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Variations in Slit Trench Dimensions to Allow Disposal of Large Components (U)

Author

James R. Cook

Westinghouse Savannah River Company
Savannah River Technology Center
Aiken, SC 29808

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Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808



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Summary

Some large components exist that have radionuclide concentrations low enough that they meet the WAC limits for Slit Trenches, but they are too large to be directly disposed in slit trenches of the nominal dimensions. The performance assessment analyzed a series of slit trenches 20 feet wide and 20 feet deep. The proposed disposal practice is to prepare an excavation that will accommodate the item to be disposed that may be greater or less than the trench dimensions analyzed in the Performance Assessment.

This analysis considers the effect of the variations and concludes that such variations will meet the disposal requirements set by the performance assessment.

Introduction

One intent of DOE Order 435.1¹, as expressed in the performance assessment/composite analysis guidance², is to ensure that proposed or discovered changes in wasteforms, containers, radionuclide inventories, facility design, and operations are reviewed to ensure that the assumptions, results, and conclusions of the DOE approved performance assessment (PA), and composite analysis (CA), as well as any Special Analyses (SA) that might have been performed, remain valid (i.e., that the proposed change is bounded by the PA and CA) and the changes are within the bounds of the Disposal Authorization Statement. The goal is to provide flexibility in day-to-day operation and to require those issues with a significant impact on the PA's conclusions, and therefore the projected compliance with performance objectives/measures, to be identified and brought to the proper level of attention. It should be noted that the term performance measure is used to describe site specific adaptations of the DOE Order 435.1 Performance Objectives and requirements (e.g., performance measures such as applying drinking water standards to the groundwater impacts assessment).

The intent of this document is to provide an evaluation to determine if the disposal of pieces of equipment using slit trenches in excavations that are either wider or narrower than 20 feet and deeper or shallower than 20 feet is within the assumptions, parameters, and bases of the approved PA³ and CA⁴. If it is, then this document serves as the technical basis for authorizing the proposed action. If not, then, according to the SRS Disposal Authorization Statement⁵, the PA and CA would need to be updated as appropriate and DOE approval sought of the update (special analysis or revision of the PA or CA).

Description of the Proposed Action

Disposal of low-activity large components in excavations of dimensions different than 20 feet wide and 20 feet deep has been proposed for the Slit Trench units within the E Area Low Level Waste Facility. A Categorical Exclusion Unreviewed Safety Question review of variations in disposal trench dimensions found that one of the UDQ criteria was exceeded.⁶

Background

The performance assessment for the E Area Low Level Waste Facility³ examined the slit trench disposal method by analyzing a series of ten slit trenches each of which was 20 feet wide and 20 feet deep. The PA developed radionuclide inventory limits this disposal method.

SRS has identified a number of items that will meet the WAC concentration limits for slit trench disposal, but are larger than the nominal 20 foot wide, 20 foot deep trench dimensions. The excavations for these disposals are to be sized for the individual item, i.e., wide enough and deep enough to accommodate the item and four feet of clean soil cover.

Supporting Analysis

An analysis has been done on the Engineered Trench disposal method.⁷ The conclusion was that the Engineered Trench, which is one wide trench covering the area planned for five slit trenches, could be operated to meet the DOE performance requirements if the radionuclide inventories calculated for five slit trenches were maintained, despite the greater volume available for disposal using the Engineered Trench concept. For the purposes of this analysis, the Engineered Trench evaluation shows that if the performance assessment-derived inventory limits are maintained over the five-trench footprint, the horizontal placement of the waste materials has no effect on the disposal facility performance. Therefore, the width of the excavations for trench disposals can be varied as long as the five-trench sum of fractions is kept below unity.

The vadose zone model used in the performance assessment assumes a 25-foot distance from the bottom of the disposal trench to the top of the water table. This is conservative since any distance greater than 25 feet would result in a travel time to the water table greater than that calculated in the performance assessment. The location of the water table wells closest to the past, current and proposed set of slit trenches is shown in Figure 1. Table 1 lists the depth to water from a number of water table wells near the location of the slit trenches. The average readings from the wells closest to the slit trenches, BGX-2D, BGX-8DR and BGX-8D, are all greater than 70 feet. The average readings from the next closest wells, BGX-1D and BGX-3D, are 61 and 76 feet, respectively. These measurements indicate that, in the past, current and future sets of slit trenches, excavations as deep as 45 feet would still maintain the 25 foot distance from the bottom of the excavation to the water table modeled in the performance assessment.

Similar logic was used in an approved Unreviewed Disposal Question Evaluation on allowing variations in trench dimensions for Components in Grout disposals.⁸

Evaluation

1. Does the proposed activity involve a change to the Performance Assessment or exceed PA performance measures/conclusions?

No. The proposal to allow portions of slit trenches to be wider or deeper than modeled in the performance assessment does not involve a change in the PA or its performance measures or conclusions.

2. Does the proposed activity involve a:
- a. change to the basic disposal concept as described in the PA?

No. The proposal is a variation of the disposal concept analyzed in the PA.
 - b. change to the analyses or radionuclide limits as described in the PA?

No. No change in the radionuclide limits is required by implementation of the proposal.
 - c. change in the disposal authorization that leads to a significant change in projected dose?

No. The proposed action is not, in and of itself, to change the Disposal Authorization Statement.
 - d. change in the results in the approved PA that is greater than 10%?

No. The proposed activity will not change the results of the PA.
 - e. change of greater than 10% in the dose calculated in the approved PA?

No. The proposal to vary the width and depth of portions of slit trench excavations to accommodate large pieces of equipment will not produce a dose greater than that projected on the PA/SA.
 - f. Does the proposed activity modify the analysis or conclusions provided in the Composite Analysis?

No. The analysis presented in this report shows that the proposed activity will meet the PA performance requirements, so it will not modify the analysis or conclusions of the Composite Analysis.
 - g. change to the Disposal Authorization Statement?

No. The proposed action itself does not involve a change to the Disposal Authorization Statement.

Conclusion

The proposed activity of varying the width and depth of excavations in portions of slit trenches to be used for disposal of large components will not affect the performance of the E Area Low Level Waste Facility provided the inventory limits calculated in the PA are met, a minimum distance of 25 feet exists between the bottom of the excavation and the water table, four feet of clean cover is placed over the disposal, and the overall set of slit trench disposals is kept within the proscribed disposal unit footprint.

References

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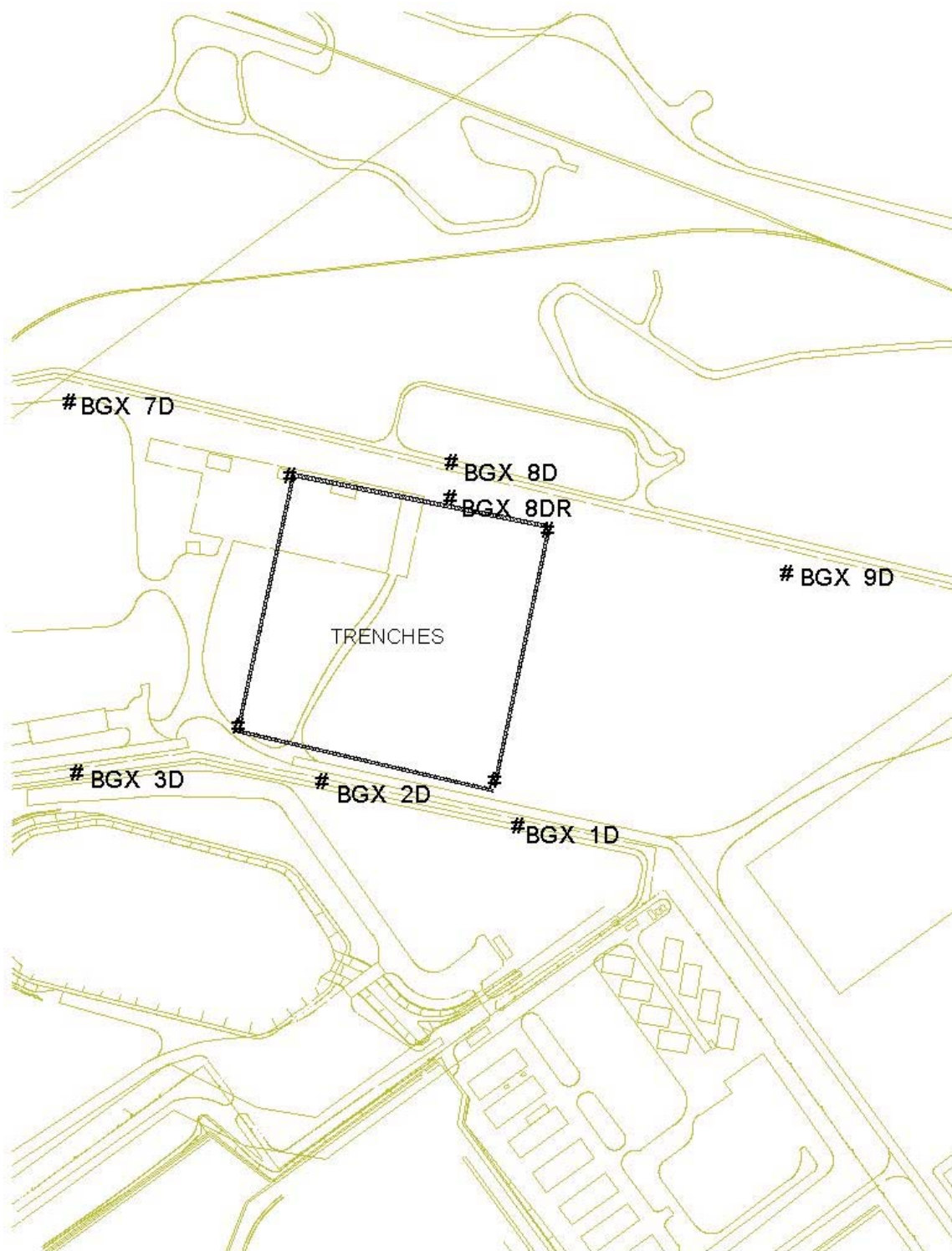


Figure 1. Location of the slit trenches and nearby water table wells

Table 1. Depth to water in the vicinity of the slit trenches

Well	Date and Time	Depth to Water (ft)	Well	Date	Depth to Water (ft)
BGX 1D	8/8/1991 9:10	61.78	BGX 1D	11/19/1998 14:30	61.85
BGX 1D	10/22/1991 13:25	61.04	BGX 1D	12/22/1998 12:14	62.05
BGX 1D	1/29/1992 12:00	61.2	BGX 1D	2/25/1999 12:23	62.41
BGX 1D	4/9/1992 10:25	61.35	BGX 1D	2/26/1999 10:00	62.41
BGX 1D	7/30/1992 12:15	62.09	BGX 1D	3/24/1999 20:56	62.51
BGX 1D	10/28/1992 11:17	61.91	BGX 1D	6/25/1999 14:16	63.05
BGX 1D	2/17/1993 10:12	61.32	BGX 1D	9/22/1999 13:56	63.36
BGX 1D	3/27/1993 13:48	61.12	BGX 1D	11/30/1999 11:13	63.68
BGX 1D	5/18/1993 10:24	60.74	BGX 1D	12/1/1999 10:15	63.68
BGX 1D	6/19/1993 10:44	60.68	BGX 1D	12/8/1999 14:29	63.67
BGX 1D	8/17/1993 10:39	60.61	BGX 1D	3/29/2000 18:00	64.18
BGX 1D	9/25/1993 13:05	60.74	BGX 1D	7/12/2000 19:52	64.32
BGX 1D	11/4/1993 13:25	60.8	BGX 1D	9/22/2000 13:45	84.52
BGX 1D	12/22/1993 14:40	61.25	BGX 1D	12/7/2000 9:26	64.68
BGX 1D	2/8/1994 14:06	61.62	BGX 1D	12/31/2000 10:00	64.68
BGX 1D	3/22/1994 14:42	61.79	BGX 1D	3/25/2001 21:03	64.08
BGX 1D	4/14/1994 12:01	61.49	BGX 1D	6/26/2001 17:20	65.4
BGX 1D	6/16/1994 10:36	62	BGX 1D	9/22/2001 15:44	64.79
BGX 1D	8/9/1994 9:03	62.11	BGX 1D	11/29/2001 11:37	64.94
BGX 1D	9/28/1994 15:15	61.79	BGX 1D	12/26/2001 9:35	69.11
BGX 1D	11/8/1994 12:17	61.88	BGX 1D	12/27/2001 14:58	69.11
BGX 1D	12/21/1994 12:51	61.73	BGX 1D	1/9/2002 8:23	65.5
BGX 1D	1/31/1995 9:26	61.75	BGX 1D	2/12/2002 8:33	65.28
BGX 1D	3/24/1995 9:44	61.89	BGX 1D	2/12/2002 11:35	65.28
BGX 1D	6/16/1995 12:16	61.69	BGX 1D	2/13/2002 8:30	65.31
BGX 1D	8/10/1995 9:17	61.35	BGX 1D	3/22/2002 13:38	66.4
BGX 1D	10/13/1995 10:25	61.26	BGX 1D	3/22/2002 15:06	66.4
BGX 1D	11/27/1995 10:07	61.38	BGX 1D	3/26/2002 10:11	66.42
BGX 1D	3/15/1996 8:49	61.69	BGX 1D	3/27/2002 8:20	66.42
BGX 1D	3/26/1996 9:58	61.9	BGX 1D	4/3/2002 10:38	65.94
BGX 1D	3/26/1996 10:40	61.9	BGX 1D	7/8/2002 10:47	66.15
BGX 1D	6/18/1996 10:56	61.91	BGX 1D	10/9/2002 8:32	66.45
BGX 1D	9/20/1996 11:45	62	BGX 1D	11/22/2002 9:39	66.54
BGX 1D	11/4/1996 13:32	62.05	BGX 1D	1/9/2003 13:04	66.47
BGX 1D	11/4/1996 13:42	62.05	BGX 1D	4/2/2003 11:02	66.53
BGX 1D	12/11/1996 10:08	62.2	Average		61.84333
BGX 1D	3/18/1997 10:17	62.69			
BGX 1D	6/12/1997 15:46	62.71			
BGX 1D	9/12/1997 9:40	63.1			
BGX 1D	11/5/1997 9:25	63.4			
BGX 1D	11/6/1997 8:30	63.4			
BGX 1D	12/16/1997 13:30	63.05			
BGX 1D	3/17/1998 13:45	62.74			
BGX 1D	6/29/1998 15:37	61.98			
BGX 1D	9/18/1998 7:24	61.8			
BGX 1D	11/19/1998 12:34	61.85			

Table 1. Depth to water in the vicinity of the slit trenches

Well	Date and Time	Depth to Water (ft)	Well	Date	Depth to Water (ft)
BGX 2D	6/11/1991 8:40	75.07	BGX 2D	12/10/1998 15:05	75.71
BGX 2D	8/7/1991 10:25	74.91	BGX 2D	12/22/1998 12:06	75.66
BGX 2D	10/18/1991 13:35	73.79	BGX 2D	3/24/1999 20:50	76.65
BGX 2D	1/29/1992 10:45	74.87	BGX 2D	6/25/1999 14:16	77.37
BGX 2D	4/9/1992 9:00	75.34	BGX 2D	9/22/1999 14:04	77.83
BGX 2D	7/30/1992 14:00	75.95	BGX 2D	11/9/1999 12:41	78.2
BGX 2D	10/28/1992 10:00	75.61	BGX 2D	11/10/1999 12:38	78.2
BGX 2D	2/17/1993 9:07	75.09	BGX 2D	12/8/1999 14:22	78.52
BGX 2D	3/27/1993 14:01	74.38	BGX 2D	3/29/2000 18:03	78.98
BGX 2D	5/18/1993 9:44	73.61	BGX 2D	7/12/2000 19:53	79.13
BGX 2D	6/19/1993 10:28	73.75	BGX 2D	9/22/2000 13:49	79.43
BGX 2D	8/17/1993 9:55	74.02	BGX 2D	11/1/2000 10:23	79.52
BGX 2D	9/25/1993 13:18	74.53	BGX 2D	12/30/2000 11:09	82.45
BGX 2D	11/4/1993 12:51	75.12	BGX 2D	3/25/2001 21:04	79.95
BGX 2D	12/22/1993 14:44	75.55	BGX 2D	6/26/2001 17:21	79.96
BGX 2D	2/8/1994 13:37	76	BGX 2D	9/22/2001 15:36	79.67
BGX 2D	3/22/1994 14:48	76.15	BGX 2D	11/13/2001 12:12	80.11
BGX 2D	4/14/1994 11:12	75.88	BGX 2D	11/13/2001 12:37	80.11
BGX 2D	6/16/1994 10:45	76.45	BGX 2D	11/29/2001 11:40	80.02
BGX 2D	8/9/1994 8:40	76.3	BGX 2D	1/9/2002 8:20	80.31
BGX 2D	9/6/1994 8:05	76.33	BGX 2D	4/3/2002 10:40	80.52
BGX 2D	9/28/1994 15:09	76.36	BGX 2D	7/8/2002 10:56	80.98
BGX 2D	11/8/1994 11:31	71.51	BGX 2D	10/9/2002 8:26	81.32
BGX 2D	12/21/1994 12:46	76.61	BGX 2D	12/19/2002 10:10	81.48
BGX 2D	1/31/1995 8:47	76.4	BGX 2D	12/19/2002 11:24	81.48
BGX 2D	3/24/1995 9:35	75.83	BGX 2D	1/9/2003 12:57	81.71
BGX 2D	6/16/1995 12:12	75.64	BGX 2D	4/2/2003 11:05	81.89
BGX 2D	8/10/1995 9:11	75.25	Average		76.02615
BGX 2D	10/26/1995 9:28	75.49			
BGX 2D	11/27/1995 10:16	75.62			
BGX 2D	3/15/1996 8:51	78.8			
BGX 2D	6/18/1996 10:47	76.18			
BGX 2D	9/20/1996 11:48	76.6			
BGX 2D	11/5/1996 10:16	76.95			
BGX 2D	11/6/1996 8:36	76.95			
BGX 2D	12/11/1996 10:12	79.88			
BGX 2D	3/18/1997 10:21	77.74			
BGX 2D	6/16/1997 11:13	78.1			
BGX 2D	9/16/1997 8:58	77.92			
BGX 2D	11/3/1997 10:12	78.1			
BGX 2D	11/3/1997 13:18	78.1			
BGX 2D	12/16/1997 13:36	78			
BGX 2D	3/17/1998 13:42	76.64			
BGX 2D	6/29/1998 15:28	74.26			
BGX 2D	9/18/1998 7:17	74.6			
BGX 2D	12/10/1998 13:08	75.71			

Table 1. Depth to water in the vicinity of the slit trenches

Well	Date and Time	Depth to Water (ft)	Well	Date and Time	Depth to Water (ft)
BGX 3D	8/7/1991 12:05	75.25	BGX 3D	2/22/1999 8:04	76.9
BGX 3D	10/17/1991 15:30	73.98	BGX 3D	2/22/1999 8:20	76.9
BGX 3D	1/29/1992 13:05	75.04	BGX 3D	3/24/1999 20:47	76.9
BGX 3D	4/8/1992 13:50	75.54	BGX 3D	6/25/1999 14:17	77.74
BGX 3D	7/31/1992 7:10	76.28	BGX 3D	9/22/1999 14:07	78.32
BGX 3D	11/16/1992 8:17	76.48	BGX 3D	11/12/1999 9:33	76.48
BGX 3D	2/11/1993 15:12	75.35	BGX 3D	12/8/1999 14:16	79.02
BGX 3D	3/27/1993 14:07	74.63	BGX 3D	3/29/2000 18:04	79.5
BGX 3D	5/17/1993 14:11	73.85	BGX 3D	7/11/2000 19:06	79.59
BGX 3D	6/19/1993 10:22	73.91	BGX 3D	9/22/2000 13:37	79.98
BGX 3D	8/16/1993 13:02	74.18	BGX 3D	10/18/2000 10:00	79.89
BGX 3D	9/25/1993 13:22	74.66	BGX 3D	11/8/2000 8:55	80.12
BGX 3D	10/27/1993 15:17	74.9	BGX 3D	12/31/2000 10:00	80.12
BGX 3D	12/22/1993 14:47	75.77	BGX 3D	3/22/2001 2:29	89.54
BGX 3D	1/31/1994 13:04	76.25	BGX 3D	6/26/2001 17:49	80.48
BGX 3D	3/22/1994 14:50	76.48	BGX 3D	9/22/2001 8:54	75
BGX 3D	4/13/1994 15:16	76.18	BGX 3D	11/30/2001 13:00	80.47
BGX 3D	6/16/1994 10:53	76.83	BGX 3D	12/22/2001 14:55	80.93
BGX 3D	8/8/1994 12:58	76.73	BGX 3D	12/23/2001 10:00	80.93
BGX 3D	9/28/1994 15:20	76.75	BGX 3D	1/8/2002 11:48	70.92
BGX 3D	11/1/1994 14:38	76.57	BGX 3D	4/3/2002 15:08	81.04
BGX 3D	12/21/1994 12:43	77.12	BGX 3D	7/9/2002 9:45	81.47
BGX 3D	2/3/1995 11:42	77.03	BGX 3D	10/7/2002 13:01	81.62
BGX 3D	3/24/1995 9:30	76.54	BGX 3D	12/2/2002 9:54	82.03
BGX 3D	6/16/1995 12:09	76.15	BGX 3D	1/9/2003 14:44	81.55
BGX 3D	8/10/1995 9:05	75.78	BGX 3D	4/1/2003 9:55	82.15
BGX 3D	10/16/1995 14:15	75.95	Average		76.60923
BGX 3D	11/27/1995 10:20	76			
BGX 3D	3/15/1996 8:52	76.49			
BGX 3D	3/26/1996 10:27	76.89			
BGX 3D	3/26/1996 11:05	76.89			
BGX 3D	6/18/1996 10:43	76.7			
BGX 3D	9/20/1996 12:05	77.15			
BGX 3D	10/22/1996 11:25	77.3			
BGX 3D	10/23/1996 9:22	77.3			
BGX 3D	12/11/1996 10:15	87.78			
BGX 3D	3/18/1997 10:34	78.22			
BGX 3D	6/16/1997 11:16	78.8			
BGX 3D	9/12/1997 9:50	78.67			
BGX 3D	11/3/1997 9:25	78.72			
BGX 3D	11/3/1997 14:15	78.72			
BGX 3D	12/16/1997 13:40	78.6			
BGX 3D	3/17/1998 13:26	77.5			
BGX 3D	6/29/1998 15:21	74.57			
BGX 3D	9/18/1998 7:30	74.76			
BGX 3D	11/2/1998 10:22	75.2			

Table 1. Depth to water in the vicinity of the slit trenches

Well	Date and Time	Depth to Water (ft)	Well	Date and Time	Depth to Water (ft)
BGX 8DR	1/30/1992 11:35	71.62	BGX 8DR	3/30/2000 9:43	75.59
BGX 8DR	4/8/1992 10:30	72.1	BGX 8DR	7/12/2000 19:54	75.75
BGX 8DR	7/31/1992 9:25	72.48	BGX 8DR	9/22/2000 11:46	76.04
BGX 8DR	11/12/1992 15:54	72.25	BGX 8DR	12/16/2000 12:37	75.96
BGX 8DR	2/17/1993 11:35	71.85	BGX 8DR	12/30/2000 11:11	75.97
BGX 8DR	3/27/1993 16:42	71.11	BGX 8DR	3/25/2001 21:05	76.12
BGX 8DR	5/17/1993 10:22	70.13	BGX 8DR	6/26/2001 17:23	75.69
BGX 8DR	6/21/1993 10:22	70.48	BGX 8DR	9/23/2001 11:42	76
BGX 8DR	8/16/1993 12:05	71.43	BGX 8DR	11/29/2001 11:51	76.1
BGX 8DR	9/24/1993 13:16	71.96	BGX 8DR	12/26/2001 10:30	76.37
BGX 8DR	10/28/1993 11:44	72.5	BGX 8DR	1/9/2002 8:32	76.51
BGX 8DR	12/22/1993 9:33	73.15	BGX 8DR	2/12/2002 10:58	76.65
BGX 8DR	2/7/1994 10:32	73.63	BGX 8DR	4/3/2002 10:59	76.86
BGX 8DR	3/23/1994 9:34	73.39	BGX 8DR	7/8/2002 11:13	77.31
BGX 8DR	4/19/1994 12:50	73.03	BGX 8DR	10/9/2002 8:48	77.66
BGX 8DR	6/15/1994 13:02	73.15	BGX 8DR	11/22/2002 11:45	77.66
BGX 8DR	8/15/1994 10:19	73.54	BGX 8DR	1/9/2003 13:35	77.58
BGX 8DR	9/28/1994 15:54	73.71	BGX 8DR	4/2/2003 11:17	77.19
BGX 8DR	11/7/1994 11:17	73.69		Average	73.27038
BGX 8DR	12/21/1994 10:21	73.73			
BGX 8DR	2/6/1995 11:17	73.09	BGX 8D	8/7/1991 14:35	70.72
BGX 8DR	3/24/1995 11:02	71.65	BGX 8D	11/6/1991 12:00	70.01
BGX 8DR	6/16/1995 11:46	71.97		Average	70.365
BGX 8DR	8/9/1995 10:50	72.34			
BGX 8DR	10/9/1995 10:18	72.67			
BGX 8DR	11/27/1995 12:03	72.92			
BGX 8DR	3/19/1996 15:08	73.45			
BGX 8DR	5/23/1996 10:40	72.99			
BGX 8DR	6/20/1996 10:04	73			
BGX 8DR	9/24/1996 13:46	73.8			
BGX 8DR	11/12/1996 14:10	74.2			
BGX 8DR	12/13/1996 9:15	74.45			
BGX 8DR	3/21/1997 10:09	74.5			
BGX 8DR	9/16/1997 11:50	74.5			
BGX 8DR	11/5/1997 13:49	74.5			
BGX 8DR	12/17/1997 10:15	74.45			
BGX 8DR	3/19/1998 11:50	70.35			
BGX 8DR	6/30/1998 9:45	69.9			
BGX 8DR	9/18/1998 12:55	71.4			
BGX 8DR	12/7/1998 14:50	72.67			
BGX 8DR	12/22/1998 12:17	72.95			
BGX 8DR	3/24/1999 18:30	73.9			
BGX 8DR	6/24/1999 11:13	74.65			
BGX 8DR	9/24/1999 13:47	74.9			
BGX 8DR	11/30/1999 11:14	75.29			
BGX 8DR	12/9/1999 8:39	75.21			

CATEGORICAL EXCLUSION UNREVIEWED SAFETY QUESTION **{ USQ-SWE-2001-0049 superseded by USQ-SWE-2002-0097 }**

CAT X USQ #	SEQ. #	DATE	EO / QR	REFERENCE DOC'T ID	REV. #	BRIEF DESCRIPTION / JUSTIFICATION
USQ-SWE-2002-0097	2759	5/13/2003	Shawn R. Reed	WSRC-RP-94-218	1	The proposed activity is to allow disposal of bulk components that are wider and deeper than currently allowed in the Silt Trench. This activity was reviewed against section B of the Cat X USQ. All questions were answered NO. This activity was also reviewed against the UDO criteria in Section 2. All questions were also answered NO, except criteria #6 (disposal facility configuration). Therefore, a UDO-E is required.

Signature: 

Note: The Brief Description/Justification section is more than the document title. Please input justification.