BROOKHAVEN
NATIONAL LABORATORY

PETITION FOR SHUTDOWN

High Flux Beam Reactor
Tritium Plume
Pump and Recharge System

March 2013

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this formal Petition for Shutdown of the Operable Unit (OU) III High Flux Beam Reactor (HFBR) Pump and Recharge System is to document that the present conditions of the groundwater meet the objectives for shutdown and that this shutdown is consistent with the criteria established in the High Flux Beam Reactor Operations and Maintenance (O&M) Manual (BNL, February 2009 – Revision 1).

1.2 Regulatory History

BNL is a federal facility owned by the United States Department of Energy (DOE) and operated by Brookhaven Science Associates (BSA). On December 21, 1989, the BNL site was included on the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) National Priorities List (NPL) under Section 120 of CERCLA. The United States Environmental Protection Agency (EPA), New York State Department of Conservation (NYSDEC), and DOE entered into a Federal Facilities Agreement, which became effective in May 1992, herein referred to as the Interagency Agreement (IAG) Administrative Docket Number: II-CERCLA-FFA-00201. The primary concern addressed in the IAG is the protection of the sole source aquifer for Suffolk County which underlies OU III. This was documented in the OU III Record of Decision (ROD) which stipulated that the cleanup of the groundwater in the Upper Glacial Aquifer at BNL meet federal drinking water standards (DWS) or Maximum Contaminant Levels (MCLs) in 30 years or less (by 2030). Contingency requirements are included in the OU III ROD for reactivation of the HFBR Pump and Recharge System.

1.3 Site Description and Plume History

In late 1996, tritium was detected in monitoring wells near the HFBR. The source of the release was traced to the HFBR spent fuel pool. In response, the fuel rods were removed and the spent fuel pool was drained.

In 1997, a three-extraction well (EW-9, EW-10 and EW-11) groundwater pump and recharge system was constructed on the Princeton Avenue firebreak road, approximately 3,700 feet downgradient of the HFBR to capture the leading edge of the tritium plume and assure that the plume would not migrate off BNL property. Operations began in June 1997 and extracted water was recharged at the Remedial Action (RA) V recharge basin. **Figure 1** shows the location of the extraction wells and the RA V recharge basin.

In September 2000, the groundwater pump and recharge system was placed in standby status as per a recommendation in the June 2000 HFBR Tritium Pump and Recharge System Evaluation Report (BNL, 2000) as groundwater monitoring data in the area of the extraction wells demonstrated that the plume was attenuating to concentrations well below the federal DWS.

As described in the OU III ROD (BNL, June 2000), the selected remedy to address the HFBR tritium plume included implementing monitoring and low-flow extraction programs to prevent or minimize the plume's growth. Beginning in June 2000, and ending April 2001, 20 low-flow extraction events removed 95,000 gallons of tritiated water with concentrations greater than 750,000 picocuries/liter (pCi/L). This water was sent off site for treatment and disposal at an approved facility. The remnant of the plume's high concentration area was then monitored using permanent and temporary wells as it migrated south over time.

The OU III ROD defined contingencies that would trigger system restart are as follows:

- A detection of tritium above 25,000 pCi/L in the monitoring wells at the Chilled Water Facility, or
- A detection of tritium above 20,000 pCi/L in the monitoring wells along Weaver Drive.

The OU III ROD contingency of exceeding 20,000 pCi/L at Weaver Drive was triggered with a detection of 21,000 pCi/L in November 2006 and signified the arrival of the higher concentration plume segment in this area of the site. In 2007, a new extraction well (EW-16) was installed upgradient of the three existing extraction wells near where these higher concentrations were detected and began pumping water to the RA V recharge basin along with existing extraction well EW-11.

2.0 SYSTEM SHUTDOWN CRITERIA

2.1 System Shutdown Determination

The shutdown of the HFBR Tritium Pump and Recharge System is based on criteria established in the 2008 BNL Groundwater Status Report (BNL, 2008) and documented in the HFBR Pump and Recharge System O&M Manual. The criteria are stated as follows:

"The pump and recharge well(s) will be operated until the tritium concentrations from Weaver Drive to extraction well EW-16 drop below 20,000 pCi/L. The estimated operational duration of 2 to 4 years is based on the length of the high concentration area slug and the time it would take to be completely captured by the new extraction well. The decision to turn the wells back to standby will be based on; 1) concentrations of tritium being less than 20,000 pCi/L in the monitoring wells at Weaver Drive as well as the extraction wells, and 2) verification that the new extraction well has captured concentrations of tritium in this area greater than 20,000 pCi/L. This decision to turn the wells back to standby will be supported with data from additional permanent and temporary wells, as needed."

This Petition for Shutdown demonstrates that shutting down the pump and recharge system is consistent with the criteria established in the 2008 BNL Groundwater Status Report and the HFBR Pump and Recharge System O&M Manual.

2.2 System Description

The HFBR Tritium Pump and Recharge System is comprised of four extraction wells (EW-9, EW-10, EW-11 and EW-16), transfer piping, and liquid-phase Granular Activated Carbon (GAC) units. The GAC units treat the extracted water for removal of volatile organic compounds (VOCs) to below the established DWS. The extraction wells are screened in the Upper Glacial Aquifer. The locations of the extraction wells are shown on **Figure 1**. The extraction well screen depths are shown in **Table 1** below.

The entire pump and recharge system can extract groundwater at a maximum flow rate of approximately 380 gallons per minute (gpm). Actual rates vary based on operational monitoring data and system optimization. Each of the three original extraction wells, EW-9, EW-10 and EW-11 were designed to be pumped at approximately 40 gpm. Extraction well EW-16 was designed to pump at approximately 150 gpm. Maximum pumping rates for the extraction wells are shown in **Table 1** below.

The treated water is recharged to the Upper Glacial Aquifer following GAC treatment for VOCs via the RA V recharge basin located approximately 3,000 feet to the northeast as shown on **Figure 1**. This recharge basin is approximately 5,500 feet north of the BNL site boundary. Groundwater containing tritium and recharged to this basin is allowed to undergo radioactive decay and dispersion and is monitored by a series of monitoring wells located downgradient of the basin.

Table 1 - HFBR Extraction Well Construction Data

HFBR Extraction Well (Site ID)	Screen Length (feet)	Screen Top (feet below land surface)	Screen Bottom (feet below land surface)	Maximum Pumping Rate (gallons per minute)
EW-9 (105-40)	20	130	150	60
EW-10 (105-39)	20	130	150	60
EW-11 (105-41)	20	130	150	60
EW-16 (096-119)	40	80	120	200

2.3 Groundwater Pump and Recharge System Operational Summary

In May 1997, the HFBR Groundwater Pump and Recharge System began operation with the purpose of preventing additional downgradient migration of the tritium plume. The system was placed on standby status in September 2000.

A detection of 21,000 pCi/L of tritium was identified at Weaver Drive in November 2006. The OU III ROD contingency plan called for the restart of the Princeton Avenue extraction wells;

however, the leading edge of the high concentration area was not anticipated to arrive at the Princeton Avenue firebreak road until 2008, and the path of the HFBR tritium plume had shifted several hundred feet to the east since the system was installed. To address this, a fourth extraction well (EW-16) was installed at a location approximately 400 feet north of the existing extraction wells (**Figure 1**). Groundwater modeling performed in 2007 was used to optimize the location of extraction well EW-16 so that it would capture the leading edge of the high concentration downgradient tritium plume segment. Extraction wells EW-16 and EW-11 (Princeton Avenue) were restarted in late 2007. Extraction well EW-11 is the easternmost of the extraction wells on Princeton Avenue and was placed in operation to capture tritium that may have passed east of the EW-16 capture zone. Extraction wells EW-9 and EW-10 remained in standby.

Data collected from the monitoring well network have shown that extraction well EW-16 has effectively captured the high concentration tritium plume.

2.3.1 Groundwater Monitoring

Monitoring of the downgradient tritium plume segment and the effectiveness of the pump and recharge system was accomplished using a combination of 20 permanent monitoring wells and 69 temporary monitoring wells (installed using Geoprobe™ equipment). The temporary wells were generally installed along several transects with some locations repeated in successive sampling rounds. A breakdown of the number of temporary wells installed by year to supplement the permanent monitoring well network is as follows:

- 2008: 19 temporary wells
- 2009: 13 temporary wells
- 2010: 24 temporary wells
- 2011: 13 temporary wells

The permanent monitoring wells were sampled at a quarterly frequency since 2007. Details on groundwater monitoring can be found in the annual BNL Groundwater Status Reports. These monitoring wells are located from the Chilled Water Facility (north) to Princeton Avenue (south) as shown in **Figure 1**. This downgradient tritium plume segment has been tracked over the past twelve years as it migrated south from the HFBR facility. An additional seven permanent wells monitor tritium concentrations in groundwater downgradient of the RA V recharge basin.

2.3.2 Monitoring Well Data Plume Description

A continuous plume containing tritium concentrations above the DWS of 20,000 pCi/L extended from the HFBR, south to the vicinity of the Chilled Water Facility transect during the late 1990s. The segment of the plume containing the highest tritium concentrations (in the vicinity of Temple Place) was remediated via low-flow pumping and off-site disposal (95,000 gallons of tritiated water above 750,000 pCi/L) in 2000 and 2001. The remnants of this high concentration segment of the plume migrated to the vicinity of Weaver Drive in 2006 and triggered the OU III ROD contingency requiring BNL to re-start the pump and recharge system. This plume segment was monitored intensively from 2007 through 2011 as it migrated to the capture zone of

extraction well EW-16. A summary of tritium sampling results from the permanent monitoring wells is provided as **Appendix 1**. Tritium sampling results from temporary monitoring wells are provided as **Appendix 2**.

Comprehensive annual summaries of monitoring well data for this plume since the pump and recharge system was re-started in 2007 can be found in the annual BNL Groundwater Status Reports (BNL, 2007-2011). The last detection of tritium in this area above the DWS was 56,600 pCi/L in temporary well GP-340 during October 2009. All data from permanent and temporary wells indicate that the downgradient tritium plume segment attenuated to less than the DWS in 2010 and 2011.

Figure 2 and **Figure 3** show tritium monitoring data for the fourth quarter of 2011 in plan and cross sectional views. These figures show that all tritium concentrations from Weaver Drive to Princeton Avenue are below the DWS for the fourth quarter of 2011.

Figure 4 demonstrates historical tritium trends for several key permanent and temporary wells upgradient of the pump and recharge system extraction wells.

Figure 5 shows a time-series comparison of the plume for select years from 1997 through 2011 to demonstrate the attenuation of the HFBR tritium plume.

The seven monitoring wells located downgradient of the RA V recharge basin (see **Figure 1**) are sampled to monitor tritium concentrations in groundwater impacted by the discharge of water from the HFBR Pump and Recharge System. Tritium data for these wells are summarized in **Appendix 1**. The highest tritium concentration observed since 2007 in these wells was 1,640 pCi/L in well 076-173 during 2010. Tritium results during the remainder of 2007-2011 for these wells were below 1,000 pCi/L. Based on these data, the impact of recharging water containing low concentrations of tritium to the RA V recharge basin has been minimal.

Tritium continues to be detected at concentrations above the DWS periodically in monitoring wells located immediately downgradient of the HFBR. These detections are in response to the flushing of residual tritium (remaining in the unsaturated zone beneath the HFBR building) into the aquifer when the water table rises. The source area will continue to be monitored and discussed in the annual BNL Groundwater Status Reports.

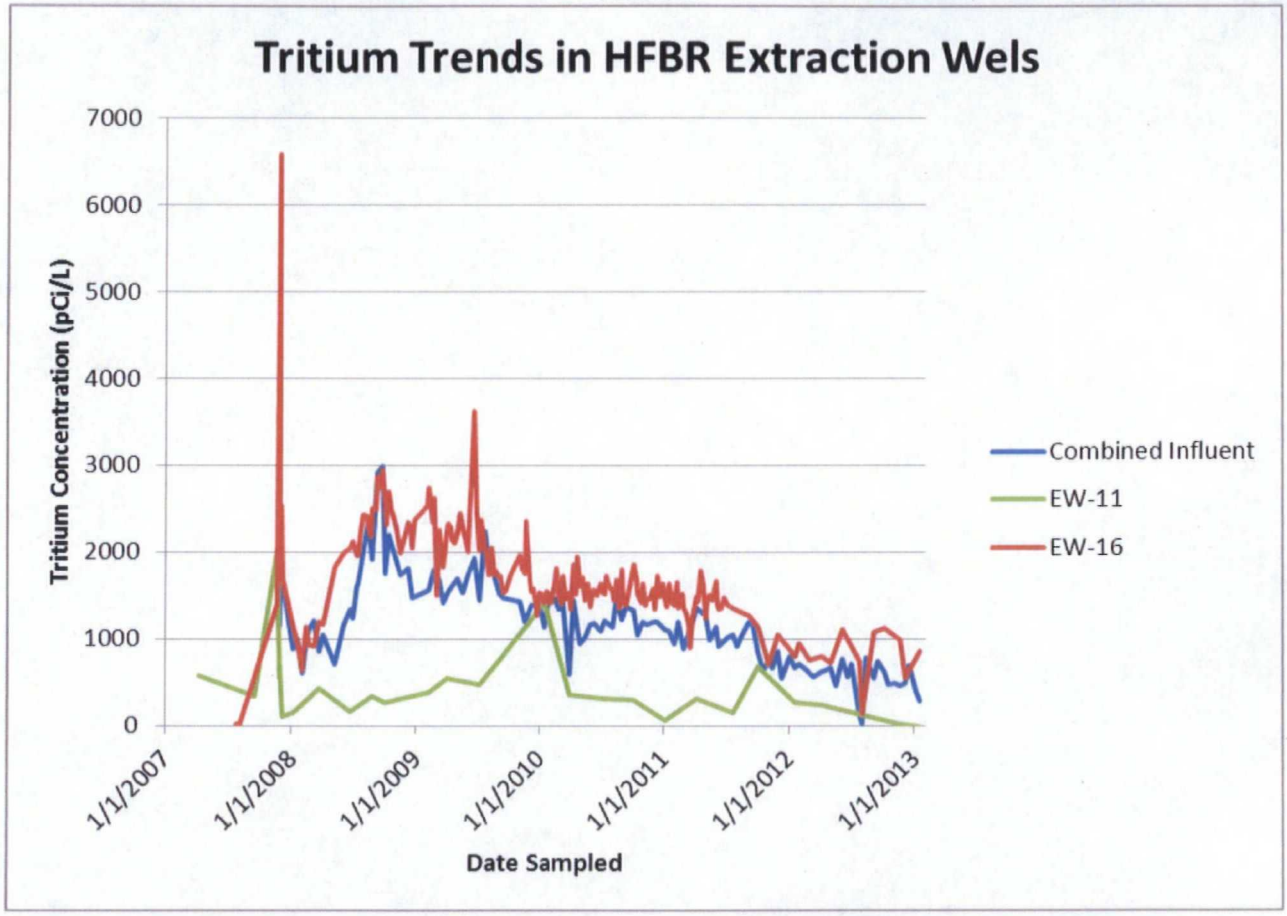
A recommendation was submitted in the 2011 BNL Groundwater Status Report (BNL, 2011) to petition for shutdown of the HFBR Pump and Recharge System and scale back groundwater monitoring of the downgradient tritium plume segment.

2.3.3 System Operational Data

The combined influent from EW-11 and EW-16 has displayed a decreasing tritium concentration since 2009 (see **Chart 1** below). The peak influent combined tritium concentration since the HFBR Pump and Recharge System was restarted in 2007 was 2,990 pCi/L in 2008. Current combined influent concentrations are less than 500 pCi/L.

Tritium in the system influent is almost exclusively derived from extraction well EW-16 where a peak tritium concentration of 6,580 pCi/L was observed shortly after system restarted in 2007. Extraction well EW-16 concentrations quickly declined following the system restart to below 3,000 pCi/L and then steadily decreased to the present concentrations of less than 1,000 pCi/L. Tritium has been near or below the method detection limit in extraction well EW-11 since the system restarted in 2007.

Chart 1



3.0 CONCLUSIONS

The following conclusions can be drawn regarding the HFBR Pump and Recharge System and downgradient plume segment:

- Tritium concentrations in permanent and temporary monitoring wells in the vicinity of the pump and recharge system have remained below the DWS since 2009.
- Tritium concentrations in extraction wells EW-16 and EW-11 have remained well below the DWS since the system was restarted in 2007 and are presently less than 1,000 pCi/L.
- Tritium concentrations in monitoring wells downgradient of the RA V recharge basin have been less than 1,000 pCi/L, with one exception in 2010 (1,640 pCi/L).

- Extraction well EW-16 was effective in capturing the downgradient, higher concentration portions of the tritium plume.
- Only trace amounts of tritium have been detected since the system restarted in 2007 in extraction well EW-11.
- This system has met all of the criteria established in the HFBR Pump and Recharge System O&M Manual for system shutdown.

4.0 RECOMMENDATIONS

Based on the conclusions above, it is recommended that the HFBR Tritium Pump and Recharge System be shut down in the spring of 2013. The system will remain in standby mode (operationally ready) for several years and the extraction wells will be sampled on a quarterly basis. Twenty-one permanent monitoring wells will be utilized to monitor the area between the Chilled Water Facility and Princeton Avenue. The recommended sampling frequencies for these wells are outlined in **Appendix 3**. In addition, temporary monitoring well locations GP-297, GP-298, GP-359, GP-340, and GP-341 will be sampled annually. The monitoring program is designed to detect any rebound or reoccurrence of elevated tritium concentrations in this area and will be re-evaluated in the Annual Groundwater Status Reports. If tritium is detected above the DWS in these wells as part of this monitoring program, a restart of the pump and recharge system will be assessed.

Monitoring of the remainder of the HFBR tritium plume will continue and will be re-evaluated as part of the upcoming 2012 BNL Groundwater Status Report.

5.0 REFERENCES

BNL, Operable Unit III Record Of Decision, June 2000

BNL, Site Environmental Report, Volume II, 2007 Annual Groundwater Status Report, June 2008

BNL, Site Environmental Report, Volume II, 2008 Annual Groundwater Status Report, June 2009

BNL, Site Environmental Report, Volume II, 2009 Annual Groundwater Status Report, June 2010

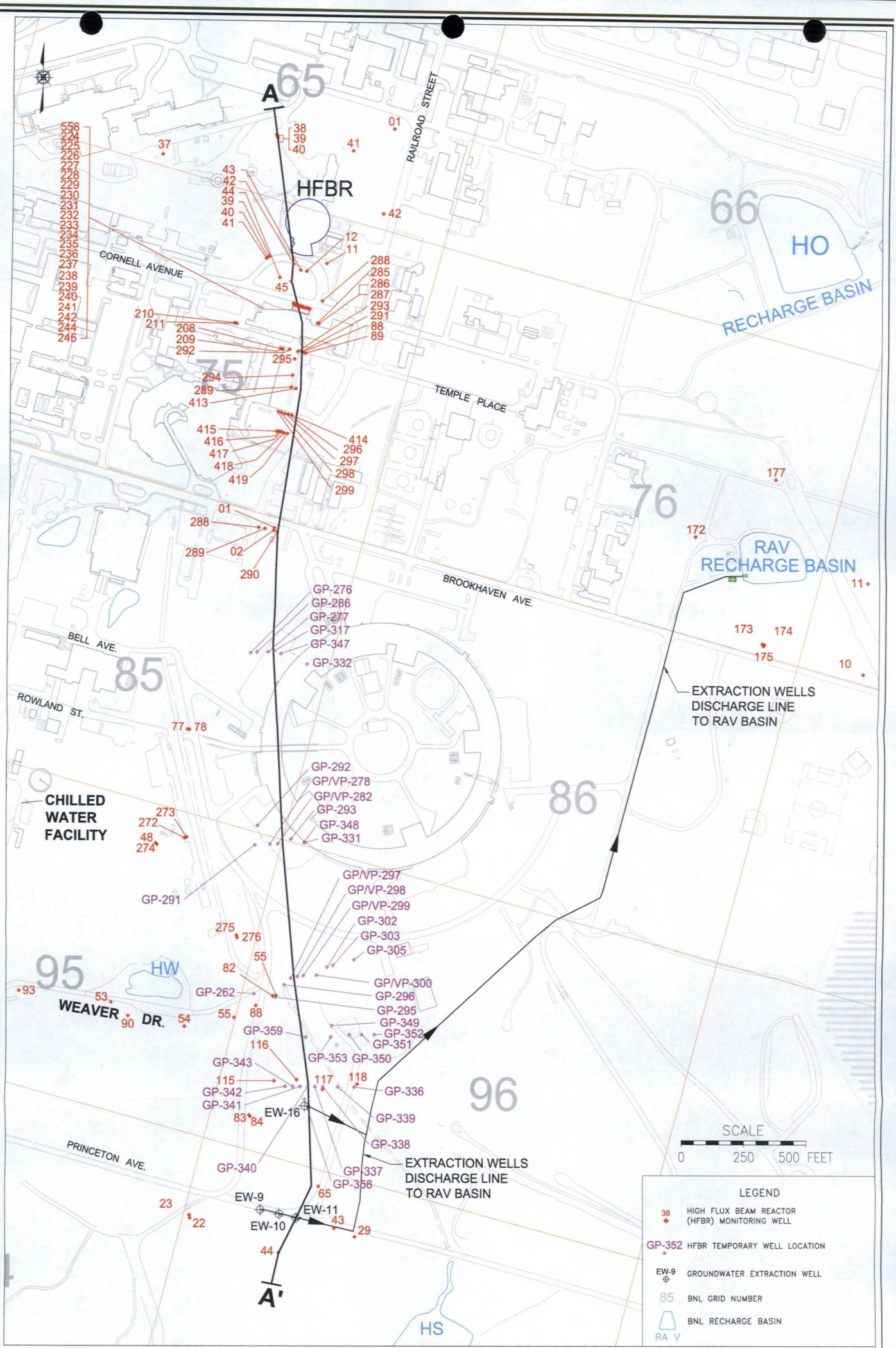
BNL, Site Environmental Report, Volume II, 2010 Annual Groundwater Status Report, June 2011

BNL, Site Environmental Report, Volume II, 2011 Annual Groundwater Status Report, September 2012

BNL, High Flux Beam Reactor Operations and Maintenance Manual, February 2009,Revision 1

BNL, HFBR Tritium Pump and Recharge System Evaluation Report June, 2000

Figures



\\OERNT\GIS\GW_PROJECTS\CY_2013_\TASK 1 01-31-13\FIG_1 02-01-13.DWG

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ENVIRONMENTAL PROTECTION DIVISION

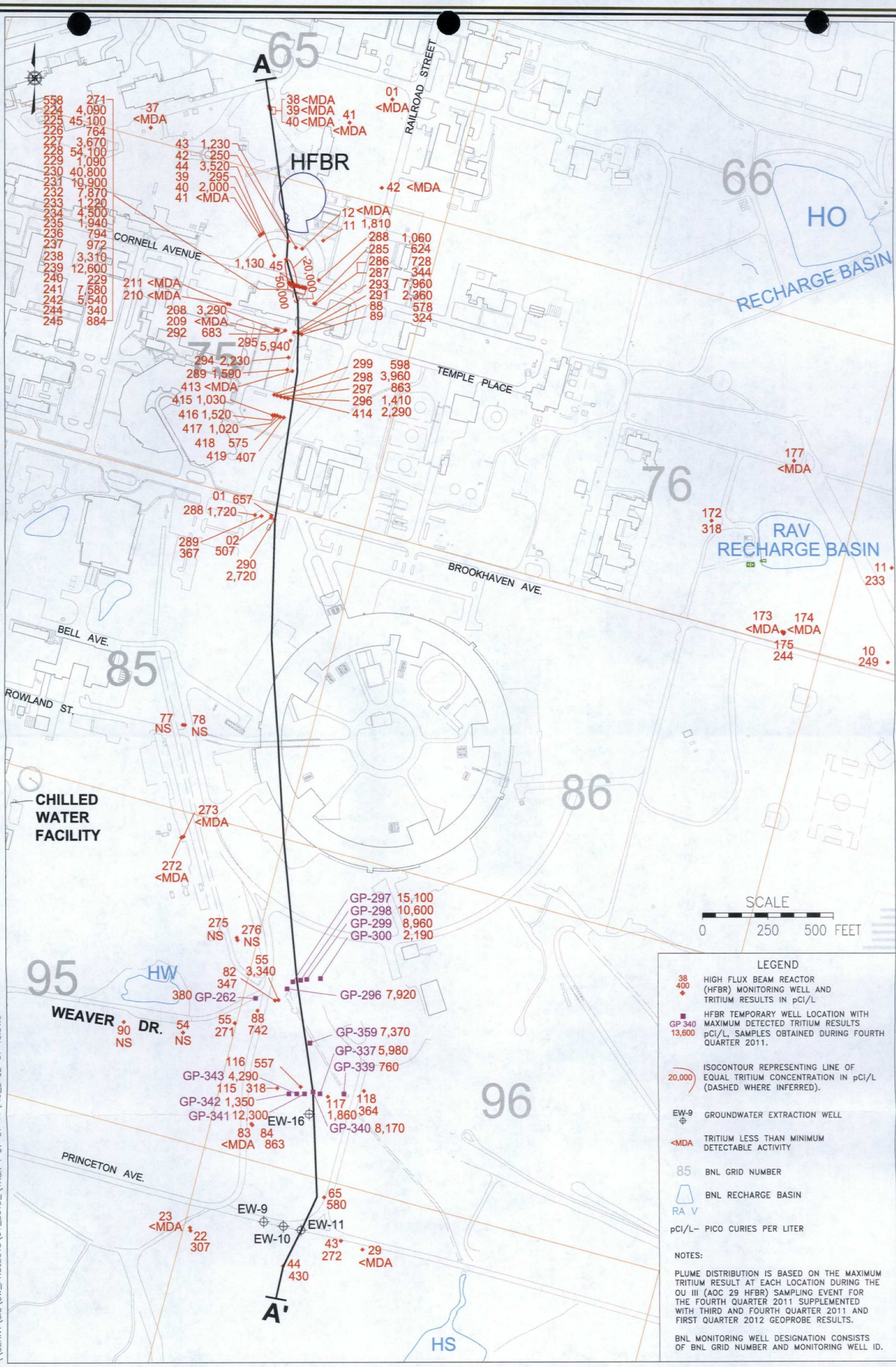
TITLE:

OU III HFBR AOC 29
HFBR TRITIUM PUMP and RECHARGE SYSTEM and MONITORING LOCATIONS

HFBR PETITION FOR SHUTDOWN

DWN:	VS: HS.:	DATE:	PROJECT NO.:
AJZ	–	02/01/13	–
CHKD:	APPD:	REV.:	NOTES:
WRD	–	–	–

FIGURE NO.: 1



\\OERNT\GIS\GW_PROJECTS\CY_2013_\TASK 1 01-31-13\FIG_2 02-01-13.DWG

BROOKHAVEN NATIONAL LABORATORY

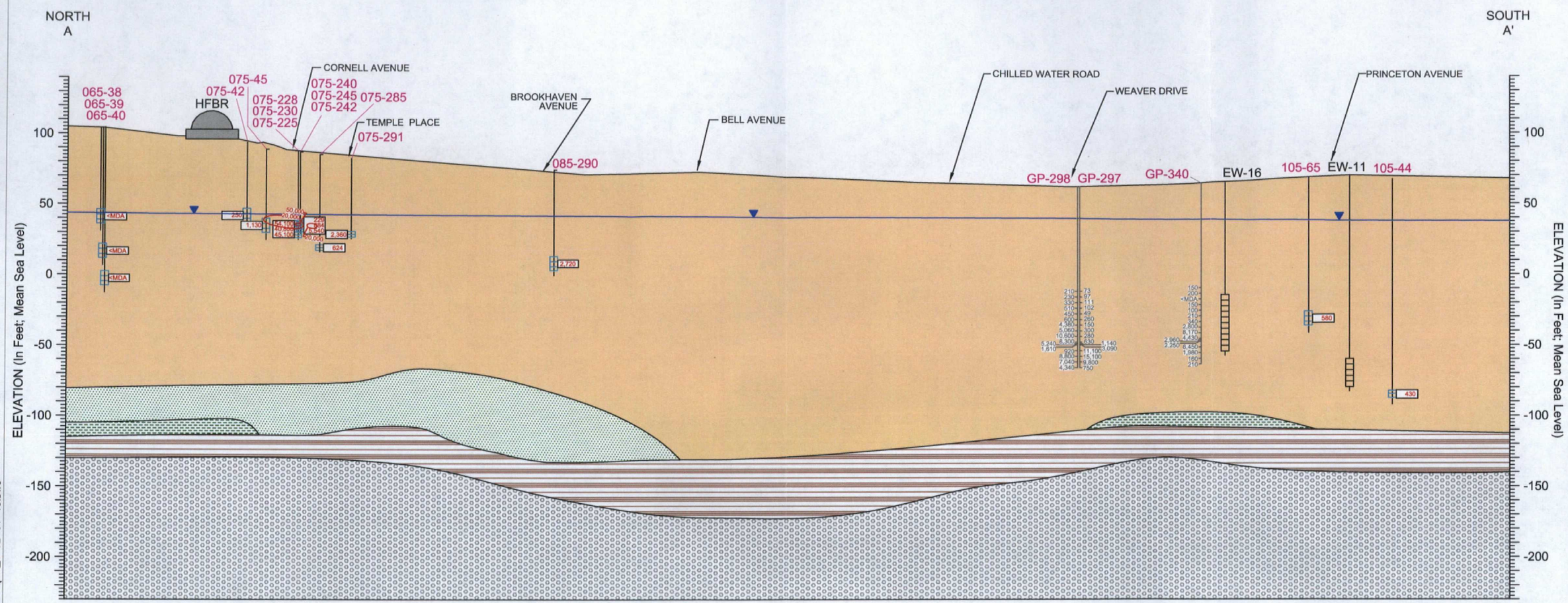
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU III HFBR AOC 29 TRITIUM PLUME CONCENTRATIONS 4th QUARTER 2011

HFBR PETITION FOR SHUTDOWN

DWN:	VS: HS.:	DATE:	PROJECT NO.:
AJZ	–	02/01/13	–
CHKD:	APPD:	REV.:	NOTES:
JEB	–	–	–
FIGURE NO.:			
2			



LEGEND

Upper Glacial aquifer

- UG Upper Glacial Sands
- UC Upper Glacial Silts & Clays
- UU Upton Unit

Gardiners Clay

- GL Gardiners Clay
- GS Gardiners Clay – Silt

Magothy aquifer

- MA Magothy Sands and Clay
- MB Magothy Brown Clay
- MC Magothy Clays (undifferentiated)
- MO Magothy – OTHER

065-40 BNL Well ID

EW-16 Groundwater Extraction Well

GP-345 Temporary well location and tritium detected (48500, 3900, 12300 pCi/L)

Monitoring Well Screen

Extraction Well Screen

Water Table As Of November 7–10, 2011

1,040 Tritium Concentration (pCi/L)

—20,000— Tritium Contour (pCi/L) (Dashed Where Inferred)

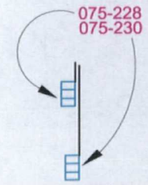
<MDA Tritium result less than minimum detectable activity

pCi/L – pico Curies per liter

HORIZONTAL SCALE

0 125 250 FEET

Monitoring Well IDs are stacked in order of the depth of the well from shallow to deep



NOTES:

1) GEOLOGIC INFORMATION SHOWN IS BASED ON ADDITIONAL EXPLORATIONS (e.g., HYDROPUNCHES, GEOPROBES, VERTICAL PROFILES, AND/OR TEST WELLS) DOCUMENTED IN PREVIOUS, MORE DETAILED REPORTS.

2) PLUME DISTRIBUTION IS BASED ON THE MAXIMUM TRITIUM RESULT AT EACH LOCATION DURING THE ENTIRE OU III (AOC 29 HFBR) SAMPLING EVENT FOR THE FOURTH QUARTER 2011 SUPPLEMENTED WITH FOURTH QUARTER 2011 AND FIRST QUARTER 2012 GEOPROBE RESULTS.

3) CONTOUR INTERVAL IS AS SHOWN.

4) BNL WELL ID COLOR CORRESPONDS TO LONG–TERM MONITORING PROGRAM COLOR CODE.

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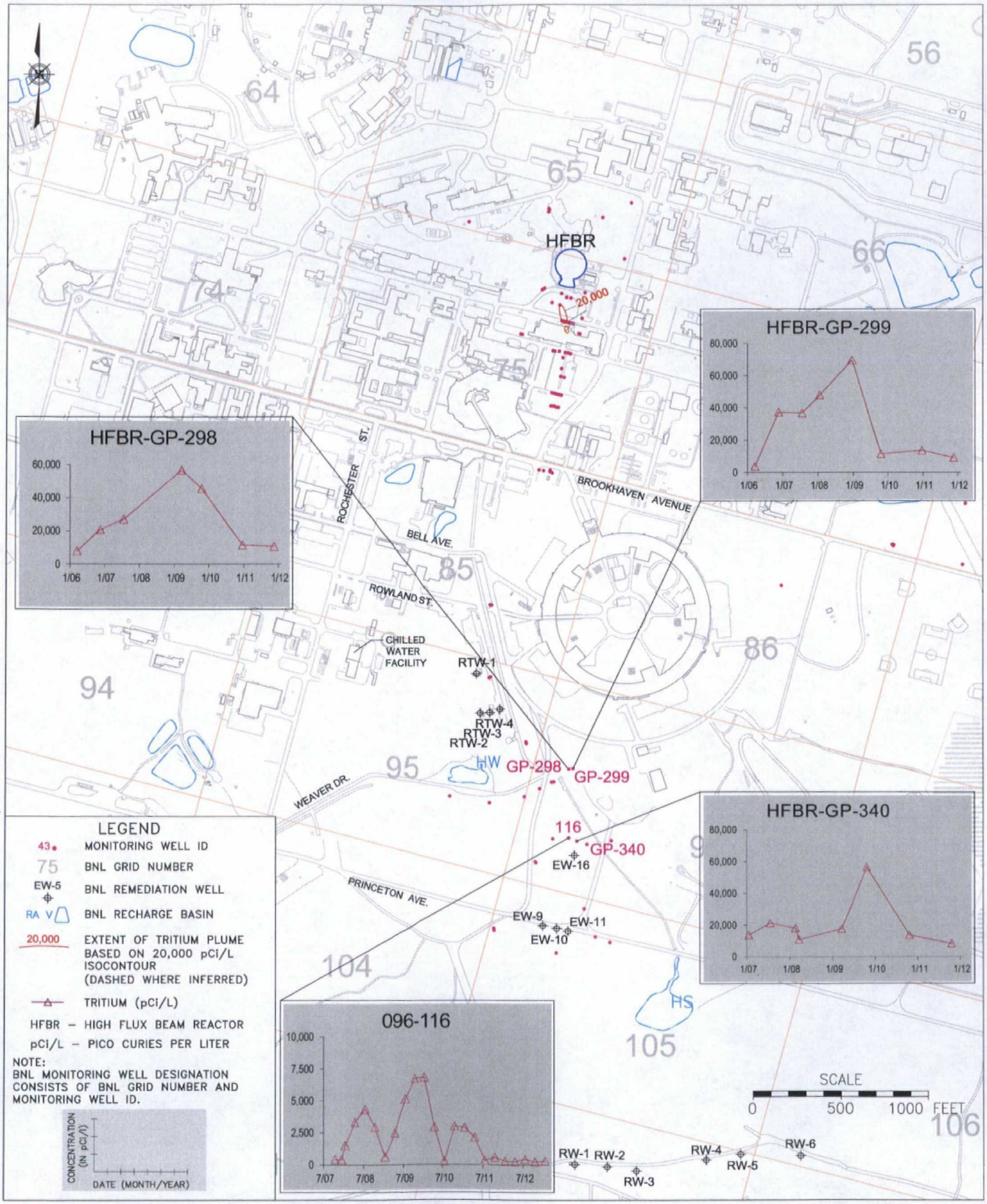
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

OU III HFBR AOC 29
TRITIUM PLUME, HYDROGEOLOGIC CROSS SECTION (A–A')
4th QUARTER 2011

HFBR PETITION FOR SHUTDOWN

DWN:	VT:HZ.:	DATE:	PROJECT NO.:
AJZ	5:1	02/01/13	–
CHKD:	APPD:	REV.:	NOTES:
JEB	WRD	–	–
FIGURE NO.:			
3			



\\OERNT\GIS\GW_PROJECTS\CY_2013_\TASK 1 01-31-13\FIG_4 02-01-13.DWG

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ENVIRONMENTAL PROTECTION DIVISION

TITLE:

HFBR DOWNGRADIENT TRITIUM PLUME SEGMENT HISTORICAL DATA TRENDS

HFBR PETITION FOR SHUTDOWN

DWN:	VT:HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/01/13	–
CHKD:	APPD:	REV.:	NOTES:
JEB	WRD	–	–

FIGURE NO.: 4

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TITLE:

OU III HFBR AOC 29
PLUME COMPARISON 1997 – 2011

HFBR PETITION FOR SHUTDOWN

DWN:	VT:HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/26/13	–
CHKD:	APPD:	REV.:	NOTES:
JEB	WRD	–	–
FIGURE NO.:			
5			

Appendix 1

Appendix 1
Summary of Tritium Results
Permanent Monitoring Wells
2007 - 2012

Site ID	Sample Date	Analyte	Value	Detection Limit	Error	Units	Depth (ft below land surface)	Qualifier
095-139	9/12/2008	Tritium	160	290	180	PCI/L	95	U
095-140	9/12/2008	Tritium	180	300	180	PCI/L	130	U
095-272	4/18/2008	Tritium	200	340	210	PCI/L	160	U
095-272	10/9/2008	Tritium	270	310	190	PCI/L	160	U
095-272	4/7/2009	Tritium	8.41	274	160	PCI/L	160	U
095-272	10/9/2009	Tritium	288	249	156	pCi/L	160	
095-272	10/7/2011	Tritium	68.6	224	133	pCi/L	160	UJ(+)-B
095-272	10/5/2012	Tritium	-54.3	272	158	pCi/L	160	U
095-273	4/18/2008	Tritium	170	340	210	PCI/L	135	U
095-273	10/9/2008	Tritium	210	300	190	PCI/L	135	U
095-273	4/7/2009	Tritium	20.7	274	160	PCI/L	135	U
095-273	10/9/2009	Tritium	204	250	153	pCi/L	135	U
095-273	10/7/2011	Tritium	26	224	132	pCi/L	135	UJ(+)-B
095-273	10/5/2012	Tritium	46.6	274	162	pCi/L	135	U
095-274	4/18/2008	Tritium	850	340	250	PCI/L	160	
095-274	10/3/2008	Tritium	550	300	210	PCI/L	160	
095-274	4/7/2009	Tritium	559	274	184	PCI/L	160	
095-275	4/18/2008	Tritium	80	340	200	PCI/L	130	U
095-275	10/3/2008	Tritium	110	300	180	PCI/L	130	U
095-275	4/7/2009	Tritium	42	278	163	PCI/L	130	U
095-275	7/9/2012	Tritium	425	265	168	pCi/L	130	UJ(+)-B
095-275	10/8/2012	Tritium	99.2	270	161	pCi/L	128	UJ(+)-B
095-276	4/18/2008	Tritium	80	330	200	PCI/L	170	U
095-276	10/3/2008	Tritium	330	300	190	PCI/L	170	J
095-276	4/7/2009	Tritium	183	276	167	PCI/L	170	U
095-276	7/9/2012	Tritium	215	265	161	pCi/L	170	UJ(+)-B
095-276	10/8/2012	Tritium	76.8	270	160	pCi/L	170	UJ(+)-B
095-48	4/3/2008	Tritium	440	380	240	PCI/L	114	J
095-48	10/2/2008	Tritium	110	310	180	PCI/L	114	U
095-48	4/7/2009	Tritium	15.7	277	162	PCI/L	114	U
095-53	10/1/2008	Tritium	170	320	190	PCI/L	90	U
095-54	1/4/2008	Tritium	110	310	180	PCI/L	122	U
095-54	4/2/2008	Tritium	180	350	210	PCI/L	122	U
095-54	7/1/2008	Tritium	9	340	190	PCI/L	122	U
095-54	10/1/2008	Tritium	100	310	190	PCI/L	122	U

Appendix 1
Summary of Tritium Results
Permanent Monitoring Wells
2007 - 2012

Site ID	Sample Date	Analyte	Value	Detection Limit	Error	Units	Depth (ft below land surface)	Qualifier
095-54	1/12/2009	Tritium	73.9	213	127	PCI/L	122	U
095-54	4/9/2009	Tritium	-56.2	276	160	PCI/L	120	U
095-54	7/6/2009	Tritium	70	350	210	PCI/L	122	U
095-55	1/4/2008	Tritium	340	310	200	PCI/L	138	J
095-55	4/2/2008	Tritium	40	350	200	PCI/L	138	U
095-55	7/1/2008	Tritium	70	340	200	PCI/L	138	U
095-55	10/9/2008	Tritium	150	300	180	PCI/L	138	U
095-55	1/13/2009	Tritium	184	212	130	PCI/L	138	U
095-55	4/3/2009	Tritium	235	256	158	PCI/L	138	U
095-55	7/6/2009	Tritium	570	350	240	PCI/L	138	
095-55	10/9/2009	Tritium	395	249	161	pCi/L	138	
095-55	1/11/2010	Tritium	129	263	157	pCi/L	138	U
095-55	4/1/2010	Tritium	292	235	147	pCi/L	138	
095-55	7/1/2010	Tritium	250	45	92	PCI/L	138	J
095-55	10/4/2010	Tritium	80	360	210	PCI/L	138	U
095-55	1/4/2011	Tritium	536	235	159	pCi/L	138	UJ(+)-B
095-55	4/4/2011	Tritium	-9.7	273	161	pCi/L	138	U
095-55	7/7/2011	Tritium	262	216	135	pCi/L	138	UJ(+)-B
095-55	10/6/2011	Tritium	271	259	159	pCi/L	138	UJ(+)-B
095-55	1/4/2012	Tritium	329	262	163	pCi/L	138	UJ(+)-B
095-55	4/6/2012	Tritium	1390	288	237	pCi/L	138	
095-55	7/12/2012	Tritium	235	270	165	pCi/L	138	U
095-55	10/8/2012	Tritium	281	271	166	pCi/L	138	UJ(+)-B
095-55	1/10/2013	Tritium	-5.55	289	170	pCi/L	138	
095-90	1/4/2008	Tritium	170	310	190	PCI/L	104	U
095-90	4/2/2008	Tritium	170	350	210	PCI/L	104	U
095-90	7/1/2008	Tritium	-5	330	190	PCI/L	104	U
095-90	10/1/2008	Tritium	40	320	180	PCI/L	104	U
095-90	1/12/2009	Tritium	77.4	212	126	PCI/L	104	U
095-90	4/9/2009	Tritium	-103	277	159	PCI/L	104	U
095-90	7/7/2009	Tritium	80	330	190	PCI/L	104	U
095-93	4/2/2008	Tritium	1530	350	300	PCI/L	175	
095-93	10/1/2008	Tritium	1870	310	310	PCI/L	175	
095-93	4/9/2009	Tritium	1160	277	223	PCI/L	175	
096-115	1/14/2008	Tritium	-50	340	190	PCI/L	90	U

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096-115	4/18/2008	Tritium	10	340	200	PCI/L	90	U
096-115	7/1/2008	Tritium	30	330	190	PCI/L	90	U
096-115	10/3/2008	Tritium	-70	310	170	PCI/L	90	U
096-115	1/12/2009	Tritium	126	211	127	PCI/L	90	U
096-115	4/3/2009	Tritium	210	257	157	PCI/L	90	U
096-115	7/7/2009	Tritium	-40	330	180	PCI/L	90	U
096-115	10/1/2009	Tritium	60	170	100	PCI/L	90	U
096-115	1/8/2010	Tritium	104	262	156	pCi/L	90	U
096-115	4/2/2010	Tritium	51.1	236	139	pCi/L	90	U
096-115	7/7/2010	Tritium	70	140	84	PCI/L	90	U
096-115	10/4/2010	Tritium	70	360	210	PCI/L	90	U
096-115	1/4/2011	Tritium	-12.3	234	136	pCi/L	90	UJ(+)-B
096-115	4/5/2011	Tritium	75.5	238	141	pCi/L	90	UJ(+)-B
096-115	7/7/2011	Tritium	33.4	217	127	pCi/L	90	UJ(+)-B
096-115	10/18/2011	Tritium	318	214	136	pCi/L	90	
096-115	1/4/2012	Tritium	186	262	158	pCi/L	90	UJ(+)-B
096-115	4/5/2012	Tritium	54.5	218	129	pCi/L	90	UJ(+)-B
096-115	7/12/2012	Tritium	83.1	270	160	pCi/L	90	U
096-115	10/4/2012	Tritium	175	288	173	pCi/L	90	
096-115	1/3/2013	Tritium	-17.8	281	165	pCi/L	90	U
096-116	1/14/2008	Tritium	1500	340	290	PCI/L	90	
096-116	4/18/2008	Tritium	3320	310	400	PCI/L	90	
096-116	7/1/2008	Tritium	4340	330	470	PCI/L	90	
096-116	10/3/2008	Tritium	2940	300	370	PCI/L	90	
096-116	1/12/2009	Tritium	603	210	151	PCI/L	90	
096-116	4/3/2009	Tritium	2440	258	328	PCI/L	90	
096-116	7/7/2009	Tritium	5120	320	520	PCI/L	90	
096-116	10/1/2009	Tritium	6740	180	610	PCI/L	90	
096-116	1/8/2010	Tritium	6820	262	753	pCi/L	90	
096-116	4/2/2010	Tritium	2930	236	357	pCi/L	90	
096-116	7/7/2010	Tritium	250	140	110	PCI/L	90	
096-116	10/4/2010	Tritium	3010	330	400	PCI/L	90	
096-116	1/4/2011	Tritium	2900	232	354	pCi/L	90	
096-116	4/5/2011	Tritium	2120	237	282	pCi/L	90	
096-116	7/7/2011	Tritium	314	218	138	pCi/L	90	UJ(+)-B

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096-116	10/18/2011	Tritium	557	214	149	pCi/L	90	
096-116	1/4/2012	Tritium	344	261	163	pCi/L	90	UJ(+)-B
096-116	4/5/2012	Tritium	201	218	134	pCi/L	90	UJ(+)-B
096-116	7/12/2012	Tritium	416	267	171	pCi/L	90	
096-116	10/4/2012	Tritium	206	288	174	pCi/L	90	
096-116	1/3/2013	Tritium	247	281	171	pCi/L	90	U
096-117	1/14/2008	Tritium	11700	340	910	PCI/L	90	
096-117	4/18/2008	Tritium	10900	310	870	PCI/L	90	
096-117	7/1/2008	Tritium	9540	330	780	PCI/L	90	
096-117	10/3/2008	Tritium	11800	300	910	PCI/L	90	
096-117	1/12/2009	Tritium	27800	213	2880	PCI/L	90	
096-117	7/7/2009	Tritium	2900	320	380	PCI/L	90	
096-117	10/1/2009	Tritium	2560	180	330	PCI/L	90	
096-117	1/8/2010	Tritium	4720	262	543	pCi/L	90	
096-117	4/2/2010	Tritium	7160	238	776	pCi/L	90	
096-117	7/7/2010	Tritium	6450	130	600	PCI/L	90	
096-117	10/4/2010	Tritium	4910	330	520	PCI/L	90	
096-117	1/4/2011	Tritium	4900	232	549	pCi/L	90	
096-117	4/5/2011	Tritium	5380	236	597	pCi/L	90	
096-117	7/7/2011	Tritium	2670	218	328	pCi/L	90	
096-117	10/18/2011	Tritium	1860	212	251	pCi/L	90	
096-117	1/4/2012	Tritium	1440	262	228	pCi/L	90	
096-117	4/5/2012	Tritium	1100	218	189	pCi/L	90	
096-117	7/12/2012	Tritium	870	271	198	pCi/L	90	
096-117	10/4/2012	Tritium	676	285	191	pCi/L	90	
096-117	1/3/2013	Tritium	876	281	199	pCi/L	90	
096-118	1/14/2008	Tritium	60	350	200	PCI/L	89	U
096-118	4/18/2008	Tritium	150	340	200	PCI/L	89	U
096-118	7/1/2008	Tritium	60	330	200	PCI/L	89	U
096-118	10/3/2008	Tritium	60	300	180	PCI/L	89	U
096-118	1/13/2009	Tritium	76.4	215	127	PCI/L	89	U
096-118	4/3/2009	Tritium	91.5	262	155	PCI/L	86	U
096-118	7/7/2009	Tritium	20	330	190	PCI/L	89	U
096-118	10/1/2009	Tritium	36	170	97	PCI/L	89	U
096-118	1/8/2010	Tritium	-7.6	262	153	pCi/L	89	U

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096-118	4/2/2010	Tritium	21.8	235	138	pCi/L	89	U
096-118	7/7/2010	Tritium	150	140	98	PCI/L	89	
096-118	10/4/2010	Tritium	80	330	200	PCI/L	89	U
096-118	1/4/2011	Tritium	68.6	232	137	pCi/L	89	UJ(+)-B
096-118	4/4/2011	Tritium	-4.88	240	140	pCi/L	89	U
096-118	7/7/2011	Tritium	160	217	132	pCi/L	89	UJ(+)-B
096-118	10/18/2011	Tritium	364	216	140	pCi/L	89	
096-118	1/4/2012	Tritium	181	262	158	pCi/L	89	UJ(+)-B
096-118	4/5/2012	Tritium	445	217	144	pCi/L	89	UJ(+)-B
096-118	7/12/2012	Tritium	492	272	177	pCi/L	89	
096-118	10/4/2012	Tritium	620	289	190	pCi/L	89	
096-118	1/3/2013	Tritium	61.4	282	167	pCi/L	89	U
096-55	1/4/2008	Tritium	50	310	180	PCI/L	134	U
096-55	4/1/2008	Tritium	220	340	210	PCI/L	134	U
096-55	7/1/2008	Tritium	-80	330	190	PCI/L	134	U
096-55	10/2/2008	Tritium	80	310	190	PCI/L	134	U
096-55	1/12/2009	Tritium	196	212	130	PCI/L	134	U
096-55	4/3/2009	Tritium	88.8	260	154	PCI/L	134	U
096-55	7/6/2009	Tritium	-30	350	200	PCI/L	134	U
096-55	10/8/2009	Tritium	163	257	155	pCi/L	134	U
096-55	1/8/2010	Tritium	94.1	263	156	pCi/L	134	U
096-55	4/1/2010	Tritium	282	234	146	pCi/L	134	
096-55	7/1/2010	Tritium	177	46	77	PCI/L	134	J
096-55	10/4/2010	Tritium	210	360	220	PCI/L	134	U
096-55	1/4/2011	Tritium	129	235	141	pCi/L	134	UJ(+)-B
096-55	4/4/2011	Tritium	559	273	178	pCi/L	134	
096-55	7/7/2011	Tritium	606	218	154	pCi/L	134	UJ(+)-B
096-55	10/18/2011	Tritium	3340	212	391	pCi/L	134	
096-55	1/5/2012	Tritium	950	285	206	pCi/L	134	
096-55	4/6/2012	Tritium	81.3	285	169	pCi/L	134	UJ(+)-B
096-55	7/12/2012	Tritium	1970	272	282	pCi/L	134	
096-55	10/4/2012	Tritium	3710	284	438	pCi/L	134	
096-55	1/10/2013	Tritium	5480	289	611	pCi/L	134	
096-82	1/4/2008	Tritium	5530	310	530	PCI/L	105	
096-82	4/1/2008	Tritium	3660	350	420	PCI/L	105	

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096-82	7/1/2008	Tritium	3280	330	400	PCI/L	105	
096-82	10/2/2008	Tritium	5060	310	510	PCI/L	105	
096-82	1/12/2009	Tritium	7200	212	779	PCI/L	105	
096-82	4/3/2009	Tritium	6230	259	698	PCI/L	105	
096-82	7/6/2009	Tritium	2620	350	370	PCI/L	105	
096-82	10/8/2009	Tritium	7400	256	811	pCi/L	105	
096-82	1/8/2010	Tritium	4380	261	510	pCi/L	105	
096-82	4/1/2010	Tritium	2640	237	330	pCi/L	105	
096-82	7/1/2010	Tritium	3060	40	360	PCI/L	105	
096-82	10/4/2010	Tritium	2850	360	390	PCI/L	105	
096-82	1/4/2011	Tritium	2070	233	277	pCi/L	105	
096-82	4/4/2011	Tritium	2680	272	336	pCi/L	105	
096-82	7/7/2011	Tritium	3930	218	450	pCi/L	105	
096-82	10/18/2011	Tritium	347	217	139	pCi/L	105	
096-82	1/5/2012	Tritium	4500	283	514	pCi/L	104	
096-82	4/6/2012	Tritium	4420	285	506	pCi/L	105	
096-82	7/12/2012	Tritium	2920	274	368	pCi/L	105	
096-82	10/4/2012	Tritium	586	284	186	pCi/L	105	
096-82	1/10/2013	Tritium	66.4	288	171	pCi/L	105	
096-83	11/24/2008	Tritium	20	300	170	PCI/L	30	U
096-83	10/9/2009	Tritium	158	251	151	pCi/L	28	U
096-83	10/4/2010	Tritium	-80	350	200	PCI/L	28	U
096-83	10/6/2011	Tritium	104	260	155	pCi/L	28	UJ(+)-B
096-83	10/4/2012	Tritium	35.9	286	169	pCi/L	28	
096-84	1/4/2008	Tritium	90	300	180	PCI/L	134	U
096-84	4/1/2008	Tritium	230	350	220	PCI/L	134	U
096-84	7/1/2008	Tritium	140	330	200	PCI/L	134	U
096-84	10/3/2008	Tritium	250	280	180	PCI/L	134	U
096-84	1/12/2009	Tritium	119	214	128	PCI/L	134	U
096-84	4/3/2009	Tritium	207	259	158	PCI/L	134	U
096-84	7/7/2009	Tritium	260	330	210	PCI/L	134	U
096-84	10/9/2009	Tritium	324	250	158	pCi/L	134	
096-84	1/8/2010	Tritium	198	262	159	pCi/L	134	U
096-84	4/1/2010	Tritium	154	235	142	pCi/L	134	
096-84	7/1/2010	Tritium	167	45	75	PCI/L	136	J

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096-84	10/4/2010	Tritium	-30	360	200	PCI/L	134	U
096-84	1/4/2011	Tritium	-4.91	233	136	pCi/L	134	UJ(+)-B
096-84	4/5/2011	Tritium	105	238	142	pCi/L	134	UJ(+)-B
096-84	7/7/2011	Tritium	121	216	130	pCi/L	134	UJ(+)-B
096-84	10/18/2011	Tritium	863	214	170	pCi/L	134	
096-84	1/5/2012	Tritium	165	284	170	pCi/L	134	U
096-84	4/6/2012	Tritium	167	288	173	pCi/L	134	UJ(+)-B
096-84	7/12/2012	Tritium	80.6	271	160	pCi/L	134	U
096-84	10/4/2012	Tritium	76.7	283	168	pCi/L	134	
096-84	1/10/2013	Tritium	75	289	171	pCi/L	134	
096-88	1/4/2008	Tritium	300	310	200	PCI/L	140	U
096-88	4/8/2008	Tritium	550	310	220	PCI/L	140	
096-88	7/1/2008	Tritium	280	330	210	PCI/L	140	U
096-88	10/3/2008	Tritium	410	280	190	PCI/L	140	J
096-88	1/13/2009	Tritium	223	211	131	PCI/L	140	
096-88	4/3/2009	Tritium	285	259	161	PCI/L	140	
096-88	7/6/2009	Tritium	100	350	210	PCI/L	140	U
096-88	10/9/2009	Tritium	475	251	166	pCi/L	140	
096-88	1/8/2010	Tritium	404	263	169	pCi/L	140	
096-88	4/1/2010	Tritium	571	227	157	pCi/L	144	
096-88	7/1/2010	Tritium	600	50	140	PCI/L	40	
096-88	10/12/2010	Tritium	630	140	160	PCI/L	140	
096-88	1/6/2011	Tritium	570	231	159	pCi/L	140	
096-88	4/4/2011	Tritium	431	273	172	pCi/L	140	
096-88	10/6/2011	Tritium	742	260	181	pCi/L	140	UJ(+)-B
096-88	1/4/2012	Tritium	687	263	179	pCi/L	140	UJ(+)-B
096-88	4/6/2012	Tritium	424	288	181	pCi/L	140	UJ(+)-B
096-88	7/9/2012	Tritium	562	263	173	pCi/L	140	UJ(+)-B
096-88	10/8/2012	Tritium	472	270	172	pCi/L	140	
096-88	1/10/2013	Tritium	150	288	173	pCi/L	140	
076-172	4/1/2008	Tritium	360	340	220	PCI/L	110	J
076-172	10/2/2008	Tritium	290	310	200	PCI/L	120	U
076-172	4/7/2009	Tritium	119	275	164	PCI/L	120	U
076-172	10/8/2009	Tritium	676	254	179	pCi/L	120	
076-172	4/2/2010	Tritium	522	238	160	pCi/L	120	
076-172	10/7/2010	Tritium	270	200	140	PCI/L	120	

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076-172	4/4/2011	Tritium	96.5	272	162	pCi/L	120	U
076-172	10/7/2011	Tritium	318	225	142	pCi/L	120	
076-172	4/5/2012	Tritium	886	215	172	pCi/L	120	
076-172	10/4/2012	Tritium	505	287	184	pCi/L	120	
076-173	4/1/2008	Tritium	-20	350	200	PCI/L	44	U
076-173	10/2/2008	Tritium	330	310	200	PCI/L	44	J
076-173	4/7/2009	Tritium	753	272	195	PCI/L	44	
076-173	10/6/2009	Tritium	275	252	156	pCi/L	44	
076-173	4/2/2010	Tritium	1640	238	241	pCi/L	44	
076-173	10/7/2010	Tritium	-95	200	93	PCI/L	58	U
076-173	4/1/2011	Tritium	185	237	144	pCi/L	44	UJ(+)-B
076-173	10/7/2011	Tritium	38.1	226	133	pCi/L	44	UJ(+)-B
076-173	4/5/2012	Tritium	805	218	168	pCi/L	44	
076-173	10/3/2012	Tritium	90.8	259	154	pCi/L	44	U
076-174	4/1/2008	Tritium	160	340	210	PCI/L	112	U
076-174	10/2/2008	Tritium	1520	310	280	PCI/L	112	
076-174	4/7/2009	Tritium	24.6	274	160	PCI/L	112	U
076-174	10/6/2009	Tritium	278	254	158	pCi/L	112	
076-174	4/2/2010	Tritium	1540	237	232	pCi/L	112	
076-174	10/7/2010	Tritium	100	210	130	PCI/L	125	U
076-174	4/1/2011	Tritium	79.9	236	140	pCi/L	112	UJ(+)-B
076-174	10/7/2011	Tritium	45.2	226	133	pCi/L	112	UJ(+)-B
076-174	4/5/2012	Tritium	200	217	133	pCi/L	112	UJ(+)-B
076-174	10/3/2012	Tritium	99.7	261	155	pCi/L	112	U
076-175	4/1/2008	Tritium	330	350	220	PCI/L	152	U
076-175	10/2/2008	Tritium	550	310	220	PCI/L	152	
076-175	4/7/2009	Tritium	231	276	169	PCI/L	152	U
076-175	10/6/2009	Tritium	609	253	175	pCi/L	152	
076-175	4/2/2010	Tritium	486	238	158	pCi/L	152	
076-175	10/7/2010	Tritium	420	200	160	PCI/L	152	
076-175	4/1/2011	Tritium	285	238	148	pCi/L	152	
076-175	10/7/2011	Tritium	244	227	140	pCi/L	152	UJ(+)-B
076-175	4/5/2012	Tritium	217	219	135	pCi/L	152	UJ(+)-B
076-175	10/3/2012	Tritium	569	261	175	pCi/L	152	
076-177	4/1/2008	Tritium	320	350	220	PCI/L	99	U
076-177	10/2/2008	Tritium	270	310	200	PCI/L	99	U
076-177	4/7/2009	Tritium	194	275	167	PCI/L	99	U
076-177	10/8/2009	Tritium	528	257	172	pCi/L	99	
076-177	4/2/2010	Tritium	215	237	145	pCi/L	99	U
076-177	10/7/2010	Tritium	250	200	140	PCI/L	99	
076-177	4/1/2011	Tritium	343	238	151	pCi/L	99	
076-177	10/7/2011	Tritium	130	224	135	pCi/L	99	UJ(+)-B
076-177	4/5/2012	Tritium	425	216	143	pCi/L	99	UJ(+)-B
076-177	10/4/2012	Tritium	288	283	174	pCi/L	99	UJ(+)-B

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077-10	4/1/2008	Tritium	350	350	220	PCI/L	104	J
077-10	10/1/2008	Tritium	330	310	200	PCI/L	99	J
077-10	4/7/2009	Tritium	125	275	164	PCI/L	104	U
077-10	10/8/2009	Tritium	397	256	165	pCi/L	104	
077-10	4/2/2010	Tritium	1520	239	231	pCi/L	104	
077-10	10/7/2010	Tritium	300	200	150	PCI/L	104	
077-10	4/1/2011	Tritium	258	237	147	pCi/L	104	
077-10	10/7/2011	Tritium	249	227	141	pCi/L	104	UJ(+)-B
077-10	4/5/2012	Tritium	373	218	141	pCi/L	104	UJ(+)-B
077-10	10/4/2012	Tritium	538	285	184	pCi/L	104	
077-11	4/1/2008	Tritium	410	350	230	PCI/L	120	J
077-11	10/2/2008	Tritium	300	310	200	PCI/L	120	U
077-11	4/7/2009	Tritium	204	274	167	PCI/L	120	U
077-11	10/8/2009	Tritium	473	256	169	pCi/L	120	
077-11	4/2/2010	Tritium	388	237	152	pCi/L	120	
077-11	10/7/2010	Tritium	220	200	140	PCI/L	120	
077-11	4/1/2011	Tritium	254	238	147	pCi/L	120	
077-11	10/7/2011	Tritium	233	226	139	pCi/L	120	UJ(+)-B
077-11	4/5/2012	Tritium	447	216	144	pCi/L	120	UJ(+)-B
077-11	10/4/2012	Tritium	545	284	184	pCi/L	120	

U - Not detected.

J - Estimated value.

UJ(+)-B - Not detected, raised estimated detection limit due to blank contamination.

Appendix 2

Appendix 2
Summary of Tritium Results
Temporary Monitoring Wells
2007 - 2012

Bell Avenue

Depth (ft. bls)	GP-276 12/1-6/10	GP-286 12/2-8/10	GP-277 2/25-26/08	GP-277 12/10-15/10	GP-317 2/7-8/08	GP-317 12/8-16/10	GP-347 3/6/2008	GP-347 12/17-22/10	GP-332 1/4-6/11
46-50'			340		<MDA				
50-54'			<MDA		<MDA				
54-58'			<MDA		<MDA				
58-62'			<MDA		<MDA				
62-66'			<MDA		510		6,440		
66-70'	<MDA	228	<MDA	1190	850	2020	2,110	2610	1570
70-74'	<MDA	250	<MDA	1440	4,510	4300	1,930	2490	2130
74-78'	<MDA	250	2,950	1730	3,930	4700	3,700	1760	3060
78-82'	<MDA	380	1,700	1870	1,990	3180	1,650	1970	2400
82-86'	<MDA	390	3,790	2050	710	3410	740	1590	1890
86-90'	180	580	12,400	2250	1,510	2140	690	1600	1900
90-94'	270	820	14,500	1710	780	1100	<MDA	1070	1690
94-98'	260	830		1790		1100	<MDA	950	1430
98-102'	440	720		1720		700	<MDA	330	1790
102-106'	<MDA	560		2000		900		420	1570
106-110'	<MDA	380		1460				210	1920
110-114'	370	560		560		850		180	1200
114-118'	<MDA	590		440		400		360	1290
118-122'	<MDA	710		310		570		250	1660
122-126'	<MDA	600		380		410		340	360
126-130'	<MDA	200		350		990		540	370

(concentrations in pCi/L)
MDA - Minimum detectable activity.
bls - Below land surface.

Appendix 2
Summary of Tritium Results
Temporary Monitoring Wells
2007 - 2012

Chilled Water

	GP-291	GP-292	GP-278	GP-278	GP-278	GP-278	GP-278	GP-282	GP-282	GP-282	GP-282	GP-282	GP-293	GP-293	GP-293	GP-348	GP-331
Depth (ft. bls)	11/23-30/10	11/22-29/10	7/30-31/07	1/14-17/08	12/16/2008	11/3/2009	11/9-17/10	8/1/07	1/22-23/08	12/11/08	11/10/2009	11/9-15/10	1/18-19/08	12/9/2008	11/16/2009	3/18-19/08	3/10-12/08
24-28'				<MDA													
28-32'				<MDA									710				
32-36'				<MDA									<MDA				
36-40'				<MDA									<MDA				
40-44'				<MDA									<MDA				
44-48'				<MDA									<MDA				
48-52'				<MDA									<MDA				
52-56'				<MDA									580				
56-60'				<MDA									<MDA			<MDA	<MDA
60-64'				<MDA									1060			<MDA	<MDA
64-68'	280	490		390			<MDA					245	<MDA			810	<MDA
68-72'	360	<MDA		<MDA	<MDA	<MDA	<MDA			<MDA	266	90	4370	<MDA	2320	1350	<MDA
72-76'	<MDA	390		1240	<MDA	<MDA	<MDA		<MDA	<MDA	<MDA	204	8200	1820	2810	6030	<MDA
76-80'	<MDA	<MDA		<MDA	<MDA	<MDA	<MDA		440	390J	552	173	6520	2410	2040	5280	<MDA
80-84'	<MDA	<MDA		400	320J	<MDA	<MDA		<MDA	930	604	380	6080	5150	1480	9500	<MDA
84-88'	220	<MDA	376	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA	1760	1,550	1490	10700	10900	901	13700	<MDA
88-92'	<MDA	<MDA	<MDA	<MDA	<MDA	308	<MDA	6,700	<MDA	9570	2,320	1580	5940	9930	906	11400	780
92-96'	<MDA	<MDA	302	<MDA	<MDA	279	<MDA	54,200	2400	8230	6,160	1180	8820	5540	604	16000	<MDA
96-100'	230	<MDA	<MDA	2690	<MDA	<MDA	158	103,000	2350	7440	12,800	1750	9360	4890	474	10700	<MDA
100-104'	<MDA	<MDA	<MDA	<MDA	860	263	<MDA	48,900	2310	6290	15,000	1580	10600	640	853	8400	<MDA
104-108'	240	<MDA	514	<MDA	780	1,280	<MDA	98,000	37000	6210	16,900	4810	13400	2050	649	7020	<MDA
108-112'	<MDA	340	1,490	630	2,290	2,930	146	118,000	113000	7350	12,300	2670	15100	2870	1880	480	<MDA
112-116'	360	<MDA	22,400	9400	1,290	3,800	<MDA	60,100	87400	5960	7,110	6650	6710	780	2110	650	<MDA
116-120'	460	550	59,300	8760	17,300	2,470	154	33,900	12700	18900	4,070	10200	<MDA	1780	587	<MDA	
120-124'	210	<MDA				10,500	122				4,480	7960			641		
124-128'	890	930				19,300	138				3,710	8050			2240		
128-132'						14,800					16,600				2870		

(concentrations in pCi/L)
MDA - Minimum detectable activity.
bls - Below land surface.

Appendix 2
Summary of Tritium Results
Temporary Monitoring Wells
2007 - 2012

Weaver Drive

Depth (ft. bls)	GP-262 1/23/2012	GP-295 10/18-11/1/1	GP-296 1/4-5/11	GP-297 5/10/2010	GP-297 11/2-4/10	GP-298 7/25/07	GP-298 1/24-26/08	GP-298 3/10/09	GP-298 10/21/2009	GP-298 12/20-22/10	GP-299 7/26-27/07	GP-299 1/28-29/08	GP-299 12/29/2008	GP-299 10/28/2009	GP-299 12/15-16/10	GP-300 8/2/2007	GP-300 1/31-2/1/08
56-60'							850										
60-64'				<MDA			2,740	<MDA	<MDA			<MDA	1420	278			<MDA
64-68'				<MDA			2,150	2480	<MDA			<MDA	4340	343			<MDA
68-72'	<MDA	1660	<MDA	<MDA	190	1,580	3,930	556	420	<MDA	<MDA	<MDA	1790	605	143	603	3,550
72-76'	<MDA	1460	340	<MDA	260	946	4,660	<MDA	896	190	592	<MDA	1790	1130	750	10,200	7,880
76-80'	<MDA	1220	290	<MDA	190	447	3,450	1490	1820	200	<MDA	370	2420	2490	1490	11,900	8,690
80-84'	<MDA	2600	230	307	190	543	880	8910	2280	360	1,130	<MDA	5100	3450	5640	39,800	14,100
84-88'	<MDA	3730	230	367	670	422	<MDA	<MDA	3110	770	9,290	<MDA	17000	3420	13500	64,200	45,400
88-92'	<MDA	5790	<MDA	314	570	909	<MDA	22200	8780	2340	36,600	2,460	38900	4110	11500	29,600	65,800
92-96'	<MDA	9600	<MDA	312	1060	27,000	2,440	15400	9560	6470	26,900	47,800	69400	5510	10400	16100	14,800
96-100'	380	10900	170	460	1830		2,090	20500	15200	7460		36,900	35300	9620	6400		4,860
100-104'	<MDA	7660	530	556	2480		11,200	37000	25700	9940		10,300	45700	8520	3520		3,930
104-108'	<MDA	2980	850	820	3600		4,840	56700	34500	9440		18,200	59500	8880	3710		1,000
108-112'	<MDA	2020	5990	2150	11200		6,530	34200	45500	6060		720	38100	11300	3500		1,460
112-116'	<MDA	2390	6400	6600	9210		8,830	13400	22400	9760		<MDA	27700	10600	3200		380J
116-120'		2620	10500	11500	19400		1,150	1990	5350	11500		<MDA	17700	7590	4600		<MDA

(concentrations in pCi/L)
MDA - Minimum detectable activity.
bls - Below land surface.

Appendix 2
Summary of Tritium Results
Temporary Monitoring Wells
2007 - 2012

Weaver Drive

Depth (ft. bls)	GP-300 1/2/2009	GP-300 12/3/2009	GP-300 1/10-14/11	GP-300 1/13/2012	GP-302 2/1-5/08	GP-302 12/19/2008	GP-302 1/18-24/11	GP-303 3/13-14/08	GP-305 3/25/2008
56-60'									
60-64'	578	414				<MDA			
64-68'	898	774				<MDA			
68-72'	2780	1920	1210	930	<MDA	353	490		
72-76'	688	4710	1680	1020	610	2182	560	10,900	<MDA
76-80'	888	6980	1120	1270	2,460	3169	510	9,960	<MDA
80-84'	2360	7980	730	1160	2,390	5195	370	2,260	760
84-88'	2690	7450	470	2190	310	4538	<MDA	360J	<MDA
88-92'	4380	6520	<MDA	2120	6,990	3106	<MDA	<MDA	<MDA
92-96'	3780	9330	<MDA	1830	18,000	863	<MDA	<MDA	<MDA
96-100'	<MDA	10600	<MDA	970	13,300	489	<MDA	<MDA	<MDA
100-104'	<MDA	7810	440	230	17,700	262	<MDA	<MDA	<MDA
104-108'	<MDA	4680	270	<MDA	5,280	<MDA	<MDA	<MDA	<MDA
108-112'	<MDA	2410	430	<MDA	<MDA	221	<MDA	<MDA	<MDA
112-116'	<MDA	<MDA	1160	240	<MDA	302	<MDA		
116-120'	<MDA	245	1200	<MDA	<MDA	412	<MDA		

Depth (bls)	GP-296 1/5/2012	GP-297 12/2/2011	GP-298 11/29/2011	GP-299 11/14/2011
66-70	290	<MDA	210	<MDA
70-74	210	<MDA	230	<MDA
74-78	220	<MDA	330	<MDA
78-82	230	<MDA	510	<MDA
82-86	<MDA	<MDA	450	<MDA
86-90	400	260	600	480
90-94	1740	150	4380	1490
94-98	5400	300	5060	520
98-102	7380	280	10600	1930
102-106	4910	630	8300	3860
106-110	5000	1140	5240	5310
110-114	7920	3090	1610	8960
114-118	2820	11100	920	8010
118-122	<MDA	15100	8800	5800
122-126	<MDA	9800	7040	7790
126-130	<MDA	750	4340	4860

(concentrations in pCi/L)
MDA - Minimum detectable activity.
bls - Below land surface.

Appendix 2
Summary of Tritium Results
Temporary Monitoring Wells
2007 - 2012

North of Railroad Tracks

Depth (ft. bls)	GP-359 11/9/2011
66-70	<MDA
70-74	<MDA
74-78	<MDA
78-82	240
82-86	<MDA
86-90	<MDA
90-94	660
94-98	4750
98-102	3220
102-106	2500
106-110	910
110-114	1610
114-118	7370
118-122	5970
122-126	1380
126-130	<MDA

Depth (ft. bls)	GP-353 5/12/2008	GP-353 3/13/2009	GP-353 10/19/2009	GP-349 1/8/2009	GP-349 3/20-24/08	GP-350 4/30/2008	GP-350 3/18/2009	GP-351 5/20/2008	GP-352 5/22/2008
60-64'		647	310	<MDA			<MDA		
64-68'	<MDA	731	611	457		12,200	<MDA	<MDA	<MDA
68-72'	<MDA	895	508	451	2,000	13,300	<MDA	<MDA	<MDA
72-76'	650	2990	4020	1350	17,300	10,300	<MDA	<MDA	<MDA
76-80'	11600	2240	4990	3700	61,100	3,090	<MDA	<MDA	<MDA
80-84'	9860	1800	7130	3430	82,300	790	<MDA	<MDA	<MDA
84-88'	28600	2310	9190	1830	8,120	<MDA	<MDA	<MDA	<MDA
88-92'	54400	3440	5940	2560	1,360	<MDA	412	<MDA	<MDA
92-96'	63300	6850	5150	2400	2,090	<MDA	<MDA	<MDA	<MDA
96-100'	11400	317	410	1950	560	<MDA	<MDA	<MDA	<MDA
100-104'	2620	189U	159	499	<MDA	<MDA	<MDA	<MDA	<MDA
104-108'	<MDA	149U	293	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
108-112'	<MDA	383	339	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
112-116'	<MDA	<MDA	418	<MDA	<MDA	<MDA	<MDA	<MDA	<MDA
116-120'	<MDA	<MDA	366	<MDA	600	<MDA	<MDA	<MDA	<MDA

(concentrations in pCi/L)
MDA - Minimum detectable activity.
bls - Below land surface.

Appendix 2
Summary of Tritium Results
Temporary Monitoring Wells
2007 - 2012

South of Railroad Tracks - North of EW-16

Depth (ft. bls)	GP-342 10/6-8/10	GP-341 7/19-20/07	GP-341 10/12-15/10	GP-340 7/17-18/07	GP-340 3/13-14/08	GP-340 2/27/2009	GP-340 10/7/2009	GP-340 10/15-11/4/1(	GP-343 7/23-24/07	GP-343 10/11-14/10	GP-338 2/26/2009	GP-338 10/9/2009	GP-338 10/21-26/10	GP-339 2/10/2009	GP-339 10/13/2009	GP-339 10/26-28/10	GP-336 2/5/2009
60-64'						<MDA	<MDA				970	573		1100	<MDA		<MDA
64-68'						<MDA	<MDA				1890	488		2610	321		<MDA
68-72'	<MDA		<MDA		460	<MDA	<MDA	<MDA		600	3990	894	207	7510	<MDA	590	<MDA
72-76'	180		<MDA		1,390	<MDA	296	<MDA		910	4230	2990	200	9640	636	390	<MDA
76-80'	<MDA	960	<MDA	1,380	1,100	<MDA	1420	<MDA	602	1860	8820	4170	160	5200	1010	280	<MDA
80-84'	<MDA	840	<MDA	7,860	1,150	558	1660	<MDA	1,550	3210	9550	4390	300	3610	701	230	<MDA
84-88'	340	260	<MDA	14,700	1,070	<MDA	761	430	1,670	6620	11900	3960	<MDA	<MDA	1850	410	<MDA
88-92'	<MDA	750	<MDA	16,800	570	<MDA	269	350	421	2970	23200	5770	210	<MDA	1610	260	<MDA
92-96'	<MDA	790	420	21,200	<MDA	<MDA	7260	190	<MDA	2650	17700	6360	3030	<MDA	581	1780	<MDA
96-100'	<MDA	10,000	<MDA	10,800	1,930	<MDA	23500	190	312	2340	6890	2390	3930	<MDA	344	4030	<MDA
100-104'	<MDA	6,060	<MDA	1340	4,690	9350	56600	180	505	410	<MDA	349	560	<MDA	317	3590	<MDA
104-108'	<MDA		<MDA		10,800	17600	50800	460		<MDA	<MDA	310	640	<MDA	384	1360	<MDA
108-112'	<MDA		1000		7,380	12000	4440	650		<MDA	<MDA	352	191	<MDA	262	230	<MDA
112-116'	<MDA		400		2,090	1140	32100	3890		<MDA	<MDA	405	350	<MDA	249	280	<MDA
114-118'								<MDA									
116-120'	<MDA				450	<MDA	892	13600		440	<MDA	460	1270	<MDA	<MDA	220	<MDA
118-122'								<MDA									
122-126'								<MDA									
126-130'								<MDA									

(concentrations in pCi/L)
MDA - Minimum detectable activity.
bls - Below land surface.

Appendix 2
Summary of Tritium Results
Temporary Monitoring Wells
2007 - 2012

South of Railroad Tracks - North of EW-16

Depth (ft. bls)	GP-336 10/16/2009	GP-358 4/21/2010	GP-358 10/19-21/10
60-64'	258	<MDA	
64-68'	<MDA	<MDA	
68-72'	<MDA	<MDA	<MDA
72-76'	<MDA	<MDA	210
76-80'	<MDA	<MDA	<MDA
80-84'	<MDA	<MDA	<MDA
84-88'	<MDA	<MDA	<MDA
88-92'	260	1140	<MDA
92-96'	<MDA	3040	<MDA
96-100'	<MDA	5470	<MDA
100-104'	<MDA	8350	<MDA
104-108'	273	7030	<MDA
108-112'	332	448	<MDA
112-116'	<MDA	302	4210
116-120'	<MDA	<MDA	9300

Depth (bls)	Geoprobe ID Sample Date	GP-342 10/7/2011	GP-343 10/13/2011	GP-341 10/17/2011	GP-340 10/27/2011	GP-337 10/31/2011	GP-339 11/4/2011
66-70		1190	<MDA	<MDA	<MDA	<MDA	760
70-74		910	<MDA	<MDA	<MDA	<MDA	320
74-78		670	210	<MDA	<MDA	<MDA	<MDA
78-82		470	200	<MDA	<MDA	250	<MDA
82-86		<MDA	300	240	<MDA	300	<MDA
86-90		<MDA	<MDA	210	<MDA	450	<MDA
90-94		<MDA	<MDA	210	340	1210	<MDA
94-98		<MDA	880	350	2800	3380	<MDA
98-102		<MDA	3320	500	8170	4940	<MDA
102-106		<MDA	3310	870	4430	2830	<MDA
106-110		<MDA	3050	3700	2960	2000	<MDA
110-114		<MDA	4290	10700	2250	3910	<MDA
114-118		<MDA	640	10000	6450	5980	<MDA
118-122		<MDA	1050	12300	1980	5080	<MDA
122-126		1350	320	230	<MDA	870	<MDA
126-130		<MDA	180	<MDA	210	360	<MDA

(concentrations in pCi/L)
MDA - Minimum detectable activity.
bls - Below land surface.

Appendix 3

Appendix 3

Proposed Sampling Frequency Changes for HFBR Downgradient Monitoring Wells

Well ID	Current Sampling Frequency	Proposed Sampling Frequency	Last Tritium Detection	Last Tritium Detection over 1,000 pCi/L	Last Tritium Detection Over 20,000 pCi/L
Plume Monitoring Wells					
095-272	Annual	Annual	10/9/2009	3/30/2004	NA
095-273	Annual	Annual	10/13/2004	2/9/2004	NA
095-54	Annual	Annual	10/5/2007	10/27/2003	NA
095-55	Quarterly	Annual	4/6/2012	4/6/2012	NA
095-90	Quarterly	Discontinue	10/12/2004	NA	NA
095-93	Semi-annual	Discontinue	4/9/2009	4/9/2009	NA
096-115	Quarterly	Semi-annual	10/4/2012	NA	NA
096-116	Quarterly	Semi-annual	10/4/2012	4/5/2011	NA
096-117	Quarterly	Semi-annual	1/3/2013	4/5/2012	1/12/2009
096-118	Quarterly	Semi-annual	10/4/2012	NA	NA
096-55	Quarterly	Semi-annual	1/10/2013	1/10/2013	NA
096-82	Quarterly	Semi-annual	10/4/2012	7/12/2012	NA
096-83	Annual	Discontinue	10/26/2005	NA	NA
096-84	Quarterly	Discontinue	10/18/2011	4/12/2005	NA
096-88	Quarterly	Discontinue	10/8/2012	NA	NA
105-22	Quarterly	Discontinue	10/18/2011	NA	NA
105-23	Quarterly	Discontinue	4/11/2011	1/12/2001	NA
105-29	Quarterly	Annual	7/1/2010	NA	NA
105-43	Quarterly	Annual	10/18/2011	NA	NA
105-44	Quarterly	Annual	10/18/2011	10/1/2008	NA
105-65	Quarterly	Annual	1/3/2013	4/2/2010	NA
Basin Monitoring Wells					
076-172	Semi-annual	Annual	10/4/2012	10/9/2002	NA
076-173	Semi-annual	Annual	4/5/2012	4/2/2010	NA
076-174	Semi-annual	Annual	4/2/2010	4/2/2010	NA
076-175	Semi-annual	Annual	10/3/2012	5/11/1998	NA
076-177	Semi-annual	Annual	4/1/2011	7/11/2002	NA
077-10	Semi-annual	Annual	10/4/2012	4/2/2010	NA
077-11	Semi-annual	Annual	10/4/2012	1/9/2003	NA

NA : Not applicable, tritium was never detected at or above the target value.