



**Attachment B**

**AFFIDAVIT OF BRADLEY J. HUNSBERGER**

**I. BACKGROUND AND QUALIFICATIONS**

1. My name is Bradley J. Hunsberger. I am the Director of Hydrogeological Services for Andrews Engineering, Inc. My business address is 3300 Ginger Creek Drive, Springfield, Illinois 62711. I provide this affidavit in support of the Amended Petition for Adjusted Standard filed by Brickyard Disposal & Recycling, Inc. ("Brickyard"). I make this affidavit based on personal knowledge, technical expertise and on knowledge I have obtained through my technical review and experience.

2. I am a Licensed Professional Geologist in Illinois. Additionally, I am a Registered Geologist in Missouri and a Professional Geologist in Tennessee, Wisconsin and Indiana. I hold a certification as a Certified Professional Geologist (AIPG), as well as OSHA certifications. My areas of specialty are hydrogeological investigations, expert witness testimony, regulatory affairs and solid waste management.

3. I have been employed full time by Andrews Engineering for 27 and one-half years. During that time I have managed numerous projects and provided expert support and testimony for several projects related to geologic and hydrogeologic issues pertaining to public health, safety, and welfare. Generally, I am responsible for design and implementation of hydrogeologic site investigations and studies of environmentally sensitive sites, such as solid waste disposal facilities, CCDD facilities, compost facilities, CCB sites, LUST sites, industrial facilities, and agri-chemical facilities.

4. As an environmental consultant, I have worked with Republic Services, Inc. at various landfill sites in Illinois and Indiana, including the Brickyard Disposal and Recycling,

both Units I and II, for approximately the last decade. I have been intimately involved in the permitting of that facility, including the initial significant modification application (Log No. 1993-057) and permitting related to the current groundwater monitoring network. In relation to AS 14-3, and previously AS 13-4, I am responsible for the preparation and drafting of the Technical Support Document and the Cover Plan Document that accompanied those petitions. Further, I have attended all of the meetings between Brickyard and the Illinois Environmental Protection Agency Bureau of Land that concerned these Adjusted Standard Petitions.

5. In my professional capacity, I routinely utilize the Board's landfill regulations, including those particularly relevant here: the Board's landfill rules (35 Ill. Adm. Code Parts 807, and 810 – 815) and the Board's groundwater protection rules (35 Ill. Adm. Code Part 620).

6. In this Affidavit, I specifically respond to the technical items raised by the Board concerning Brickyard Unit I's hydrological characteristics as related to Section 814.402(b)(3)(A), (C) and (F) of the Board's rules (Items 1-4) and the items concerning Brickyard's interpretation and calculation of the "average annual high water mark" as related to Section 814.402(b)(3)(H). (Item 10). Further, I concur with the assessments presented in the Amended Petition as related to the Board's questions concerning Brickyard's intended long-term maintenance of the proposed cover plan (Items 5-9).

## **II. HYDROLOGICAL CHARACTERISTICS OF UNIT I – Items 1 -4.**

7. The term "water-bearing zone" in the Technical Support Document ("TSD") is used synonymously with the term "aquifer" in Section 3 of the Illinois Groundwater Protection Act, and Section 810.103 of the Board's rules. The intention was to provide a

more detailed and accurate description of this “aquifer” however, which is limited in extent. Thus, the term “water-bearing zone” is consistent with the nomenclature previously used in IEPA permitting. This water-bearing zone is encompassed by the Board’s definition of aquifer because hydraulic gradients and boundaries of the zone can be identified and mapped using hydrogeologic data. Accordingly, I answer the Board’s Item #1 in the affirmative.

8. More specifically, the terminology “water bearing zone” or “groundwater” was used to describe the water being monitored at Brickyard 1. The aquifer is of limited extent, and it will have no adverse impact on any potential well utilized for drinking water purposes. Those potential wells are identified in the Technical Support Document, and reiterated in Footnote 3 of the Amended Petition.

9. The water-bearing zone beneath and directly adjacent to Brickyard I is, in actuality, a combination of the coal seam, mine voids (where the coal has been removed via underground mining) and spoil/bedrock interface where surface mining has occurred. This zone is continuous beneath Brickyard I.

10. Any groundwater in this zone is confined vertically by low hydraulic conductivity bedrock deposits. This confining layer was identified in the Technical Support Document as the Middle Shale. On the eastern side of the property, the Middle Shale transitions to a Silty Sandstone deposit. In actuality, both constitute the lower confining layer.

11. It is my understanding that the Agency concurs that, however identified, this is the appropriate water source to be monitored for purposes of early detection of migration of any contaminants from Brickyard I and that, due to impacts from prior mining, the Agency

also concurs that the groundwater within this water-bearing zone (or “aquifer”) is Class IV groundwater.

12. The temporary groundwater monitoring network in place at Brickyard Unit I, through prior permitting, has been in place for at least 5 years. In the permitting applications and discussions that led to this temporary network, detailed descriptions of the geological conditions underlying the site, and voluminous other data, has been provided to the Agency and resulted in the permitting of this temporary network. References to those permitting efforts are contained throughout the TSD.

13. It is my understanding from discussions with Agency permitting personnel that permanent permitting of the groundwater monitoring network, without this adjusted standard, will require placing the monitoring wells in the area containing extraneous materials, based upon specific provisions of the Board’s landfill rules, specifically Section 811.318(b)(3). Accordingly, Brickyard seeks this adjusted standard in order to identify a logical Compliance Boundary, in the specific context of this site, via Section 814.402(b)(3). This will allow for early detection of a change in groundwater quality due to influences from either Brickyard Unit I or the extraneous materials.

14. The area identified as the “water-bearing zone” is the same as the “uppermost aquifer” in the context of this site.

15. The bottom of the uppermost aquifer is the upper part of the Middle Shale and the Sandy Siltstone deposits. See Illustration #1, attached hereto.

16. The Middle Shale is largely present beneath the extraneous material area, but transitions at the eastern edge of the landfill property to a “Sandy Siltstone” deposit.

17. The Sandy Siltstone deposit contains nearly the same horizontal hydraulic conductivity as the Middle Shale. As reported in the Application for Significant Modification (Log No. 1994-419), the geometric mean of the horizontal hydraulic conductivities for the Middle Shale and the Sandy Siltstone are  $3.46 \times 10^{-7}$  cm/sec and  $4.68 \times 10^{-7}$  cm/sec, respectively, as determined from falling head tests.

18. Therefore, the bottom of the uppermost aquifer is the top of the Middle Shale (from the west end to the area under the extraneous materials) and the top of the Sandy Siltstone (east of the extraneous materials area). The actual transition of the Middle Shale to the Sandy Siltstone at the bedrock surface will vary with location. Both of these geologic formations serve as the bottom of the uppermost aquifer.

19. These deposits are sedimentary. As such, the vertical hydraulic conductivity is typically 1 to 2 orders of magnitude lower than the horizontal value. See Domenico, P.A. and F.W. Schwartz, *Physical and Chemical Hydrology*, John Wiley & Sons, New York (1990) [Table 3, page 67].

20. Given the reference by Domenico and Schwartz, the vertical hydraulic conductivity of the Middle Shale and Sandy Siltstone should be approximately  $6.7 \times 10^{-8}$  to  $6.7 \times 10^{-9}$  cm/sec. This correlates well with the laboratory derived average vertical hydraulic conductivity ( $1.54 \times 10^{-9}$  cm/sec) for the Sandy Siltstone, as reported in the aforementioned permit application (Log No. 1994-419). The vertical confining properties of the bedrock appear better than liner hydraulic conductivity currently required of Subtitle D landfills ( $1 \times 10^{-7}$  cm/sec). See 35 IAC 811.306(d)(2).

21. Figure 1 has been modified (Attachment A of the Amended Petition) to reflect the contours of the top of the Middle Shale and the Sandy Siltstone deposits. It is my

opinion that this best represents the vertical extent of the zone of attenuation, which is the bottom of the uppermost aquifer. The bottom of the zone of attenuation is coincident with the upper part of the Middle Shale or Sandy Siltstone. More specific information related to the depth of those deposits is contained in the TSD, at Section 4.1.1 and Attachments 1 and 2.

22. The modification to Figure 1 does not represent a change in Brickyard's requested zone of attenuation. The modification is made simply to better identify the vertical extent of the zone of attenuation, in response to the Board's items.

23. The proposed lateral extent of the zone of attenuation is the same as requested in the original petition as it is contiguous with the proposed compliance boundary. The proposed compliance boundary contained in this Amended Petition, however, has been modified pursuant to post-filing discussions with the IEPA and is now consistent with the illustrations and figure Brickyard presented in its Response to IEPA Recommendation, filed on August 27, 2014.

24. Since these deposits are sedimentary, the vertical hydraulic conductivity is typically 1 to 2 orders of magnitude lower than the horizontal value, which is even more restrictive. The vertical confining properties of the bedrock are anticipated to be better than current liner quality requirements, as further evidences by the laboratory testing reported in application Log No. 1994-419. Thus, the water-bearing zone is an aquifer, and it is the uppermost aquifer.

### **III. ANNUAL HIGH WATER MARK – BOARD ITEM #10**

25. The term "annual high water mark" is ambiguous and is not a common term in the lexicon of hydrology. The annual high water mark varies from year to year, and

averaging the annual maximum elevation of the river over the course of several years is an appropriate measure for ensuring that the zone of compliance does not extend past the annual high water mark.

26. "Zone of Compliance" is also a term that is confusing in the context of Section 814.402(b)(H) as that term is not defined in Illinois law and regulations. In reviewing the background related to the Board's landfill rules, particularly R88-7, we determined that Zone of Compliance should, for the purposes here, be used synonymously with zone of attenuation.

27. Since the "annual high water mark" will vary from year to year, the average annual high (maximum) elevation was determined, which represents conservative (worst case) conditions. In developing this average annual high (maximum) elevation, water level data were utilized from USGS Station 03339000, which is the USGS station on the Vermilion River closest to the subject area. Data dating back to 1960 was reviewed for this determination. The data was infrequent from 1960 to October 1, 1993, with no data being available for the years 1961, 1962, 1963, 1965 and 1967. However, from October 1, 1993 through July 18, 2012, daily measurements were available.

28. The highest river elevation on the single day for each of the years for which data was available was utilized to determine the annual maximum river elevation (i.e., high water mark) for that year, and these were averaged over the subject time interval. On the basis of the above, the "annual high water mark" was calculated to be 519.14 feet above mean sea level ("MSL").

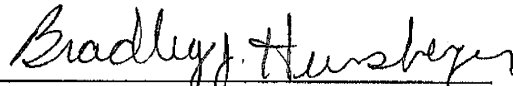
29. The highest individual recorded river elevation was 534.66 feet MSL, occurring on April 13, 1994. This is within less than two feet of the 100-year flood elevation (533.40



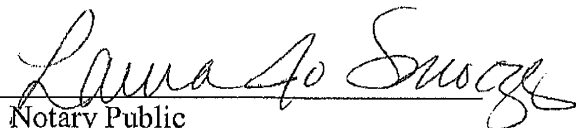
MSL), which by definition has a one percent probability of occurring annually. The annual high water mark as referenced in Section 814(b)(3)(H) implies an occurrence of once a year, or a 100% probability of occurring annually.

30. The lowest ground surface elevation along the proposed compliance boundary is 531.82 feet above mean sea level, between wells T114 and T115. This is well above average annual maximum elevation, and very close to the 100-year flood elevation. Figure 9-3 of Attachment 9 to the TSD illustrates the location of the proposed compliance boundary with respect to the 100-year flood elevation and the average annual high water mark. Pursuant to these calculations, the proposed compliance boundary does not extend beyond the “annual high water mark”.

**FURTHER AFFIANT SAYETH NOT.**

  
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**Bradley J. Hunsberger, Affiant**

**Subscribed and Sworn** to me this 6<sup>th</sup> day of November, 2014.

  
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Notary Public

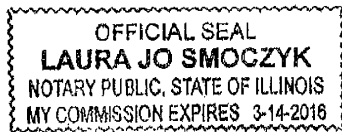
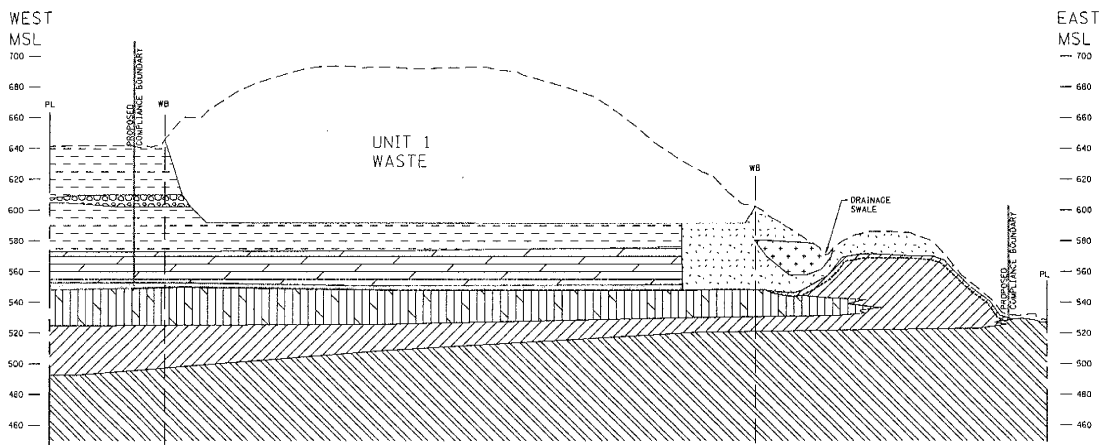
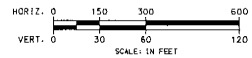


ILLUSTRATION 1



	SPoil/DISTURBED		EXTRANEous MATERIALS
	SILTY CLAY (ORIFT)		SANDY SILTSTONE (LOCALLY INTERBEDDED WITH SHALE)
	UPPER SHALE		LOWER SHALE
	MIDDLE SHALE		SAND AND GRAVEL
	COAL UNIT (WITH VOIDS AND UNDER CLAY)		

EXPLANATION	
	PROPERTY BOUNDARY (PL)
	PERMITTED WASTE BOUNDARY (WB)
	PROPOSED COMPLIANCE BOUNDARY
	BOTTOM OF UPPERMOST AQUIFER



- NOTES
1. THE STRATIGRAPHY IN THE CROSS SECTION REPRESENTS TYPICAL CONDITIONS (WEST TO EAST) BENEATH AND ADJACENT TO UNIT 1. THE EXACT CONTACTS BETWEEN GEOLOGIC DEPOSITS, MINED MATERIALS, AND EXTRANEous MATERIALS WILL VARY DEPENDENT UPON LOCATION. THE BOTTOM OF THE UPPERMOST AQUIFER IS LOCATED AT THE BEDROCK CONTACT DIRECTLY BENEATH THE EXISTING COAL OR MINED COAL.
  2. THE SIZE AND LOCATION OF THE EXTRANEous MATERIALS ARE FOR ILLUSTRATION PURPOSES ONLY.

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NO.	DATE	REVISION	BY
 <b>ANDREWS ENGINEERING, INC.</b> 1150 N. State Street, Springfield, IL 62761 Phone: (217) 792-2334 Fax: (217) 792-2406 Professional Engineering and Land Surveying Registration LICENSE NO. 012-000000-0000-0000			
GENERALIZED CROSS SECTION		UNIT 1	
BLAIS PREPARED FOR		BRICKYARD DISPOSAL & RECYCLING	
DANVILLE, ILLINOIS		DATE: SEPTEMBER 2014	
PROJECT NO.		115A-115A	
SHEET NUMBER		FIG. 2	

CERTIFICATE OF SERVICE

I, Claire A. Manning, certify that I have date served the attached Affidavit of Bradley J. Hunsberger with Illustration (Amended Petition Attachment B), by means described below, upon the following persons:

To: Pollution Control Board, Attn: Clerk  
100 West Randolph Street  
James R. Thompson Center, Suite 11-500  
Chicago, Illinois 60601-3218  
(Via Electronic Filing)

Kyle N. Davis, Esq.  
Division of Legal Counsel  
Illinois Environmental Protection Agency  
1021 North Grand Avenue, East  
P.O. Box 19276  
Springfield, Illinois 62794-9276  
(Via First-Class Mail)

Carol Webb  
Hearing Officer  
Illinois Pollution Control Board  
1021 North Grand Avenue East  
P.O. Box 19274  
Springfield, Illinois 62794-9274  
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Dated: November 7, 2014

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By: 