000	December, 2013	5,080
Quad Cities	7,500,000	2008	15,700

River Bend	1,135,000	February, 2013	690,000
Salem	15,000,000	April, 2003	41,400
Seabrook	750,000	1999	2,080
Sequoyah	25,060	2015	9,547
St. Lucie	161,000	2000	2,100
Summer	23,000	July, 2011	3,000
Surry	31,900	October, 2007	6,210
Susquehanna	>20,000	1995	Not detected
Three Mile Island	900,000	1981	8,360
Turkey Point	>20,000	1979	3,816
Vogtle	>20,000	1990s	<1,000
Waterford	22,000	1997	Not detectable
Watts Bar	550,000	February, 2005	3,362