

**BEFORE THE ENVIRONMENTAL APPEALS BOARD  
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C.**

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In the Matter of: )  
West Bay Exploration Co. of ) Permit Appeal No. UIC \_\_\_\_\_  
Traverse City, Michigan )  
West Bay #22 SWD )  
Permit No. MI-075-2D-0009 )  
Jackson County, Michigan )

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**PETITIONER PETER BORMUTH'S PETITION FOR REVIEW**

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## **STATEMENT OF COMPLAINE WITH WORD LIMITATION**

I hereby certify that this Petition for Review contains 4683 words according to the Microsoft Word program used to compose it.

# PETITION FOR REVIEW

December 25, 2015

I, Peter Bormuth, file this petition for review of the Underground Injection Control Permit #MI-075-2D-0009 issued to West Bay Exploration Company for the West Bay #22 SWD well in Jackson County Michigan, for disposal of oil and gas related brine for injection into the Niagaran at depths between 2662 and 3032 feet.

According to 40 CFR § 124.19(a) *“Any person who filed comments on [the] draft permit or participated in the public hearing may petition the Environmental Appeals Board to review any condition of the permit decision.”* I claim the right of petition since I participated in the November 20, 2014 public hearing held at Columbia Elementary School in Brooklyn Michigan. Additionally under Section 124.13 *“the person filing the petition for review does not necessarily have to be the one who raised the issue”* during the comment period. *See In re Broward County, Florida*, NPDES Appeal No. 92-11, at 11 (EAB, June 7, 1993).

The burden of demonstrating that review is warranted rests with the petitioner. *See In re Avery Lake Property Owners Ass’n*, UIC Appeal No. 92-1, at 3 (EAB, Sept. 15, 1992).

The burden of demonstrating that the injection is safe and will not harm drinking water or the health of person’s rests with West Bay Exploration and now since the permit has been issued, that burden rests with the EPA. *See* 40 CFR § 144.12(a). *“No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.”*

The petitioner challenges the permit decision since it is based on clearly erroneous findings of fact. Under the rules governing this proceeding, an erroneous finding of fact demands and warrants review. *See* 40 CFR § 124.19; FED. REG. 33, 412 (1980).

The petitioner claims that the EPA clearly erred in finding that underground sources of drinking water would not be endangered by the injection of brine at this specific location. The geological formation at this site is clearly inappropriate for injection purposes. Conversion of the Anhydrite cap to Gypsum will definitely take place upon exposure to the injected water. The combination of the pressure from the injected liquid, the pressure created by the contained swelling of the anhydrite cap, and the natural upward flow gradient in the Michigan Basin would then allow migration of brine outside of the confining layer. The petitioner states that both laboratory and field data show that it is likely that the brine containing naturally occurring toxic chemicals will breach the cap through naturally occurring fault lines, pressure induced fractures, and areas where the converted anhydrite-to-gypsum dissolves in solution. The breaching of the anhydrite cap and the upward migration of the brine clearly would violate the Safe Drinking Water Act and endanger the health of persons.

The EPA lists these common components of oil field brines:

**Benzene** is a “conclusively” known human carcinogen and a notorious cause of bone marrow failure. Vast quantities of epidemiological, clinical, and laboratory data link benzene to aplastic anemia, acute leukemia, kidney cancer, and bone marrow abnormalities. Benzene exposure has been linked directly to neural birth defects, spina bifida, and anencephaly. **Ethylbenzene** exposure can irritate the eyes, nose, and throat. Very high levels can cause paralysis, trouble breathing, and death. High exposure may also damage the liver and chronic long term effects can last for months or years. **Toluene** exposure is associated with effects such as psychoorganic syndrome, visual evoked potential, toxic polyneuropathy, optic atrophy, brain lesions, and cerebellar, cognitive and pyramidal dysfunctions. Low to moderate levels can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, and loss of appetite, hearing, and color vision. **Xylene** is an irritant of the eyes and mucous membranes at concentrations below 200 ppm. Ingestion of xylene causes gastrointestinal distress, disturbances of liver and kidney function and may cause toxic hepatitis. Chronic exposure may cause central nervous system depression, anemia, mucosal hemorrhage, bone marrow hyperplasia, liver enlargement, and liver necrosis. **Naphthalene** is classified as “possibly carcinogenic to humans” and may

damage or destroy red blood cells. Exposure may cause confusion, nausea, vomiting, diarrhea, cataracts, blood in the urine, and jaundice. Under California's Proposition 65, naphthalene is listed as "known to the State to cause cancer". **Polycyclic aromatic hydrocarbons** are known for their carcinogenic, mutagenic, and teratogenic properties. Prenatal exposure is associated with lower IQ and childhood asthma. The Center for Children's Environmental Health reports that exposure to PAH during pregnancy is related to adverse birth outcomes including low birth weight, premature delivery, and heart malformations.

Obviously if these naturally occurring toxic chemicals breach the confining layer a serious hazard to human health could result. The petitioner claims this outcome is likely because the Salina Group, a thick sequence of carbonate, anhydrite, and salt formations will be breached and the injected brine will migrate upwards into our USDW. The A-1 and A-2 Evaporate formations will not confine the injected fluids containing these toxic chemicals and known human carcinogens.

On page 3 of the Response to Comment document dated December 8, 2015 (Final Determination) the EPA states that the Salina Group, a sequence of carbonate, anhydrite and salt layers, will act as a confining layer to prevent flow out of the injection zone. The EPA cites the Michigan Hydrological Atlas with regard to the mineral structure of the Salina group and the A-1 & A-2 Evaporate. The petitioner contests the conclusion by the EPA that the carbonate, anhydrite and salt layers of the Salina Group are excellent confining layers and essentially impermeable. The Petitioner contends that this statement is an erroneous finding of fact which contradicts the known scientific data. Wikipedia states: "When exposed to water, anhydrite readily transforms to the more commonly occurring gypsum." Two German investigators state: "in contact with water every anhydrite dissolves or alters to gypsum." (See Rauh & Thuro, *Engineering Geology*, Technische Universitat Munchen, Germany, INVESTIGATIONS ON THE SWELLING BEHAVIOR OF PURE ANHYDRITES). Korzhinsky showed that the solubility of minerals increases when the rock fabric experiences pressures higher than that of groundwater (see Korzhinsky, D.S. *AN SSR Publ. Moscow* (1953), ESSAY ON METASOMATIC PROCESSES). Experimental data by Manikhin suggests that the solubility of Anhydrite increases sharply with the increase of pressure; each 0.01 Pa

increase in pressure results in a 3 to 5 times increase in solubility (see Manikh, V.I. *Geokhimicheskie Materialy*, vol. 34 p.193-196, ON THE QUESTION OF SOLUBILITY OF CALCIUM SULFATE UNDER HIGH PRESSURES; see also Klimchouk, Alexander, *Int. J. Speleol* 25 (3-4), (1996), THE DISSOLUTION AND CONVERSION OF GYPSUM AND ANHYDRITE).

Laboratory experiments show that anhydrite readily reverts to gypsum when brought into contact with water (See Hardie, *The American Mineralogist*, Vol. 52, January-February 1967 – THE GYPSUM-ANHYDRITE EQUILBRIUM AT ONE ATMOSPHERE PRESSURE; see also Zen, *Journal of Petrology*, Vol. 6, Part 1, 1965 – SOLUBILITY MEASUREMENTS IN THE SYSTEM CaSO<sub>4</sub>-NaCl-H<sub>2</sub>O at 35, 50, & 70 degrees C and ONE ATMOSPHERE PRESSURE – publication approved by the Director, U.S. Geological Survey). The Petitioner cited these and other studies in his public comments and provided copies of the studies to the EPA on November 20, 2014 at Columbia Elementary School.

In their Response to Comments (Comment #11, p. 10, ¶ 5) the EPA asserts that, “The research cited by the commenter concerns mineral reactions in situations that are not analogous or relevant to the Salina Group below the West Bay #22 well site.” The EPA goes on to state that laboratory experiments do not relate to the behavior of rock at depth with respect to exposure to fluids. The EPA conveniently ignore the studies that show anhydrite will convert to gypsum at depth. In a study published in *Groundwater in Engineering Geology*, London 1986, researchers Bell, Cripps & Culshaw found that “massive anhydrite can be dissolved to produce uncontrollable runaway situations in which seepage flow rates increase in a rapidly accelerating manner. Even small fissures in massive anhydrite can prove dangerous....Within about 13 years the flow rate increases to a runaway situation.” In CRYSTALLIZATION, ALTERNATION & RECRYSTALLIZATION OF SULPHATES, researcher Jonna Jaworska states: [the gypsification (hydration) of anhydrite] “under natural conditions can occur very quickly: within a few years (Farnsworth, 1925) or even within one year (Moiola & Glover, 1965);...” These studies show that the reliance of Region 5 on the Hydrogeologic Atlas of Michigan (Response to Comments, p. 2 & 3, footnotes 1, 3, 4, 5) is misplaced since permeability estimates cannot be applied to rocks like anhydrite and salt which are susceptible to solution. The Bell, Cripes & Culshaw study found that “the solution rate of

gypsum or anhydrite is principally controlled by the area of their surface in contact with water and the flow velocity associated with a unit area of the material.” The study also notes that “salt is even more soluble than gypsum and the evidence of slumping, brecciation and collapse structures in rocks which overlie saliferous strata bear witness to the fact that salt has gone into solution in past geological times.” *Id, Groundwater in Engineering Geology*, London 1986

It is an accepted fact of science that anhydrite will convert to gypsum upon exposure to water at depth. The very name anhydrite means “without water”. It is the burial process that removed water from gypsum, creating the anhydrite found at depth in the Michigan basin. Now the EPA is returning water to that formation, insuring that the chemical reaction will reverse. Many researchers have reported evidence of this conversion at shallower depths with Murray reporting it at a depth of 3500 feet below the surface. (see Murray, *Journal of Sedimentary Petrology*, Vol. 34, No. 3 September 1964 – ORIGIN AND DIAGENESIS OF GYPSUM AND ANHYDRITE). When hydration occurs at shallower depths, the gypsum formed may be removed in solution. At greater depths, anhydrite is effectively confined which results in a gradual buildup of pressure. Such pressure may be liberated in a sudden explosive movement into the next layer of the overburden. (see Bell, Cripps & Culshaw, *Groundwater in Engineering Geology*, London 1986, A REVIEW OF THE ENGINEERING BEHAVIOR OF SOILS AND ROCK WITH RESPECT TO GROUNDWATER). Similar Anhydrite rock layers have been observed to swell and increase in volume up to 60% upon exposure to water and when such swelling is prevented due to confining conditions immense swelling pressures from 1.7 up to 4.7 MPa have been monitored and recorded. (see Steiner, *International Journal of Rock Mechanics and Mining Sciences & Geomechanics Abstracts*, 30, 4, (1993) – SWELLING ROCK IN TUNNELS; see also Sass & Burbaum, *ACTA Carsologica* 39/2 Postonjna (2010) – DAMAGE TO THE HISTORIC TOWN OF STAUFEN (GERMANY) CAUSED BY GEOTHERMAL FRILLINGS THROUGH ANHYDRITE-BEARING FORMATIONS).

The scientific literature shows that certain salts activate rather than inhibit the hydration of anhydrite and thus promote the conversion of anhydrite to gypsum. In laboratory studies the best activators were found to be sodium, potassium sulfate and sulfuric acid. Anhydrite reacts very rapidly with concentrated Na<sub>2</sub>SO<sub>4</sub> solutions to form Ca-Na double sulfates. These double-

salts are unstable in dilute solutions and decompose to gypsum and/or glauberite. (see Conley and Bundy, *Geochimica et Cosmochimica Acta*, v. 15 (1958) – MECHANISM OF GYPSIFICATION; see also Hardie, *The American Mineralogist*, Vol. 52, January-February 1967 – THE GYPSUM-ANHYDRITE EQUILIBRIUM AT ONE ATMOSPHERE PRESSURE); see also Singh, *Amer. Ceram. Soc.* Vol. 88 (January 2005) - EFFECT OF ACTIVATOR K<sub>2</sub>SO<sub>4</sub> ON THE HYDRATION OF ANHYDRITE OF GYPSUM (CASO<sub>4</sub>.II). The brine that West Bay will inject into this well contains these chemicals which will accelerate the conversion of anhydrite.

In the laboratory Singh proposed the following mechanism for the conversion of anhydrite to gypsum: as soon as anhydrite comes into contact with water, a part of it is dissolved, making a solution saturated with respect to Ca<sup>2+</sup> and SO<sub>4</sub><sup>2-</sup> ions. These ions, which are hydrated in the solution, rapidly get absorbed at the surface of anhydrite, giving a higher surface area. The thickness of the absorbed layer increases over time. When the thickness of the absorbed layer increases beyond a certain limit, cracks are formed. Water molecules enter through the cracks and come in contact with a fresh surface of anhydrite. When there are sufficient numbers of Ca<sup>2+</sup> and SO<sub>4</sub><sup>2-</sup> ions and water molecules at the surface, nuclei of gypsum are formed (Singh, *Amer. Ceram. Soc.* Vol. 88 (January 2005) - EFFECT OF ACTIVATOR K<sub>2</sub>SO<sub>4</sub> ON THE HYDRATION OF ANHYDRITE OF GYPSUM (CASO<sub>4</sub>.II). The natural cracking is significant since under pressure the Anhydrite can be expected to fracture along naturally occurring fault lines. In a private communication with the petitioner, Dr. Timothy Bechtel PhD. P.G. stated: “the biggest problem with anhydrite is the 60% volumetric expansion it suffers when hydrating to gypsum. I have been involved with an anhydrite case in Germany (Google Staufen im Breisgau) in which introduction of water into an anhydrite bed has produced swelling and cracking of the earth. Oilfield brine could produce similar results...swelling and cracking to produce conduits for fluid migration.” (e-mail – Bechtel to [wardance@live.com](mailto:wardance@live.com) – 7-18-12). And Suthersan in his study of hydraulic and pneumatic fracturing notes that “The injection pressure required to create hydraulic fractures is remarkably modest (less than 100 psi).” (See Suthersan, Boca Raton: CRC Press LLC, (1999) – HYRDAULIC AND PNEUMATIC FRACTURING).

The Petitioner's scientific argument is not an untested hypothesis but an established scientific fact upon which an engineering technology has been developed over the last 40 years in the related field of gas storage. Engineers have created caverns in large domal structures (salt) since the 1960's. Today advances in technology allow caverns to be shaped into extensive horizontal strata of salt and anhydrite, typically at depths ranging between 600 and 7000 feet. Fresh or low-salinity water is pumped down into the formation through a borehole (leaching string) and waste brine is returned through the withdrawal/production string to progressively dissolve the salt in a controlled manner. Roughly eight to ten volumes of water are required to dissolve one volume of salt. Construction time to construct a cave with a volume of about 400000 m<sup>3</sup> is approximately 20 months. The only significant difference between this construction technique and the waste injection process is that the injected water is removed. The engineering firm controls the size of the cavity which will be formed as the anhydrite or salt layers dissolve, instead of creating a runaway situation such as described by the *Bell, Cripps & Culshaw* study, which is what the EPA is permitting. As *Jawarski* noted in her paper, the gypsification of massive anhydrite when exposed to water under natural conditions can occur very quickly: within few years (*Farnsworth, 1925*) or even within one year (*Moiola & Glover, 1965*). The West Bay #22 waste injection well will probably operate for 20 years. The Salina A-2 Evaporate layer, the Salina A-1 Evaporate layer, the B-Salt and B-Unit layers, the D-Unit layer, and the E-Unit layer can all be expected to dissolve or partially dissolve in solution. The EPA's assertion that these layers will confine the injected fluid is a joke and contrary to all known scientific theory and current technological practices. These layers will react and dissolve in solution upon exposure to water injected under pressure.

The most conclusive evidence that the EPA is committing an erroneous finding of fact comes from their own files. The EPA permitted the creation of natural gas storage caverns in Michigan in the very Salina group anhydrite and salt layers that they now claim are impermeable. EPA Permit #MI-163-3G-A002, issued June 14, 2006, for the Sunoco Inkster Facility in Wayne County, authorized the dissolution of Salina Group salt and anhydrite layers through injection of water for the purpose of enlarging pre-existing natural gas storage caverns. Water was injected at a pressure of 383 psi (the EPA limited the rate to 383 psi to prevent injection formation fracturing using the formula:  $\{0.8 \text{ psi/ft} - 0.433 \text{ psi/ft (specific gravity)}\} \times \text{depth} - 14.7 \text{ psi}$ ) with the F

member of the Salina formation was used at the depth, a specific gravity of 1.05 was used for the injected fluid and a fracture gradient of 0.8 psi/ft was determined from a default value for Michigan)] and over a period of months leached the salt and anhydrite layers of the Salina Group, thus expanding the caverns. The permit notes that the Inkster site “has nine caverns solution mined from the SALINA salt formation. Four of the operating caverns are in the “F” salt layer at 1,175 feet to 1,280 feet and four are in the “B” salt layer at 15,100 feet to 1,730 feet. Sunoco is looking at expanding the later group.” On one hand the EPA permits the creation of caverns through the injection of water while on the other hand (with West Bay #22) they claim the identical strata will prevent upward migration of injected brine. Contrary to their claim that the anhydrite and salt formations of the Salina Group are impermeable, the EPA clearly has knowledge that these layers will dissolve in solution through injection of water. The EPA is deliberately and maliciously putting southern Michigan’s underground aquifers at risk.

In Response to Comment #11, p. 12, ¶ 2 the EPA contends that other formations, “such as the Artrium Formation, Bedford Shale formation, Bell Shale Formation, Sunbury Shale Formation and Coldwater Shale Formation above the confining zone will prevent any fluid from migrating upward into a USDW.” Simply listing the series of geologically intervening layers does not prove that they are impermeable. Each layer must be individually examined and the permit must be written for a particular layer. The EPA cannot simply say “oh, well, there are other layers of rock 1000 feet above this layer that will confine the fluid before it reaches our USDW.” Then the EPA should write the permit with one of these formations as the confining layer and the petitioner will comment on and contest that new permit. This avoidance of responsibility for writing an accurate permit is not acceptable. The most likely candidate mentioned by the EPA capable of acting as an adequate confining layer is the Coldwater Shale Formation. The 1964 Stratigraphic Succession map shows the Coldwater shale to be sandy, and thus permeable. The 2000 Stratigraphic Succession Map shows the maximum thickness of the Coldwater shale to be only 250 feet thick with significant inclusions of Berea Sandstone which is porous and permeable. These facts indicate that the Coldwater shale will not act as a confining layer.

The EPA deliberately ignores the fact that there is a known vertical component to the Michigan hydraulic gradient which will move this brine upwards naturally through pre-existing fractures in the overburden rock formations such as the Artrium Formation, Bedford Shale formation, Bell Shale Formation, Sunbury Shale Formation and Coldwater Shale Formation. Transport of fluid upwards, even considered as simple particle velocity, will occur. There are several studies that document cross-formational pathways in the Michigan basin which have allowed deeper saline water to migrate into shallower freshwater aquifers. This upward migration of saline fluid into the overlying glacial sediments was interpreted to reflect isostatic rebound following the retreat of the glaciers, leading to fracture intensification and increased permeability of the near surface layers, including shales. (see Weaver, Frapre, Cherry, *Geol. Soc. Am. Bull.* 107 (1995) – RECENT CROSS-FORMATIONAL FLUID FLOW AND MIXING IN THE SHALLOW MICHIGAN BASIN; see also Long, Wilson, Takacs, Rezabek, *Geol. Soc. Am. Bull.* 100 (1988) – STABLE-ISOTOPE GEOCHEMISTRY OF SALINE NEAR-SURFACE GROUNDWATER: EAST-CENTRAL MICHIGAN BASIN).

Recent scientific findings show that migration of injected fluid through strata is far more common and widespread than previously believed. A Duke University study (see Warner; Jackson; Darrah; Osborn; Down; Zhao; White; Vengosh. *Proceedings of the National Academy of Sciences*, (May 2012) GEOCHEMICAL EVIDENCE FOR POSSIBLE NATURAL MIGRATION OF MARCELLUS FORMATION BRINE TO SHALLOW AQUIFERS IN PENNSYLVANIA) demonstrates that deep formation brine may migrate to shallow aquifers. The EPA in Document # 600/R-00/000 (December 2011) INVESTIGATION OF GROUND WATER CONTAMINATION NEAR PAVILLION WYOMING concluded that "...when considered together with other lines of evidence, the data indicates likely impact to ground water that can be explained by hydraulic fracturing." In another study independent researcher Tom Myers used computer modeling and concluded that "...fluid can migrate through thousands of feet of rock and endanger water supplies." (see Myers, *Ground Water*, (April 2012) POTENTIAL CONTAMINANT PATHWAYS FROM HYDRAULICALLY FRACTURED SHALE TO AQUIFERS). While these studies dealt with hydraulic fracturing, the mechanism of pressure, cracking, and gas or fluid migration does not differ from this Waste Injection situation. The EPA cannot claim that the findings of these studies may not also be applied to the waste injection process.

The Michigan State University Earth Sciences Department informed the petitioner that one atmosphere (101 kPa or 14.7 psi) can lift/move water by 34 feet. West Bay's permit allows them to inject at 737 psi so they could conceivably move/lift fluid 1700 feet (50 atmosphere's times 34 feet). This does not take into account the additional pressure dynamics resulting from the confined swelling of the anhydrite. As I mentioned previously, these forces can be immense and would surely push the liquid even farther than the injection pressure alone. The temperature 100 feet below the surface is 55 degrees. There is 1 degree of temperature increase for each 100 feet you descend so an estimate of the temperature at 2500 feet is 80 degrees usable in all calculations. Michigan State also informed the petitioner that the average pressure gradient in the Michigan Basin is approximately 0.43 lb/ft, thus the ambient pressure (that is, the pressure in the absence of any additional compression) is roughly 1290 psi (87.8 atm). A calculation of pressure must take into account this value, the 1,200 BWPD of water injected into the Anhydrite rock strata at a pressure of 737 psi, the pressure of the overbearing rock strata, and the potential pressure created by the swelling of the Salina A-2 Evaporite formation upon contact with the injected fluid which could range from from 1.7 up to 4.7 MPa. In an over pressurized system, a depth pressure gradient greater than 0.465 psi for brines indicates a potential upward flow. (see Kreitler, Charles, *Journal of Hydrology*, 106 (1989) 29-53, HYRDOGEOLOGY OF SEDIMENTARY BASINS). The petitioner has proven that upward migration of fluid is natural in the southern Michigan basin. The Petitioner has proven the transformation of anhydrite to gypsum will cause enormous pressures in addition to the pressure caused by the injected fluid. The petitioner has shown that pressure above 0.465 psi will cause upward flow. These facts must be taken into consideration by the EPA.

Finally the Petitioner notes in Response to Comment #11 on page 10, ¶ 3 of their Response to Public Comments document that: "the EPA has have permitted many wells across Michigan with the same injection and confining zones as the West Bay #22 well." This comment is true and reason for concern. The petitioner has identified 18 Waste Injection wells permitted at similar strata in the lower Michigan basin: State of Michigan WI Permit #30108, #30248, #30123, #36867, #31503, #36958, #30229, #40099 in Calhoun County, Michigan; WI Permit #36629, #42486,

#37378 in Macomb County, Michigan; WI Permit #23252, #23701, #23011, #22661 in Saint Clair County, Michigan; WI Permit #25224, and #20452 in Allegan County, Michigan; and MI Permit #075-2D-0010 in Jackson County, Michigan.

These 18 wells are operating in violation of 40 C.F.R. § 144.12(a) and the Safe Drinking Water Act, Part C, § 1421(a)(3)(C). The EAB has previously ruled that: *“In reviewing an underground injection well permit application, the Region has a regulatory obligation to consider whether geological conditions may allow the movement of any contaminant to underground sources of drinking water.”* *In re Stonehaven Energy Management*, UTC Appeal No. 12-02 LLC Permit No. PAS2DOIOBVEN (EAB March 28, 2013). The Petitioner claims the Board should exercise its discretion to review an important policy matter; ie whether these wells constitute a danger to our Michigan aquifers (see 40 C.F.R. § 124.19(a)(4); see also *In re City of Attleboro*, NPDES Appeal No. 08-08, slip op. at 10 (Sept. 15, 2009). There is a statutory requirement that the EPA review the Petitioner’s geological argument that Salina Group anhydrite and salt formations will dissolve when exposed to a continuous supply of water.

## **CONCLUSION**

The EPA reached a conclusion that the geologic siting of this well was safe. This erroneous finding of fact warrants review. In a step by step process, documented by scientific studies and technical facts, the Petitioner has proven that the Salina Group anhydrite and salt layers which the EPA cites as confining layers for this permit will dissolve in solution. EPA Permit #MI-163-3G-A002, issued June 14, 2006, for the Sunoco Inkster Facility in Wayne County, authorized the dissolution of these same Salina Group salt and anhydrite layers through injection of water for the purpose of enlarging pre-existing natural gas storage caverns. The Petitioner has demonstrated the scientific likelihood that the injected fluid containing toxic substances will then migrate vertically. Vertical migration would endanger our USDW. The petitioner has also identified 18 other waste injection well permits in Michigan that currently endanger our USDW in the southern Michigan basin. The EAB must apply the “preponderance of the evidence” standard established by 40 C.F.R. § 22.24(b). *See In re The Bullen Cos.*, 9 E.A.D. 620, 632 (EAB

2001). The Board cannot defer to the Region's scientific determination because the EPA's position is clearly inaccurate and unsupported by the known scientific data. The EPA cannot issue a permit to dissolve the Salina Group A-2 carbonate, anhydrite and salt layers through injected water and then claim that these layers are impermeable with regard to West Bay #22. The Michigan basin is generally uniform and bowl shaped and these layers have identical geological properties. Review of this permit by the Board is warranted by the evidence and 40 C.F.R. § 144.12(a) and the Safe Drinking Water Act, Part C, § 1421(a)(3)(C) require that West Bay #22 be rejected.

Respectfully submitted,

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## **CERTIFICATE OF SERVICE**

I hereby certify that on December 28, 2015 I did send a copy of my Petition for Review and Appendix A to Tinka Hyde, EPA Region 5, Environmental Protection Agency, 77 West Jackson Boulevard, Chicago, IL 60604-3507 and to William Horn, Mika, Meyers, Becket & Jones, 900 Monroe Ave. NW, Grand Rapids, MI 49503 by regular mail.

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