

Alistair MacDonald

From: David Swisher [dswisher@tamerlaneventures.com]
Sent: September 10, 2007 9:54 AM
To: Alistair MacDonald
Cc: 'Rick Hoos'; 'David Swisher'
Subject: RE: Remaining 2nd Round IR Responses

Good morning Al,

Please see the following:

- Calculated flood levels
 - Calculated from the Flood Risk Map for the Hay River Area, the rail loadout area lies between contours 172.5 & 172.0. The DFL (design flood level) for the rail loadout area is at 172.3. Accordingly, Flood proofing requires raising of structures above this elevation. Any wooden substructure must be a minimum of .3m above the DFL and floor elevations a minimum of .5m above the DFL. Tamerlane's proposed rail loadout facility will be concrete foundation and walls and will be constructed ~ 1.0m above the DFL.
- (Final Analysis Attached) Basal inflow analysis (currently being reviewed and recalculated by EBA hydrogeologist)
- (Attached) Injection well picture
- (Attached) Injection well usage locations
- (Attached) MSDS sheets for reagents

Thanks,

David Swisher
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From: David Swisher [mailto:dswisher@tamerlaneventures.com]
Sent: Thursday, August 30, 2007 2:38 PM
To: Alistair MacDonald
Cc: Rick Hoos; David Swisher
Subject: Remaining 2nd Round IR Responses

Hello Al,

Please see the attached final second round IR responses along with the modified DAR summary report. Any changes in the summary report are in green font. I'm also working on some points of clarification surrounding the following:

- Calculated flood levels

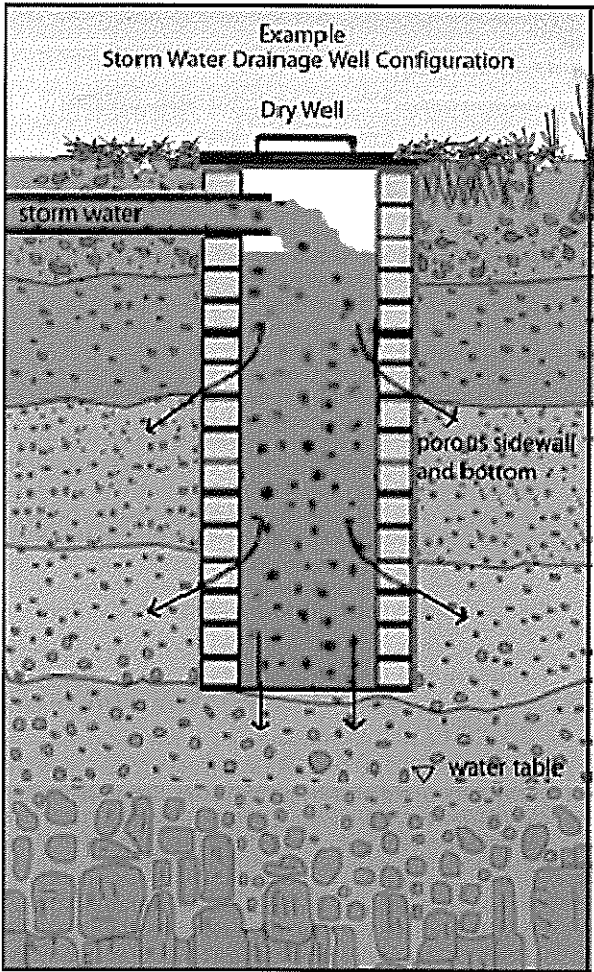
13/09/2007

- Basal inflow analysis (currently being reviewed and recalculated by EBA hydrogeologist)
- Injection well picture
- Injection well usage locations
- MSDS sheets for reagents

If you have any questions, please don't hesitate to call me.

Thanks,

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CLASS V UIC STUDY FACT SHEET
SEWAGE TREATMENT EFFLUENT WELLS

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| What is a sewage treatment effluent (STE) well? | Class V STE wells are used for the shallow disposal of treated sanitary waste from publicly owned treatment works or treated effluent from a privately owned treatment facility that receives only sanitary waste. In addition to being used for the purpose of wastewater disposal, STE wells are commonly used where injection will aid in aquifer recharge or subsidence control, or to prevent salt water intrusion. |
| What types of fluids are injected into STE wells? | Fluids generally subjected to secondary or tertiary treatment in a municipal wastewater treatment plant or a privately owned wastewater treatment plant |
| Do injectate constituents exceed drinking water standards at the point of injection? | Secondary treated effluent may contain fecal coliform and nitrates at concentrations above primary drinking water standards, and either secondary or tertiary treated effluent also may exceed secondary drinking water standards for chloride, sulfate, or total dissolved solids. Available injectate quality data for STE wells show that injectate samples have exceeded drinking water standards for fecal coliform, nitrates, total dissolved solids, and pesticides at at least one facility. Also, available information indicates that at least one facility is permitted to discharge injectate that exceeds the secondary drinking water standard for chloride. |
| What are the characteristics of the injection zone of a STE well? | Some STE wells inject into shallow (<50 feet) aquifers that are of extremely poor quality and that are not likely to be used as sources of drinking water. However, other wells are used to inject treated wastewater effluent for aquifer recharge, and may be injecting into aquifers of drinking water quality. |
| Are there any contamination incidents associated with STE wells? | Several studies and incidents have shown that STE wells may have contributed to or caused ground water or surface water contamination. One study showed nitrate contamination of onsite ground water at a STE site in NH where both primary treated effluent and raw septage were released into a leach field. Two STE wells on the Island of Maui, HI were thought to be causing surface water contamination through migration of nitrates in the injectate to surface water bodies. |
| Are STE wells vulnerable to spills or illicit discharges? | STE wells are not vulnerable to spills or illicit discharges. The injectate is treated wastewater, and the wastewater treatment plants that generate the injectate are generally subject to effluent quality standards and monitoring, reporting, and record keeping requirements. |
| How many STE wells exist in the United States? | There are 1,675 documented sewage treatment wells and more than 1,739 wells estimated to exist in the United States. |
| Where are STE wells located within the United States? | More than 95 percent of the documented wells are located in five states: AZ (79); CA (205); FL (830); HI (378); and MA (105). NY did not report any documented STE wells in the state, but reported that less than 50 wells may actually exist. |



CLASS V UIC STUDY FACT SHEET STORM WATER DRAINAGE WELLS

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| What is a storm water drainage well? | Storm water drainage wells are Class V underground injection control (UIC) wells used to remove storm water or urban runoff from impervious surfaces such as roadways, roofs, and paved surfaces to prevent flooding, infiltration into basements, etc. The primary types of storm water drainage wells are bored wells, dug wells, and improved sinkholes. In addition, "lake level control wells" are used to drain lakes to prevent overflow following heavy precipitation. |
| What types of fluids are injected into storm water drainage wells? | Primarily rain water and melted snow runoff. |
| Do injectate constituents exceed drinking water standards at the point of injection? | Available sampling data indicate that concentrations of antimony, arsenic, beryllium, cadmium, chromium, cyanide, lead, mercury, nickel, nitrate, selenium, and certain organics in storm water runoff have exceeded primary drinking water standards. Available sampling data also show that concentrations of aluminum, chloride, copper, iron, manganese, total dissolved solids, zinc, and methyl tert-butyl ether have exceeded secondary drinking water standards or health advisory levels. Water quality data from FL indicate that lake level control well injectate has exceeded primary drinking water standards or health advisory levels for turbidity, arsenic, pentachlorophenol, and fecal coliforms, as well as secondary drinking water standards for iron, manganese, pH, and color. |
| What are the characteristics of the injection zone of a storm water drainage well? | In general, the point of injection for most storm water drainage wells is into sandy, porous soils, a permeable coarse-grained unit, karst, or a fractured unit because these types of formations can readily accept large volumes of fluids. |
| Are there any contamination incidents associated with storm water drainage wells? | Contamination related to storm water drainage wells has been reported to various degrees in OH, KS, WI, CA, WA, AZ, OK, TN, NY, IN, FL, KY, and MD. Several studies, however, do not clearly distinguish contamination from storm water drainage wells versus more general, nonpoint source pollution. Lake level control wells have been associated with two documented contamination incidents in FL. |
| Are storm water drainage wells vulnerable to spills or illicit discharges? | Storm water drainage wells are generally vulnerable to spills or illicit discharges of hazardous substances, as they are often located in close proximity to roadways, parking lots, and commercial/industrial loading facilities where such substances are handled and potentially released. |
| How many storm water drainage wells exist in the United States? | There are approximately 71,000 documented storm water drainage wells and approximately 248,000 storm water drainage wells estimated to exist in the United States. |
| Where are storm water drainage wells located within the United States? | About 81 percent of the documented wells are in seven western states: AZ (14,857), CA (3,743), WA (22,688), OR (4,148), ID (5,359), MT (4,000), and UT (2,890). Five other states contain approximately 15 percent of the total wells: OH (3,036), FL (2,153), MI (1,301), MD (1,678), and HI (2,622). There are approximately 200-250 lake level control wells in FL. |



CLASS V UIC STUDY FACT SHEET
AGRICULTURAL DRAINAGE WELLS

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| What is an agricultural drainage well (ADW)? | ADWs are Class V underground injection control (UIC) wells that receive agricultural drainage. This includes improved sinkholes, abandoned drinking water wells, and underground drain tiles and cisterns. |
| What types of fluids are injected into ADWs? | Excess surface and subsurface water from agricultural fields, including irrigation tailwaters and natural drainage resulting from precipitation, snowmelt, floodwaters, etc. ADWs may also receive animal yard runoff, feedlot runoff, dairy runoff, or runoff from any other agricultural operation. |
| Do injectate constituents exceed drinking water standards at the point of injection? | Available sampling data show that the primary constituent in ADW injectate that is likely to exceed health-based standards is nitrate. The data also indicate that boron, sulfate, coliforms, and certain pesticides (cyanazine, atrazine, alachlor, aldicarb, carbofuran, 1,2-dichloropropane, and dibromochloropropane) in agricultural drainage have exceeded primary drinking water standards or health advisory levels. Total dissolved solids (TDS) and chloride in some ADWs also have been measured above secondary drinking water standards. |
| What are the characteristics of the injection zone of an ADW? | Suitable subsurface geologic formations for ADWs often include areas with shallow, fractured bedrock formations, or limestone bedrock, particularly where affected by karst that provides solution channels and sinkholes that allow rapid transmission of water. |
| Are there any contamination incidents associated with ADWs? | A number of studies and incidents have shown that ADWs have in fact contributed to or caused ground water contamination. In particular, ten studies reviewed for The Class V UIC Study document nitrate contamination of ground water in agricultural areas, six of these studies clearly link the contamination to ADW use. In addition, there are two known contamination incidents in IA involving direct discharges from septic tanks to ADWs. Other contamination incidents include ground water and drinking water contamination linked to 15 drainage wells in Minidoka County, ID and a community supply well in Dane, WI. |
| Are ADWs vulnerable to spills or illicit discharges? | ADWs may be vulnerable to spills from manure lagoons, direct discharges from septic tanks, and accidental releases of materials used in farming operations (e.g., motor oils, pesticides). |
| How many ADWs exist in the United States? | There are at least 1,069 documented ADWs and more than 2,842 ADWs estimated to exist in the United States. |
| Where are ADWs located within the United States? | Although believed to exist in at least 21 states, more than 95 percent of the documented wells are in just five states: ID (303), IA (290), OH (>200), TX (135), and MN (92). |