PLAN COMPLETION REPORT FOR THE VB 2/3 AND POND AREA

BRAIDWOOD GENERATION STATION
BRACEVILLE, ILLINOIS

Prepared For:
Exelon Generation Company, LLC

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EXECUTIVE SUMMARY

This document demonstrates the successful completion of the remediation of tritium in shallow groundwater at the Exelon Generation Company LLC's (Exelon) Braidwood Generating Station property (Station) in Braceville, Illinois[1], specifically in the Vacuum Breaker 2/3 and Pond (VB 2/3 and Pond) area. Groundwater which had previously been impacted by tritium released from the Station's Blowdown Line has been cleaned up to safe levels through the use of active pumping and monitored natural attenuation. In accordance with the March 11, 2010 Agreed Consent Order, this document presents the Plan Completion Report for the VB 2/3 and Pond Area. This Plan Completion Report fully describes the implementation, identifies any corrective action goals that have been met, and demonstrates the efficacy of the remedy as implemented.

In late 2005 and early 2006, surface water and groundwater investigations led to the discovery of elevated tritium concentrations in the groundwater in the VB 2/3 and Pond area. The elevated tritium concentrations in the groundwater were attributed to leaks in the vacuum breaker valves. The leaks were subsequently repaired. In order to remediate the groundwater in the VB 2/3 and Pond area, Exelon initiated active remediation through the pumping of the Exelon Pond in June 2006 and the pumping of recovery wells RW-9 and RW-10 in January 2008.

Through active remediation, tritium concentrations in groundwater in this area have decreased significantly between January 2006 and June 2012. Tritium concentrations in January 2006 were as high as 228,283 picocuries per liter (pCi/L) (at monitoring well P-13D), while in June 2012, the maximum tritium concentration detected was 945 pCi/L (at monitoring well P-4D). The active remediation significantly decreased tritium concentrations in the groundwater to below the drinking water standard (20,000 pCi/L) and has prevented further migration of tritium in groundwater off Exelon-owned property at concentrations greater than the lower limit of detection (LLD) of 200 pCi/L.

The data, evaluations, and modeling contained in this Plan Completion Report lead to the following conclusions which support the closure of all remedial activities at the VB 2/3 and Pond area.

[1] The Braidwood Station property includes lands listed under the Station's Nuclear Regulatory Commission (NRC) licensed property along the blowdown line and property recently purchased by Exelon along Smiley Road and Center Street.

- The maximum concentrations of residual tritium in groundwater in the VB 2/3 and Pond area as of June 2012 are less than 5% of the US EPA's drinking water standard of 20,000 pCi/L; and
- As demonstrated by predictive modeling, the residual levels of tritium in the VB 2/3 and Pond area will not migrate further off the Station's licensed property and onto private property at levels above the LLD of 200 pCi/L.

1.0 INTRODUCTION AND PURPOSE

This Plan Completion Report has been prepared for the Illinois Environmental Protection Agency (IEPA) to address groundwater remediation regarding the Vacuum Breaker 2/3 and related Pond area at the Exelon Generation Company LLC's (Exelon) Braidwood Generating Station property located in Braceville, Illinois. Specifically, this Report discusses the groundwater investigation, monitoring, and remedial actions that were implemented in accordance with the Agreed Preliminary Injunction Order (PIO) dated May 24, 2006, and the March 11, 2010 Agreed Consent Order (ACO), entered into by Exelon and the State of Illinois. Information collected to date as a result of Action Plan implementation is sufficient to determine that remediation at the VB 2/3 and Exelon Pond area is complete and can be concluded.

These orders refer to a number of "Action Plans" necessary to remediate groundwater impacted by tritium to levels below the drinking water standard [20,000 picocuries per liter (pCi/L)] and then to levels below agreed upon background levels (200 pCi/L) which is represented by the lower limit of detection (LLD).

The first Action Plan generated for the VB 2/3 and Pond Area was the June, 2006 *"Migration Control Plan, Vacuum Breakers 2 and 3"*. This plan involved the pumping of the Exelon Pond and the prevention of tritium migrating off of Exelon's property at levels above the drinking water standard (20,000 pCi/L). The second Action Plan developed for the VB 2/3 and Pond Area was the November 2006 *"Minimize Impairment Plan for Vacuum Breakers 2 and 3"*. This (Minimize Impairment) plan was to be implemented if tritium remained for a significant time period at concentrations below the drinking water standard, but above the LLD at locations off the Exelon Property. This plan has not been implemented as the remedial efforts have been successful in significantly reducing tritium in groundwater. Current modeling (Section 3.5) indicates that any residual tritium remaining in groundwater will be mitigated by natural attenuation to concentrations below the LLD of 200 pCi/L before it migrates from its existing location to adjacent properties.

This Report presents the data gathered to demonstrate that the remedial efforts in the VB 2/3 and Pond area have been successful and that all required objectives provided in the Action Plans of the PIO and ACO have been met. All tritium concentrations are currently below 1,000 pCi/L, and future predictive modeling indicates that tritium will not migrate further off the Station's property at concentrations greater than the LLD of 200 pCi/L, even after all pumping activities have stopped. As such, remediation is considered complete for this area.

The PIO and ACO were put into place as a result of several tritium leaks detected by Exelon. In 1998 and 2000, leaks originating from the vacuum breakers were detected and subsequently repaired. In the spring of 2005, following the detection of tritium above ambient levels in the perimeter ditch, Exelon investigated shallow groundwater on the east side of the Station, in areas along Smiley Road and Center Street, and along the Station's blowdown line. As a result of these investigations, the vacuum breakers were repaired and active remediation in the VB 2/3 and Pond area was initiated. As presented in the June 2006 Migration Control Plan, the remediation in the VB 2/3 and Pond area included pumping of the Exelon Pond. The pumping of the Exelon Pond was initiated in June 11, 2006. In January 2007, elevated tritium concentrations were detected in the area near monitoring well BL-06 (south of the pond). Exelon installed two recovery wells (RW-9 and RW-10) north of BL-06 in November 2007. RW-9 and RW-10 began pumping in January 2008. Since 2006, Exelon has developed an extensive monitoring well network in the VB 2/3 and Pond area in order to monitor tritium concentrations. Select monitoring wells are monitored on a quarterly basis for tritium concentrations and for water levels.

Since the initiation of these remedial activities, Exelon has pumped over 700,000,000 gallons of water from the Exelon Pond in support of its remedial activities at the VB 2/3 and Pond area.

As a result of the implementation of the approved Action Plan, the concentrations of tritium detected in groundwater have generally been reduced to less than the LLD of 200 pCi/L in the VB 2/3 and Pond area. As of December 2011 sampling, only six monitoring wells indicate tritium concentrations greater than 200 pCi/L, and no locations indicate concentrations greater than 1,000 pCi/L. In addition, as of June 2012, only four small areas of residual tritium remain around the VB 2/3 and Pond area: three isolated areas south of the Exelon Pond and a fourth area northwest of the Exelon Pond. Additionally, a significant amount of geologic and hydrogeologic data has been collected as part of the Action Plan implementation, allowing for a better understanding of the groundwater movement and tritium migration. Predictive modeling indicates that tritium will not migrate further off the Station's property at concentrations greater than the LLD even after all pumping activities have stopped.

Documents which provide the foundation for the design and implementation of remedial activities completed at the VB 2/3 and Pond area are presented in Section 6.0 of this Plan Completion Report. Section 6.0 provides a list of references specific to the VB 2/3 and Pond area as well as pertinent documents related to the other areas on the Braidwood Station property where remediation of tritium in groundwater has been performed.

2.0 DESCRIPTION OF REMEDIATION

This section describes the VB 2/3 and Pond area remediated, the remedial objectives required by the IEPA, and Exelon's implementation of the Action Plans to remediate groundwater in the VB 2/3 and Pond area.

2.1 DESCRIPTION OF VB 2/3 AND POND AREA

Land surrounding the VB 2/3 and Pond area falls mainly into the agricultural, residential, and recreational use categories (Figure 2.1). Directly north of the VB 2/3 area is the Exelon Pond. Further to the north, there are several ponds or small lakes. South of the VB 2/3 area is the Cooling Lake. The center of the Village of Braidwood is approximately 7,200 feet from VB 2. To the northwest of the VB 2/3 area, there are two main highways (Illinois State Highway 53 and Illinois Route 129) running parallel to each other with a railroad (Southern Pacific Railroad) between them (Figure 2.2). VB 2 is located approximately 3,000 feet east of VB 1 along the blowdown line, and VB 3 is located approximately 600 feet northeast of VB 2.

The VB 2/3 and Pond area includes the land and pond located at the northeast corner of Smiley Road and Center Street (Figure 2.2). The pond is referred to as the "Exelon Pond" and covers approximately 30 acres (Figure 2.3). Figure 2.3 presents the monitoring well network in the vicinity of the VB 2/3 and Pond area. This figure includes temporary 1-inch diameter monitoring wells and permanent 2-inch diameter monitoring wells. Since late 2005, a total of 141 monitoring wells have been installed into the deep and shallow zones of the overburden sand aquifer in the VB 2/3 and Pond area.

2.2 REMEDIAL OBJECTIVES

The intent of the Action Plans was to address the groundwater that had been impacted by concentrations of tritium. The first component was to prevent the migration of tritium at levels above 20,000 pCi/L from migrating off the Exelon owned property. The second component was to address those concentrations of tritium above 200 pCi/L, but below the drinking water standard of 20,000 pCi/L, in the VB 2/3 and Pond plume area.

The following objectives were established as part of the Action Plans:

- To restrict the migration of tritium in groundwater toward existing groundwater users, preventing levels above 20,000 pCi/L from migrating off Exelon owned property
- To reduce the amount of groundwater that is impaired by tritium at a concentration above 200 pCi/L but below the drinking water standard
- To ensure that tritium migration does not potentially impact existing groundwater users and to prevent groundwater use of tritium-impacted groundwater

2.3 PRE-REMEDIATION CONDITIONS

Active pumping of the Exelon Pond began in June 2006. Prior to the initiation of this pumping, comprehensive groundwater sampling was completed in January 2006. Figure 2.4 presents the groundwater elevations and flow directions in the deep overburden sand aquifer for January 2006. This figure indicates that groundwater flows generally northeast to north-northwest in this aquifer in the vicinity of VB 2/3 and the Exelon Pond under natural (non-pumping) conditions. The pattern of groundwater contours and the elevation of the water in the Exelon Pond indicate that there is a significant interaction between the groundwater in the overburden sand aquifer and the water in the Exelon Pond.

Figure 2.5 presents the estimated horizontal distribution of tritium in the vicinity of VB 2/3 in the deep zone of the overburden aquifer in January 2006. This figure indicates conditions prior to implementation of remedial activity.

2.4 ACTION PLAN IMPLEMENTATION - GROUNDWATER PUMPING

To accomplish the Action Plan objectives, as set out in the June 2006 Migration Control Plan, Exelon initiated active remediation, which consisted of pumping water from the Exelon Pond and from the recovery wells. By these activities, tritium-impacted groundwater is prevented from migrating and is eventually removed from the groundwater aquifer.

Pumping of the Exelon Pond

As part of the Action Plan, pumping of the Exelon Pond began on June 11, 2006. The pumping rate in the Exelon Pond was balanced to optimize the cleanup time while minimizing potential effects on nearby private wells, ponds, and vegetation. Drawdown

of the Exelon Pond has been maintained at an elevation between 5 and 7 feet less than the elevation recorded in May 2006. Over 700,000,000 gallons of water have been removed from the Exelon Pond since pumping was initiated. Water from the Exelon Pond is pumped into the Braidwood Station blowdown line, which then empties into the Kankakee River. The Exelon Pond is currently being pumped.

In accordance with the Action Plan, groundwater monitoring of tritium concentrations and water levels has been performed at Exelon Pond on a quarterly basis. In addition, the capture of groundwater around the Exelon Pond is also evaluated quarterly with the use of groundwater contour maps.

Pumping of RW-9 and RW-10

Recovery wells (RW-9 and RW-10) were installed north of monitoring well BL-06 in November 2007. Both recovery wells are constructed of 8-inch diameter polyvinyl chloride (PVC) materials, with a 17-foot long PVC screen set at an approximate depth of 27 feet below ground surface (bgs), at the top of the underlying confining layer (the Wedron Formation). Four-inch diameter submersible pumps were installed into each of the recovery wells.

Pumping of these recovery wells began in January 2008. The groundwater captured by these recovery wells is pumped directly into the Exelon Pond. The water in the Exelon Pond is then pumped into the blowdown line at VB 2. These recovery wells were pumped at an average rate of 32 to 35 gallons per minute. Exelon stopped pumping RW-9 and RW-10 in the spring of 2010. Currently, these recovery wells are not pumping.

As part of Operations and Maintenance, groundwater monitoring of tritium concentrations and water levels has occurred on a quarterly basis. In addition, the capture of groundwater around these recovery wells is also evaluated quarterly with the use of groundwater contour maps.

Monitoring of Private Wells

Pursuant to the Action Plan, 13 nearby private wells were monitored for tritium on a quarterly basis. Subsequently, this list was reduced to six private wells and two ponds on five properties. All private wells have indicated concentrations of tritium below the LLD since sampling was initiated in 2006. Appendix A provides the analytical data for the private wells, and Figure 2.6 provides the private residential well locations that are currently sampled.

3.0 CURRENT GROUNDWATER CONDITIONS AT THE VB 2/3 AND POND AREA

This section presents the current groundwater conditions, an evaluation of the remedial action, and an evaluation of future groundwater conditions at the VB 2/3 and Pond area.

3.1 CURRENT GROUNDWATER QUALITY CONDITIONS

The concentrations of tritium in groundwater have been significantly reduced in the VB 2/3 and Pond area since the area has undergone active remediation. The most recent groundwater sampling event at each monitoring well location, as presented in Table 3.1, confirmed there are no instances of tritium in groundwater at concentrations above the US EPA's drinking water standard of 20,000 pCi/L. More specifically, at the VB 2/3 and Pond area, where pumping started in June of 2006, tritium concentrations have dropped from over 230,000 pCi/L to less than 1,000 pCi/L in June 2012. Furthermore, in the area near RW-9 and RW-10, the concentrations of tritium in groundwater have been reduced by 100% at all monitoring well locations (e.g., BL-06, BL-06D, MW-140D, etc.).

For the purposes of evaluation of the effectiveness of remediation, the VB 2/3 and Pond area has been subdivided into specific areas, as defined on Figure 3.1. These specific areas include the VB 2 area (including the BL-06 and the RW-9 and RW-10 areas), the VB 3 area, the Exelon Pond area (further divided into the Northeast of Pond area, the Northwest of Pond area, and the Southeast of Pond area), and the Leading Edge area.

One of the tools used to evaluate groundwater conditions included a statistical analysis of each monitoring well that was sampled between January 2006 and June 2012. Appendix B presents the analytical results. In some cases, data was available prior to January 2006, in which case, the earlier data was also utilized. Statistical analyses[2] include the trend, percent reduction, and minimum and maximum concentrations for each monitoring well. Statistical analyses were only performed utilizing data from monitoring locations that indicated tritium concentrations greater than the LLD during at least one sampling event between January 2006 and June 2012. This included 21 monitoring wells in the VB 2 area, five monitoring wells in the VB 3 area, 19 sampling locations (including monitoring wells and the Exelon Pond) in the Exelon Pond area, and five monitoring wells in the Leading Edge area. Monitoring wells that did not indicate tritium concentrations greater than the LLD for at least one sampling event between January 2006 and June 2012 were excluded from the statistical analysis. The

[2] The trend was determined from the Mann-Kendall Trend Test. Percent reduction was calculated from the highest detected concentration and the most current concentration.

excluded monitoring wells included 21 monitoring wells in the VB 2 area, ten monitoring wells in the VB 3 area, eight monitoring wells in the Exelon Pond area, and two monitoring wells in the Leading Edge area.

The statistical analyses indicate a predominately downward trend of tritium concentrations in the groundwater monitoring wells in the vicinity of the VB 2/3 and Pond area over time. Forty-three out of 49 monitoring well locations indicate a reduction of tritium concentrations by 100%. In addition, all monitoring well locations indicate a reduction in tritium concentrations between the maximum detected concentration and the most recent concentration. The following discussion outlines the statistical analysis of each area in greater detail.

VB 2 Area

Table 3.1 presents the latest tritium concentration detected in monitoring wells in the VB 2 area between December 2010 and December 2011. The statistical analyses indicate a predominately downward trend of tritium concentrations in the groundwater in the vicinity of VB 2. Tritium concentrations have been reduced by as much as 100%, from 52,874 pCi/L in July 2006 to less than the LLD of 200 pCi/L in June 2012, as indicated at monitoring well location BL-09D. Groundwater samples collected from monitoring wells in the VB 2 area are at levels less than the drinking water standard of 20,000 pCi/L and, in fact, all sample data, as of June 2012, are currently less than 318 pCi/L in the VB-2 area. Figures 3.2, 3.3, and 3.4 present this predominately downward trend in tritium concentrations over time at select monitoring wells in the VB 2 area, BL-06 area, and RW-9 and RW-10 area, respectively.

VB 3 Area

Table 3.1 presents the latest tritium concentration detected in monitoring wells in the VB 3 area between December 2010 and December 2011. The statistical analyses indicate a predominately downward trend of tritium concentrations in the groundwater in the vicinity of VB 3. Tritium concentrations have been reduced by as much as 100%, from 108,736 pCi/L in January 2006 to less than the LLD of 200 pCi/L in June 2012, as indicated at location VB-3-10D. Groundwater samples collected from monitoring wells in the VB 3 area are at levels significantly less than the drinking water standard of 20,000 pCi/L, and, in fact, all sample data, as of June 2012, are currently less than 249 pCi/L in the VB-3 area. Figure 3.5 presents this predominately downward trend in tritium concentrations over time at select monitoring well locations in the VB 3 area.

Exelon Pond Area

Table 3.1 presents the latest tritium concentration detected in monitoring wells in the Exelon Pond area between December 2010 and December 2011. The statistical analyses

indicated a predominately downward trend of tritium concentrations in the groundwater near the Exelon Pond. Tritium concentrations have been reduced by as much as 100%, from 78,123 pCi/L in January 2007 to less than the LLD of 200 pCi/L in June 2012, as indicated at location MW-135D. Groundwater samples collected from monitoring wells in the Exelon Pond area are at levels significantly less than the drinking water standard of 20,000 pCi/L, and, in fact, all sample data, as of June 2012, are currently less than 1,000 pCi/L in the Exelon Pond area. 945 pCi/L (detected at monitoring well P-4D) was the highest tritium concentration detected in December 2011 for the entire VB 2/3 and Pond area. Figures 3.6, 3.7, and 3.8 present the predominately downward trend in tritium concentrations over time at select monitoring wells in the Northeast of Pond area, the Northwest of Pond area, and the Southeast of Pond area, respectively.

Leading Edge Area

Table 3.1 presents the latest tritium concentration detected in monitoring wells in the Leading Edge area between December 2010 and December 2011. Tritium concentrations have been reduced by as much as 100%, from 969 pCi/L in September 2006 to less than the LLD of 200 pCi/L in June 2012, as indicated at location F-6D. Groundwater samples collected from monitoring wells in the Leading Edge area are at levels significantly less than the drinking water standard of 20,000 pCi/L, and, in fact, all sample data are currently less than 529 pCi/L in the Leading Edge area. The statistical analyses indicate that most monitoring wells in the vicinity of the Leading Edge have a downward trend of tritium concentrations in the groundwater. Figure 3.9 graphically presents the tritium concentrations in the Leading Edge monitoring wells over time.

3.2 CURRENT GROUNDWATER FLOW CONDITIONS

Figure 3.10 provides the June 2012 groundwater contours for the VB 2/3 and Pond area. Since the shallow and deep monitoring wells are located within the same hydraulic unit and have historically indicated similar groundwater elevations, the shallow and deep monitoring well elevations are contoured together. Groundwater flow is generally to the north. This figure also indicates the capture of groundwater around the Exelon Pond due to the pumping of the Pond.

3.3 COMPARISON OF CURRENT GROUNDWATER QUALITY CONDITIONS TO HISTORICAL DATA

Figure 3.11 provides the June 2012 tritium concentrations and presents the isolated areas of residual tritium. The areas of residual tritium in the VB 2/3 and Pond area have been significantly reduced since January 2006. Currently, there are four isolated areas of detectable tritium, three of which are directly south of the Exelon Pond and one to the northwest of the Exelon Pond. The isolated areas of detectable tritium which are located south of the Exelon Pond would be expected to flow into the Exelon Pond and be remediated by pumping or natural attenuation. The isolated area of detectable tritium to the northwest of the Exelon Pond would be expected to be remediated by natural attenuation.

Figure 3.12 presents the January 2006 tritium plume versus the June 2012 residual tritium in the VB 2/3 and Pond area. This figure indicates a significant decrease in tritium concentrations and impacted area since remedial activities began in June 2006. Tritium concentrations have been reduced from over 200,000 pCi/L to less than 1,000 pCi/L. The January 2006 tritium plume has been reduced to four isolated areas of residual tritium in June 2012.

3.4 EVALUATION OF THE REMEDIAL ACTION

The remedial activities performed in the VB 2/3 and Pond area over the last 6 years have been very successful in decreasing the concentrations and reducing the extent of tritium in groundwater. During the course of pumping activities at the Exelon Pond and at RW-9 and RW-10, groundwater at select monitoring wells has been monitored on a quarterly basis for tritium concentrations and groundwater levels. The data collected over the last 6 years have been presented in Appendix B and on Figures 3.2 through 3.12. These data provide sufficient information to demonstrate the following regarding the cleanup of tritium in the VB 2/3 and Pond area:

- There is no groundwater that contains tritium above the drinking water standard of 20,000 pCi/L.
- The current limits of detectable tritium (above 200 pCi/L) in this area have not extended beyond the Exelon owned property boundary.
- The maximum detected concentration in the entire area of VB 2/3 and the Pond as of June 2012 is 945 pCi/L.

- Only six out of 22 monitoring wells sampled during the June 2012 sampling event indicated tritium concentrations above the LLD of 200 pCi/L.
- The trend in tritium concentrations in routine sampling events has generally been downward. For 15 monitoring wells, either no trend could be statistically identified or there was not enough data available to determine a trend. One monitoring well indicated an upward trend; however, this location indicated tritium concentrations below the LLD for the last four sampling events.
- Since June 2006, the cone of influence (capture zone) around the Exelon Pond has been successful in preventing further migration of tritium from this area.
- Since January 2008, pumping and the resultant cone of influence (capture zone) around the two recovery wells (RW-9 and RW-10) have been successful in preventing further migration of tritium from the area around BL-06.

3.5 EVALUATION OF FUTURE GROUNDWATER CONDITIONS

Predictive modeling simulations were performed in 2012 in order to determine the effect of a complete shutdown of all pumping activities (Exelon Pond and RW-9 and RW-10) in the VB 2/3 and Pond area on tritium extent and concentrations. Modeling of groundwater and tritium in this area indicates that the residual areas of detectable tritium located south of the Exelon Pond will dissipate within 0.3 year (120days). The areas of residual tritium to the northwest of the Exelon Pond will dissipate to a concentration below the LLD of 200 pCi/L within 0.4 years (150 days). The isolated areas of residual tritium in groundwater will not migrate off the Station's licensed property or onto private property at levels above the LLD of 200 pCi/L.

Exelon initiated active pumping of groundwater based on the results from the predictive groundwater flow and transport modeling (CRA, August 2006, 2008). Pumping from the Exelon Pond directly with accelerated extractions (using extraction wells) in the area south of Exelon Pond was considered the most efficient remedial option to clean up the tritium plume associated with the releases from Vacuum Breakers 2 and 3. This pumping operation has been ongoing since June 2006. Routine quarterly groundwater monitoring data from 2006 to 2012 have demonstrated that the tritium plume has been shrinking over time to the current measured conditions.

It is anticipated that the remaining isolated areas of detectable tritium in groundwater will attenuate naturally over time, even if all pumping activities are stopped (both from Exelon Pond and from extraction wells RW-9 and RW-10). In order to verify that these

residual areas of tritium in groundwater would naturally attenuate in the future without pumping, additional groundwater flow and transport modeling was performed using June 2012 data. The primary objective of these modeling efforts was to evaluate how long it will take for the areas of residual tritium to dissipate (i.e., with tritium concentrations reduced to below the LLD of 200 pCi/L). The second objective of the modeling was to determine the migration pathway of the residual tritium. The memorandum presenting this groundwater flow and transport modeling effort is provided in Appendix C.

The modeling results demonstrate that the extent of the residual tritium areas will decrease while the areas may migrate slightly further downgradient from the current location. The areas of residual tritium will eventually reduce to below the LLD of 200 pCi/L within 150 days after the pumping cessation. In addition, tritium concentrations will increase initially and then drop sharply to below the LLD (200 pCi/L).

The following conclusions can be drawn based on the groundwater modeling simulations:

- It will take less than 150 days for the isolated areas of residual tritium in groundwater in the VB 2/3 and Pond area to naturally attenuate to below the LLD of 200 pCi/L after the current pumping operations at the Exelon Pond and the extraction wells are stopped; and
- The isolated areas of residual tritium in groundwater will not migrate onto other adjacent private properties after the pumping operations are shut down.

4.0 CONCLUSIONS

The remedial activities in the VB 2/3 and Pond area have resulted in a significant decrease in tritium concentrations and reduction in the overall extent of tritium in groundwater. This reduction has occurred in the last 6 years through active pumping and by the natural attenuation of tritium in the groundwater.

This Plan Completion Report documents the effectiveness of the remedial activities to date, as well as the ability of natural attenuation to eliminate the remaining isolated areas of residual tritium. Specifically, the following conclusions have been reached with regard to the remedial actions at the VB 2/3 and Pond area:

- Concentrations of tritium in groundwater are less than the drinking water standard of 20,000 pCi/L.
- As of June 2012, tritium concentrations in groundwater have decreased to less than 1,000 pCi/L and only four small isolated areas of residual tritium remain in the VB 2/3 and Pond area.
- Localized areas of residual concentrations of tritium above 200 pCi/L will not migrate off the Station's licensed property or Exelon owned property, and will not impact other off-Site private groundwater users.

5.0 PLANNED COMPLETION ACTIVITIES

As a final component of the remedial strategy at the VB 2/3 and Pond area, the groundwater pumping activities will be shut down. In addition, the current quarterly groundwater monitoring program will be discontinued. However, as part of the nuclear power industry's voluntary groundwater monitoring programs, Exelon will continue groundwater monitoring of a number of key monitoring wells in the VB 2/3 and Pond area. The monitoring wells that were associated with the quarterly groundwater monitoring program will be abandoned. Each of these aspects is presented in more detail below.

Shutdown of Pumping Activities

Exelon will terminate the pumping in the Exelon Pond and in recovery wells RW-9 and RW-10, and dismantle the equipment. Upon shutdown of the pumping systems, the water level in Exelon Pond is expected to recover upward to conditions prior to pumping (i.e., similar to the surrounding static groundwater elevations). It is anticipated that Exelon will restore the land surface and vegetation in the areas of the pumping equipment and discharge lines to at least the same conditions as prior to remedial activities.

Groundwater Monitoring Program

While the current monitoring program will be discontinued, the VB 2/3 and Pond area will continue to be monitored through Exelon's Radioactive Groundwater Protection Program (RGPP)[3]. The RGPP is a program that meets the guidance provided by NEI 07-07, ANI 07-01, and EPRI 1015118. VB 2/3 and Pond area monitoring wells included in the RGPP are presented in Table 5.1 and on Figure 5.1. The goal of the RGPP monitoring is to ensure that any potential future impacts to groundwater are identified by Exelon in a timely manner.

Monitoring Well Abandonment

Monitoring wells in the VB 2/3 and Pond area that are not associated with the RGPP will be abandoned and sealed. The monitoring wells to be abandoned and sealed are listed in Table 5.2. Monitoring wells designated BL are considered blowdown line monitoring well locations and will not be abandoned.

[3] Monitoring wells that are currently above 200 pCi/L, but not included in the RGPP, will be monitored during RGPP sampling events. These monitoring wells will continue to be monitored until two consecutive sampling events indicate tritium concentrations below 200 pCi/L, at which time the monitoring well will be abandoned. This includes VB-2-5D, VB-3-4D, P-4D, and P-13D.

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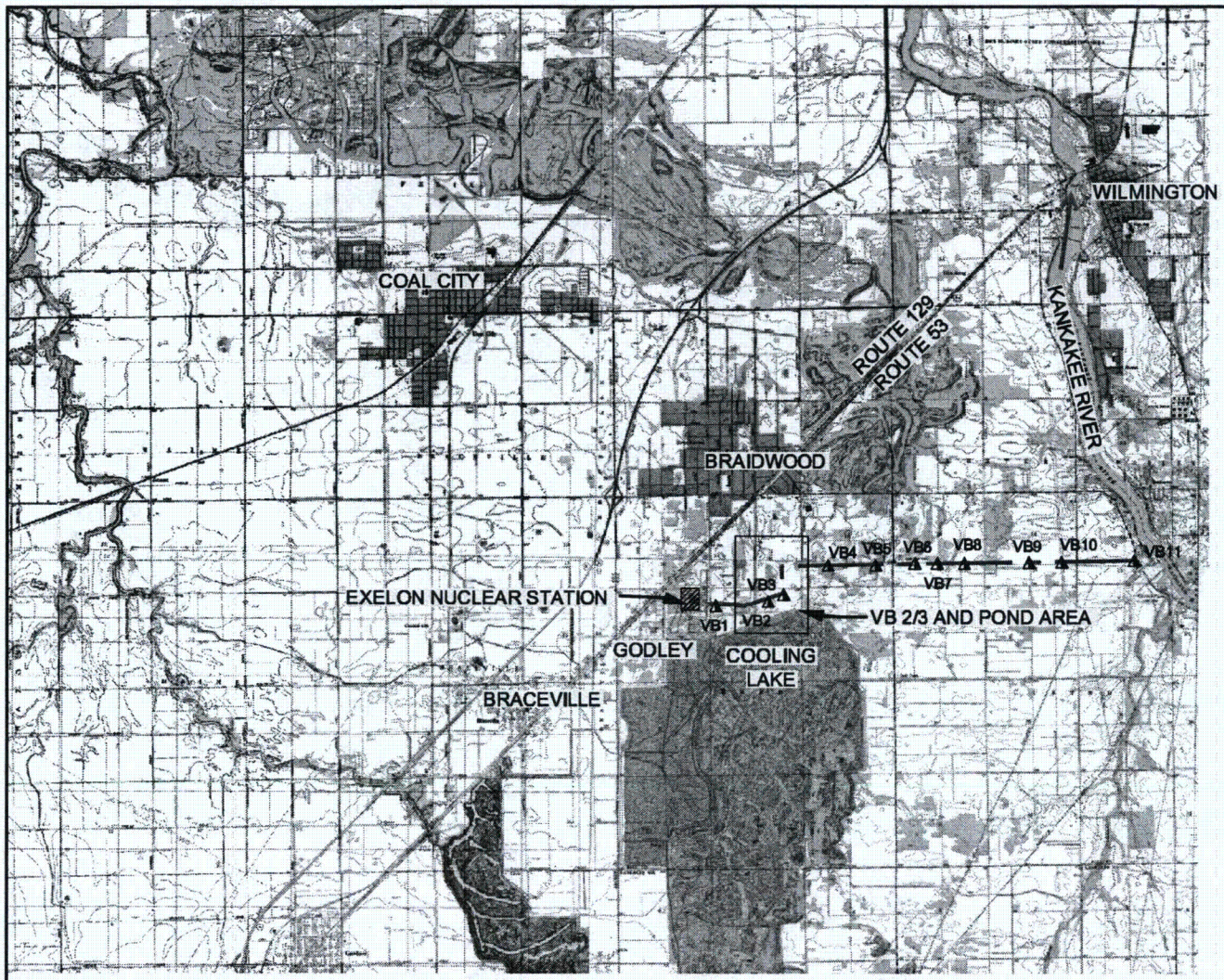
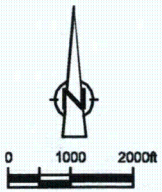




LEGEND

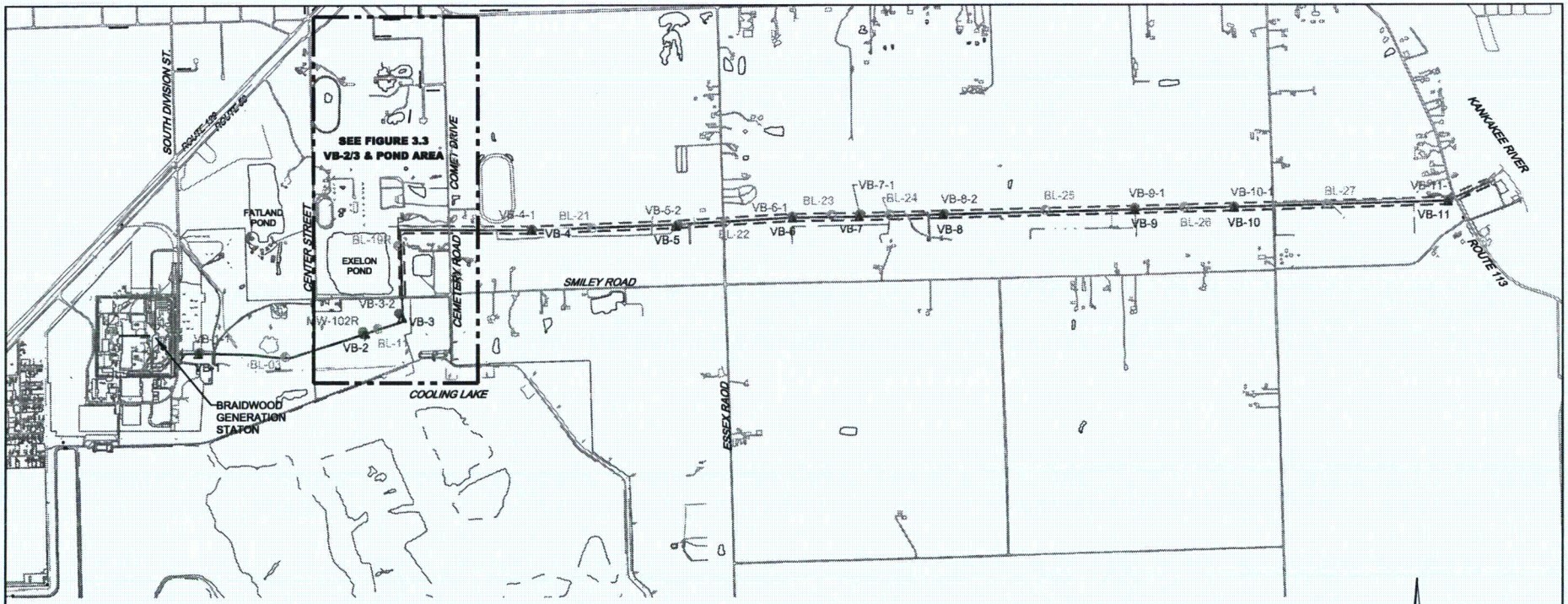
VB-1 ▲ VACUUM BREAKER LOCATION AND IDENTIFIER

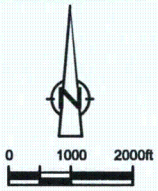
BLOW DOWN LINE

figure 2.1

VB 2/3 AND POND AREA SITE LOCATION MAP
EXELON GENERATION BRAIDWOOD STATION
Braceville, Illinois

16841-75(045)GN-CO001 JUN 27/2012





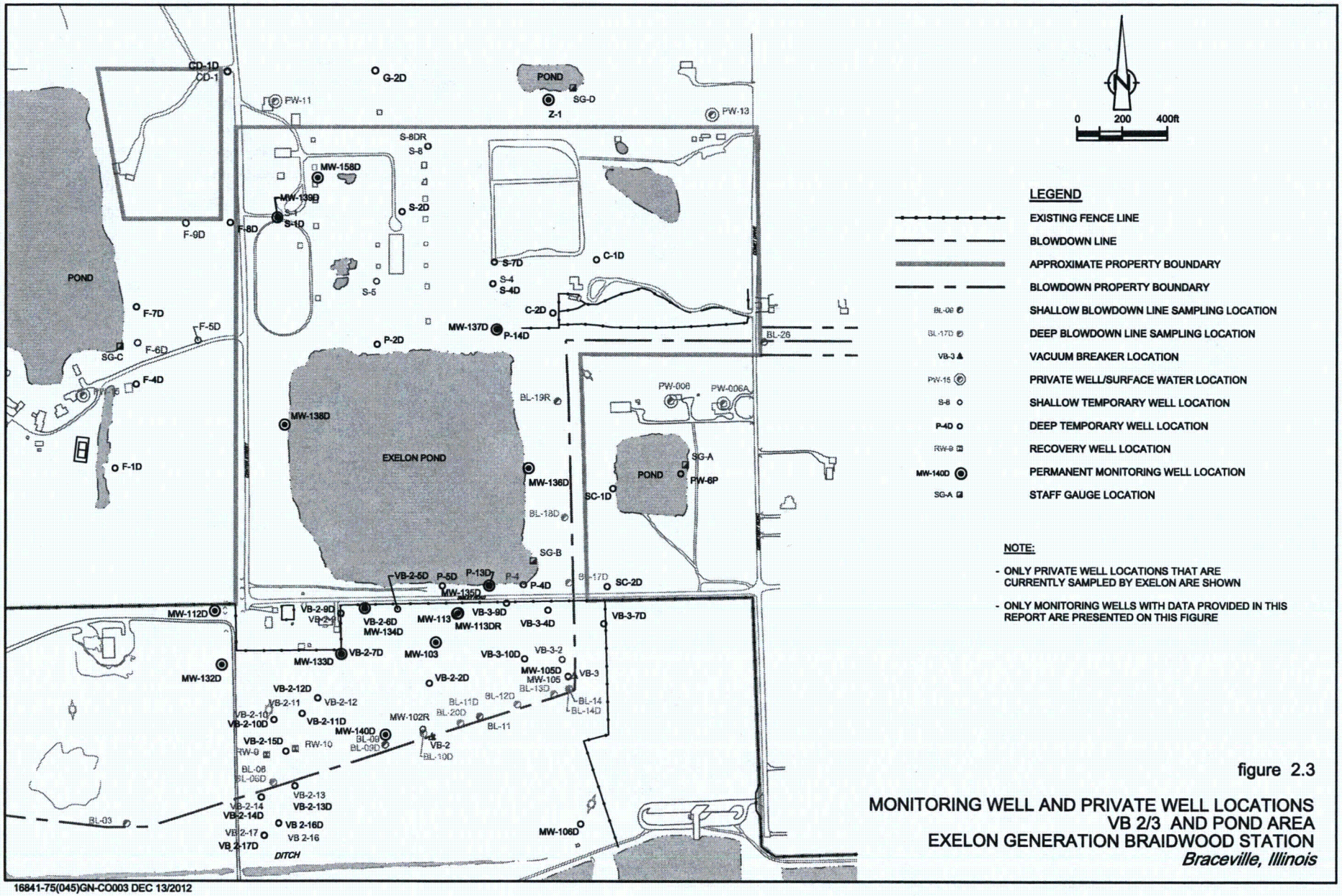
LEGEND

- APPROXIMATE BLOWDOWN PROPERTY LINE
- BLOWDOWN LINE
- MAKEUP LINE
- VB-1 ▲ VACUUM BREAKER
- BL-03 ⊘ MID POINT MONITORING WELL LOCATION AND IDENTIFIER
- VB-1-1 ● VACUUM BREAKER MONITORING WELL LOCATION AND IDENTIFIER

figure 2.2

LOCATION MAP FOR VB 2/3 AND POND AREA
EXELON GENERATION BRAIDWOOD STATION
Braceville, Illinois

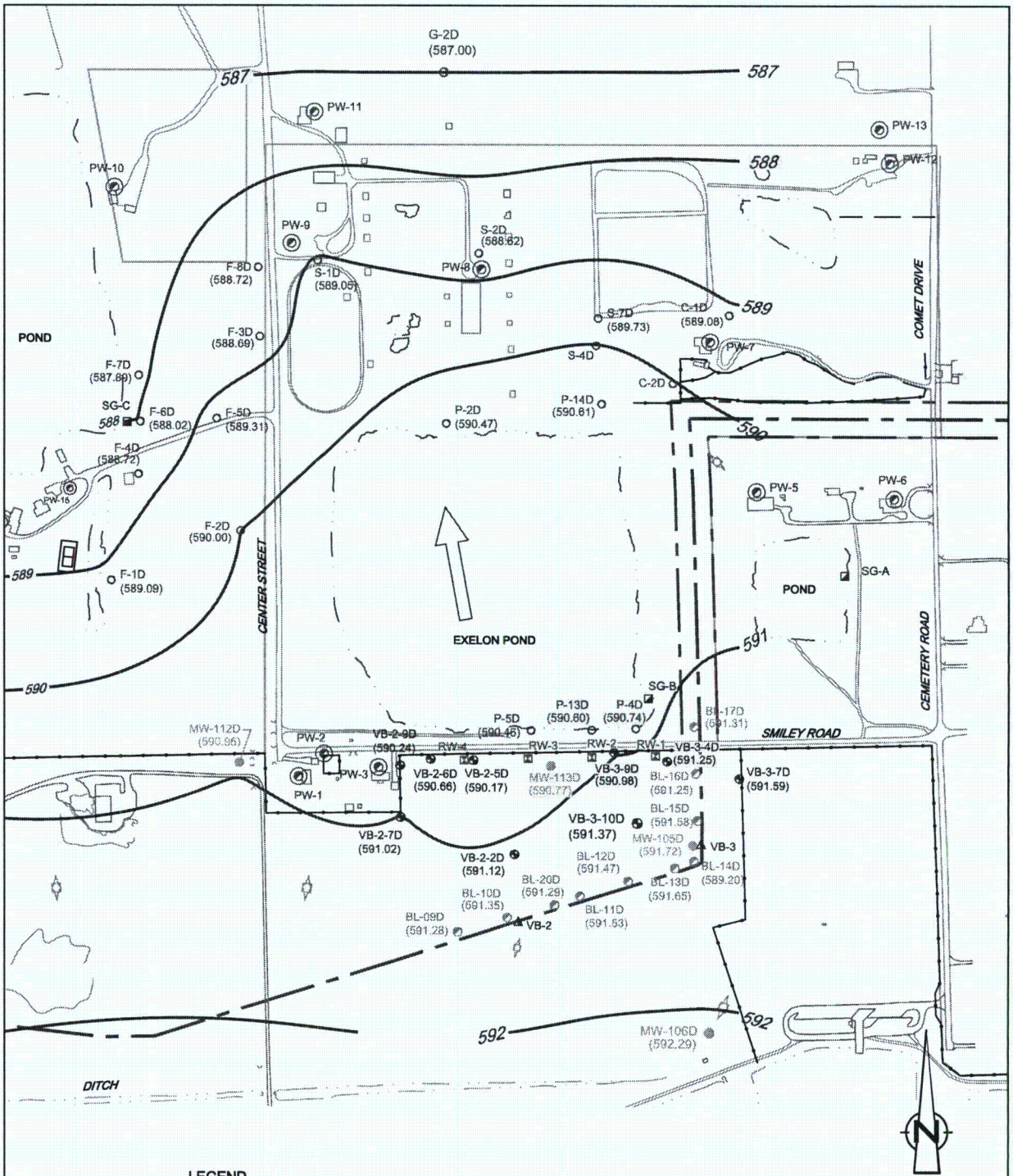
16841-75(045)GN-CO002 DEC 13/2012



16841-75(045)GN-CO003 DEC 13/2012

figure 2.3

MONITORING WELL AND PRIVATE WELL LOCATIONS
VB 2/3 AND POND AREA
EXELON GENERATION BRAIDWOOD STATION
Braceville, Illinois



LEGEND

- EXISTING FENCE LINE
- BLOWDOWN LINE
- PLANT PROPERTY LINE (2006)
- BL-17D — BLOWDOWN LINE SAMPLING LOCATION
- VB-3 — VACUUM BREAKER LOCATION
- VB-3-7D — VACUUM BREAKER SAMPLING LOCATION
- MW-113D — MONITORING WELL LOCATION
- SG-B — STAFF GAUGE LOCATION
- PW-5 — PRIVATE WELL LOCATION
- P-4D — TEMPORARY WELL LOCATION
- RW-2 — RECOVERY WELL LOCATION
- (590.59) — GROUNDWATER ELEVATION (ft AMSL)
- 591 — GROUNDWATER ELEVATION CONTOUR (ft AMSL)
- GROUNDWATER FLOW DIRECTION

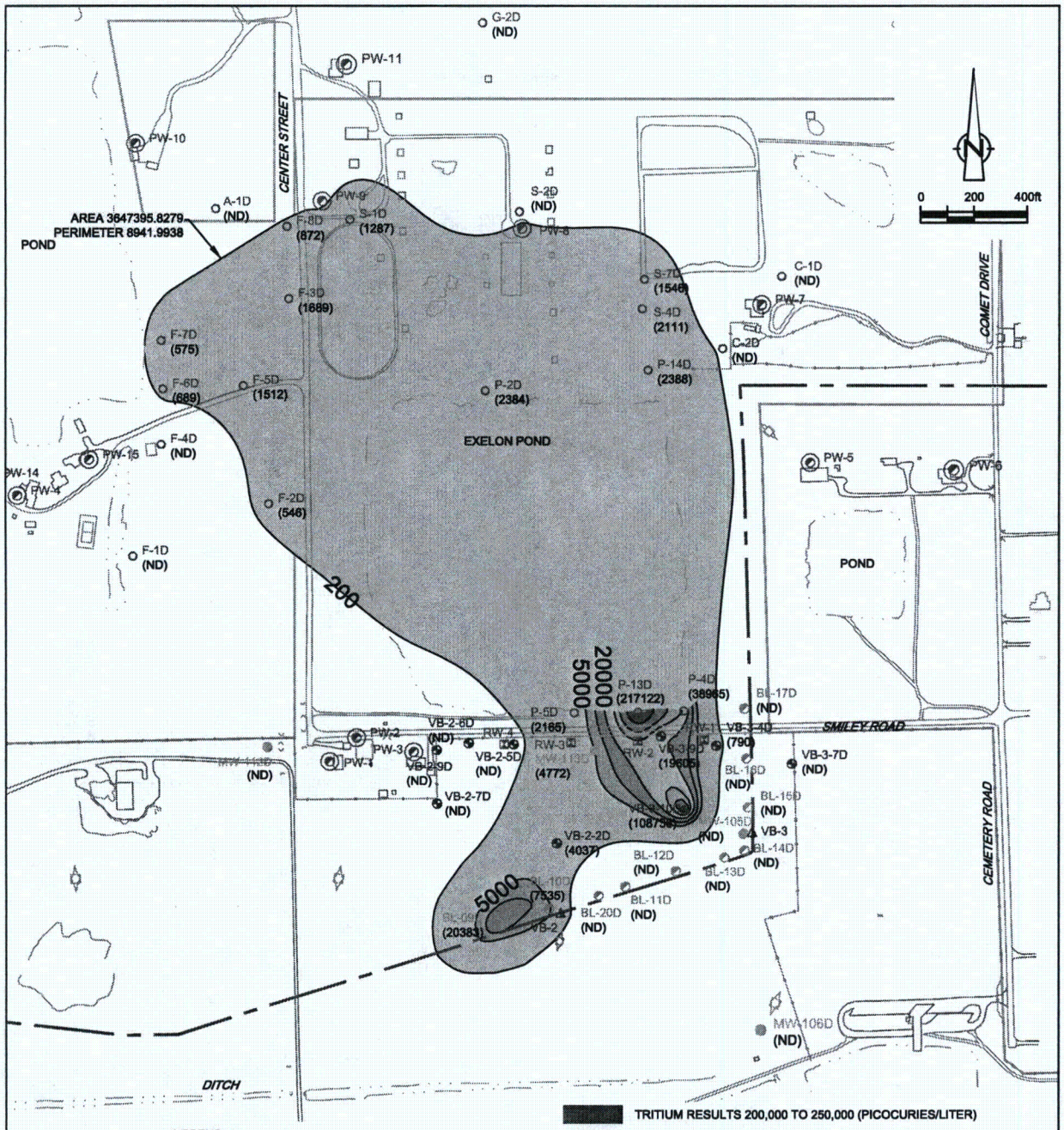
NOTE:
MONITORING WELL DATA TAKEN JANUARY 3, 2006 TO JANUARY 24, 2006.

SOURCE:
CRA, MARCH 2006 TRITIUM INVESTIGATION

figure 2.4

GROUNDWATER LEVEL CONTOURS - JANUARY 2006
DEEP GROUNDWATER ZONE
EXELON GENERATION BRAIDWOOD STATION
Braceville, Illinois

16841-75(045)GN-CO017 DEC 13/2012



LEGEND

- EXISTING FENCE LINE
- EXISTING PERIMETER DITCH LIMITS
- BLOWDOWN LINE
- PLANT PROPERTY LINE (2006)
- BL-17D — DEEP BLOWDOWN LINE SAMPLING LOCATION
- VB-3 — VACUUM BREAKER LOCATION
- VB-3-7D — DEEP VACUUM BREAKER SAMPLING LOCATION
- MW-115D — DEEP MONITORING WELL LOCATION
- PW-5 — PRIVATE WELL LOCATION
- P-4D — DEEP TEMPORARY WELL LOCATION
- PW-8P — POND SAMPLING LOCATION
- RW-2 — DEEP RECOVERY WELL LOCATION
- (2,484) — TRITIUM RESULT IN GROUNDWATER
- 200 — TRITIUM CONTOUR
- SOURCE: CRA, MARCH 2006 TRITIUM INVESTIGATION

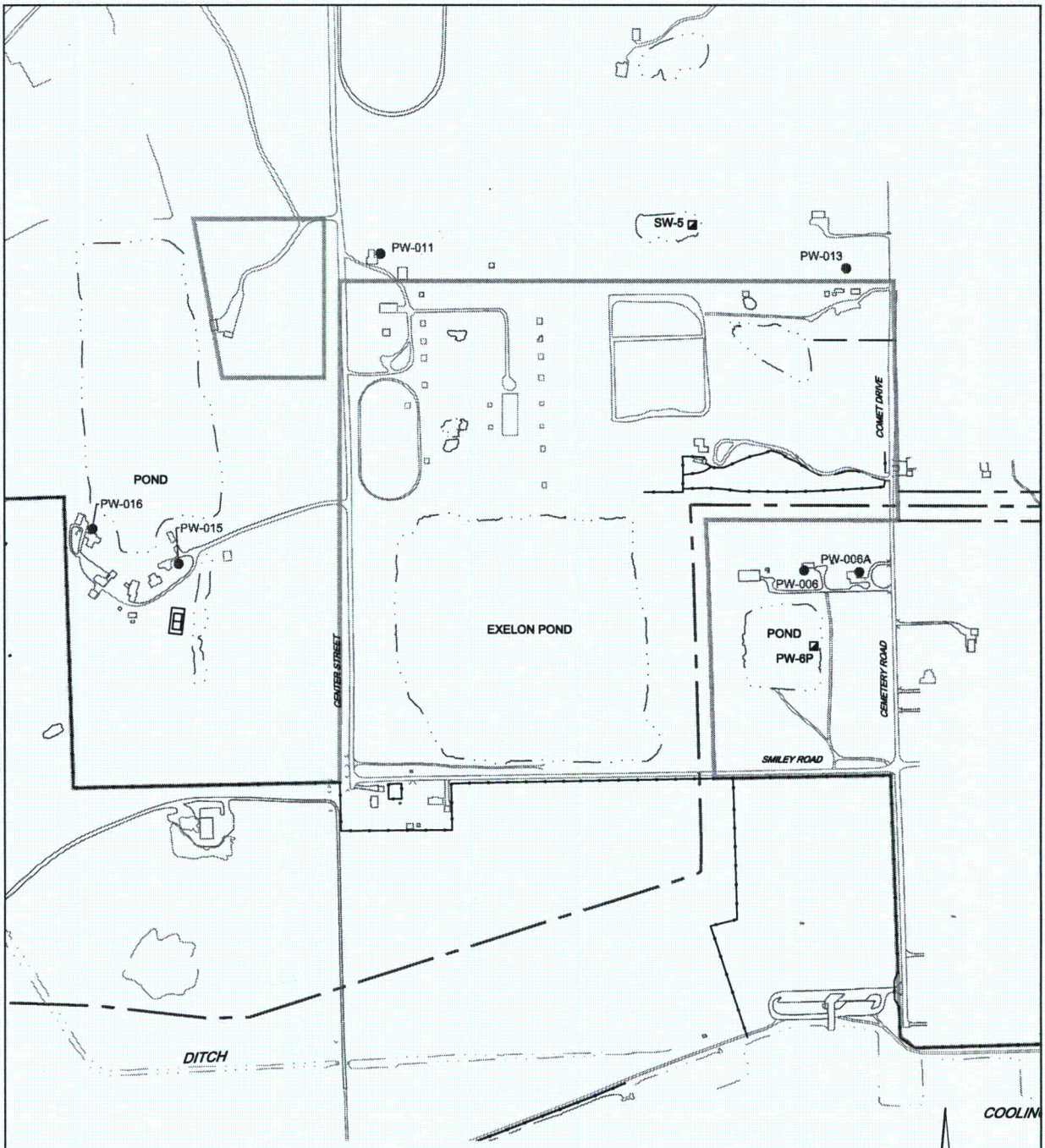
- TRITIUM RESULTS 200,000 TO 250,000 (PICOCURIES/LITER)
- TRITIUM RESULTS 100,000 TO 200,000
- TRITIUM RESULTS 60,000 TO 100,000
- TRITIUM RESULTS 40,000 TO 60,000
- TRITIUM RESULTS 20,000 TO 40,000
- TRITIUM RESULTS 10,000 TO 20,000
- TRITIUM RESULTS 5,000 TO 10,000
- TRITIUM RESULTS 200 TO 5,000
- TRITIUM RESULTS 0 TO 200
- (ND) NON-DETECT BELOW 200 pCi/L.

NOTE:
BACKGROUND TRITIUM CONCENTRATION: 200 PCI/L
DRINKING WATER STANDARD FOR TRITIUM: 20,000 PCI/L
TRITIUM DATA FOR SAMPLES COLLECTED THROUGH JANUARY 30, 2006. CONTOURS WERE GENERATED USING LOG VALUES.

figure 2.5

ESTIMATED TRITIUM RESULTS-JANUARY 2006
DEEP GROUNDWATER ZONE
EXELON GENERATION BRAIDWOOD STATION
Braceville, Illinois

16841-75(045)GN-CO019 DEC 13/2012



LEGEND

- EXISTING FENCE LINE
- BLOWDOWN LINE
- APPROXIMATE PROPERTY BOUNDARY
- BLOWDOWN PROPERTY BOUNDARY
- PW-006 ● RESIDENTIAL WELL LOCATION AND IDENTIFIER
- SW-5 ◪ RESIDENTIAL POND LOCATION AND IDENTIFIER

figure 2.6

CURRENT RESIDENTIAL SAMPLING LOCATIONS
EXELON GENERATION BRAIDWOOD STATION
Braceville, Illinois

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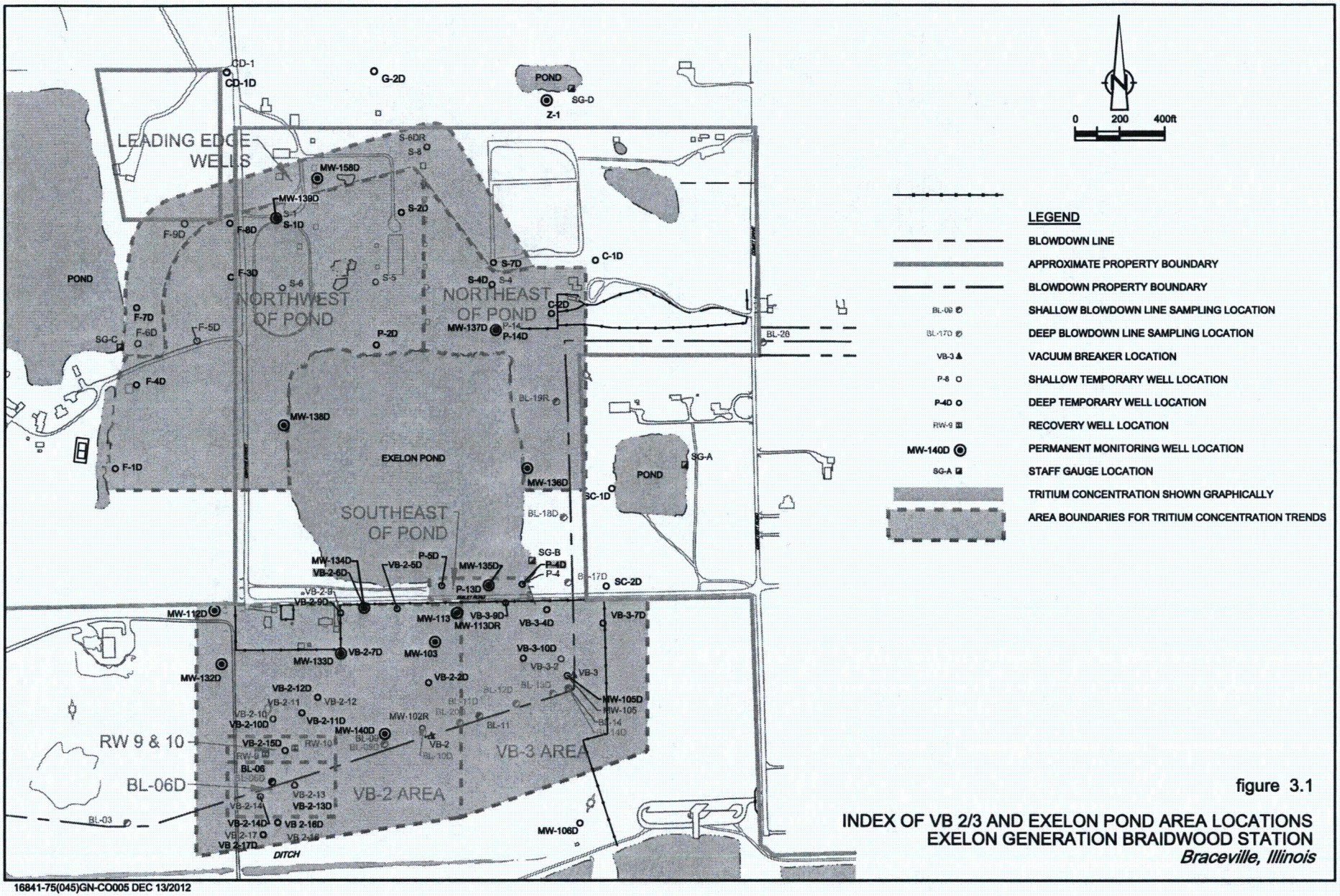

figure 3.1

INDEX OF VB 2/3 AND EXELON POND AREA LOCATIONS
EXELON GENERATION BRAIDWOOD STATION
Braceville, Illinois

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