Five-Year Review Report

Second Five-Year Review Report
For the
Stoughton City Landfill Superfund Site
Stoughton, Dane County, Wisconsin

April 2008

Prepared by:
Wisconsin DNR for the
United States Environmental Protection Agency
Region 5
Chicago, Illinois

Approved by: Date:

for R.K 4/16/08

Richard C. Karl, Director
Superfund Division
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List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DCE	1, 2-Dichloroethylene
EPA	United States Environmental Protection Agency
ES	Enforcement Standard (state of Wisconsin)
ESD	Explanation of Significant Differences
IC	Institutional Controls
LOD	Level of Detection
LOQ	Level of Quantification
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MW	Monitoring Well
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PAL	Preventive Action Limits (State of Wisconsin)
PPB	Parts-per-billion or micrograms per liter (ug/L)
PCOR	Preliminary Close Out Report
PRP or RP	Potentially Responsible Party
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
TCE	Trichloroethylene
THF	Tetrahydrofuran
UAO	Unilateral Administrative Order

VC	Vinyl Chloride
VOC	Volatile Organic Compound
WAC	Wisconsin Administrative Code
WDNR	Wisconsin Department of Natural Resources

Executive Summary

The remedy for the Stoughton City Landfill site in Stoughton, Dane County, Wisconsin, according to the September 1991 Record of Decision and the February 1996 Explanation of Significant Differences, included: excavation of wastes outside the area of main waste disposal and placement of these materials under the cap; placement of a solid waste landfill cover (cap) system over the waste disposal area; placement of a fence around the cap, or slightly within the edges of the cap; land use restrictions to prevent the installation of drinking water wells within 1200 feet of the property boundary and to prevent residential development of the property; and long-term groundwater monitoring to confirm the effectiveness of the other components of the selected remedy. The Record of Decision also included a requirement for the extraction and treatment of contaminated groundwater unless additional investigations indicated that this might not be required; and further investigation of the groundwater during the remedial design indicated that it was not necessary to implement this at the time of the construction of the cap. Based on the evaluation of monitoring results since that time, it may be necessary to examine the need for additional groundwater actions depending on future groundwater monitoring results. The site achieved construction completion with the signing of the Preliminary Close Out Report on December 15, 1998. The trigger for this review was the five year anniversary of the first Five Year Review. The first Five Year Review was triggered by the reported start of on-site construction on April 10, 1998.

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. However, in order for the remedy to be protective in the long-term, all the institutional controls that are part of the remedy need to be implemented and groundwater monitoring results need to continue to be assessed. Long term protection requires compliance with effective ICs which must be monitored and maintained.

Five-Year Review Summary Form

Use the updated summary form from the revised FYR Model Template (attached)

SITE IDENTIFICATION		
Site Name (from *WasteLAN*): Stoughton City Landfill		
EPA ID (from *WasteLAN*): WID980901219		
Region: 5	State: WI	City/County: Stoughton/Dane County
SITE STATUS		
NPL status: _x_ Final __ Deleted __ Other (specify) _____		
Remediation status (choose all that apply): __ Under construction _x_ Operating __ Complete		
Multiple OUs?* __ Yes _x_ No	Construction completion date: 12/15/98	
Has site been put into reuse? __ Yes _x_ No		
REVIEW STATUS		
Lead Agency: _x_ EPA __ State __ Tribe __ Other Federal Agency _____		
Author name: Gary A. Edelstein, P. E.		
Author title: Waste Management Engineer and Support Agency Project Manager	Author affiliation: Wisconsin DNR	
Review period:** 10/01/07 to 4/10/08		
Date(s) of site inspection: 10/17/07		
Type of review: _x_ Post-SARA __ Non-NPL remedial action site __ Regional discretion	__ Pre-SARA __ NPL State/Tribe-lead __ NPL-removal only	
Review number: _ 1 (first) _x_ 2 (second) __ 3 (third) __ Other (specify) _____		
Triggering action: __ Actual RA on-site construction at OU # 1 __ Construction completion __ Other (specify) _____	__ Actual RA start at OU # __ _x_ Previous five-year review report	
Triggering action date (from *WasteLAN*): 4/10/03	Due date: 4/10/08	

*--"OU" refers to operable unit.

**--Review period should correspond to the actual start and end dates of the five-year review in *WasteLAN*.

Issues:

- Water below MCLs was found flowing from 3 monitoring wells and discharging on the ground at the inspection. Wisconsin DNR's O&M contractor already successfully plugged four flowing wells before the inspection and is under contract to plug one more well that was found discharging at the inspection. Two wells, OW2 and OW4, were found to be discharging at the inspection for the first time.

- Based on an evaluation of the groundwater monitoring results, a single well showed an increasing trend for one of the contaminants of concern.

- Monitoring wells that are no longer monitored, including wells that were or are discharging water to the surface that are no longer monitored, should be properly abandoned.

- The institutional controls (ICs) specified in the Record of Decsion (ROD) and 1997 Consent Decree with the City of Stoughton have not been implemented because of proposed reuse plans. The reuse plan proposed has now been abandoned by the City of Stoughton. Implementing the ICs is required to assure protectiveness of the remedy. Long-term stewardship must be assured which includes maintaining and monitoring effective ICs. The EPA will work with the City to resolve this issue within the next six months.

Recommendations and Follow-up Actions:

- Wisconsin DNR will plug the two newly discovered flowing wells by July, 2008, unless it is decided that the wells be fully abandoned.

- Based on an evaluation of the groundwater monitoring results, the monitoring program will continue. If increasing trends continue in the single well or other wells start to show increasing trends, then the contingency groundwater remedy described in the ROD will be considered prior to the next Five-Year Review report.

- EPA and the Wisconsin Department of Natural Resources (WDNR) will determine the fate of unused monitoring wells.

- EPA will develop an IC Plan by October 2008. The plan will assure that effective ICs are implemented, monitored and maintained. The EPA will oversee the placement of the required restrictive covenants and any other necessary ICs on the property parcels and monitor the long-term stewardship of the site.

Protectiveness Statement(s):

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. However, in order for the remedy to be protective in the long-term, the institutional controls (ICs) that are part of the remedy need to be implemented. Groundwater monitoring results need to be assessed regularly because a few wells continue to show contaminant concentrations in excess of Wisconsin Preventative Action Limits (PALs)

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Stoughton City Landfill Superfund Site
Stoughton, Dane County, Wisconsin
Second Five-Year Review Report

I. Introduction

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in a five-year review report. In addition, the Five-Year Review report identifies issues found during the review, if any, and identifies recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to §121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Part 300). CERCLA §121 states:

> If the president selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The president shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Region 5 of the United States Environmental Protection Agency (EPA) has conducted the Five-Year Review of the remedy implemented at the Stoughton City Landfill Superfund site in Stoughton, Wisconsin. This review was conducted for the entire site by the support agency Project Manager through April, 2008. This report documents the results of the review.

This is the second Five-Year Review for the Stoughton City Landfill (SCL) site. The triggering action for this statutory review is the signature date of the first Five-Year Review, April 17, 2003. The triggering action for the first Five-Year Review was the reported initiation of the remedial action on April 10, 1998; this was the date that mobilization of construction equipment and subcontractors began. The Five-Year Review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use or unrestricted exposure.

II. Site Chronology

Event	Date
Landfill began operation (initially as an uncontrolled dump)	about September 1952
Operation as a state-licensed landfill began	1969
Wisconsin Department of Natural Resources required closure	1977
Closure completed following operation for landfilling of construction debris since 1978	1982
Site proposed for the National Priority List (NPL)	10/15/84
Placed as final on the NPL	6/10/86
Administrative Order by Consent for the remedial investigation (RI) and feasibility study (FS)	April 15, 1988 effective May 2, 1988
RI field work begins	March 1989
Proposed Plan released	7/12/91
Public meeting to discuss Proposed Plan and RI and FS reports	7/24/91
End of public comment period for the Proposed Plan	8/12/91
Record of Decision (ROD)	9/30/91
Fund lead remedial design (RD) began	9/28/92
Negotiations for RD and remedial action completed	9/28/92
Explanation of Significant Differences released	2/29/96
RD completed	1/30/97
Consent Decree for cost settlement between City of Stoughton and United States and State of Wisconsin	lodged 6/5/97 entered 8/13/97
Fund lead RA began	9/27/97
On-site mobilization for RA began	4/10/98
Preliminary Close Out Report (construction completion under CERCLA)	12/15/98
Site inspection for the first five-year review	4/08/03
First Five-Year Review report completed	4/17/03
Site inspection for second Five-Year Review	10/17/07

III. Background

Land and Resource Uses and Physical Characteristics

The Stoughton City Landfill site is located in the northeast portion of Stoughton, Dane County, Wisconsin. The property containing the landfill site encompasses approximately 27 acres and occupies a portion of section 4, township 5 north, range 11 east. Although the landfill property originally occupied approximately 40 acres, landfilling has occurred on only about 15 acres of the property. Since 1982, land exchanges between the city and the owner of an adjacent property have modified the original property boundaries.

A wetland area that existed in the southeast portion of the current property boundary was the initial area of waste disposal. Wetlands occur adjacent to the southeast portion of the site, in the north portion of the site, and west of the site along the Yahara River. The river comes within

approximately 400 feet of the waste disposal area. Approximately 1/8 of the site (the northeastern section, which consists of wetlands) is situated within the 100-year flood plain. The nearest developed land occurs along Amundson Parkway, the site access road to the south, and Skogdalen Dr., a road off Amundson Parkway just south of the site, where residential homes have been built. An extensive residential area occurs approximately 1/4 mile south of the site, where the city street grid pattern begins. The land immediately adjacent to the southern site boundary was undeveloped at the time of the remedial investigation. Then, as now, there was no developed land in the vicinity of the site to the west, north or east. The City of Stoughton now has a population of about 12,400. The residents of Stoughton are connected to city water.

Quaternary/glacial deposits, composed primarily of lacustrine plain and ice-contact stratified deposits, are approximately 200 feet thick at the site. Ice-contact stratified deposits generally include significant sand and gravel deposits and land forms such as kames and eskers. These deposits occupy higher ground within the landfill site and south of it. Lacustrine plain or glacial lake-bottom sediments are generally composed of fine-grained silt and clay. Some sand is present near former shorelines and stream inlets. These areas are often flat, poorly drained, and show evidence of peat accumulation. Lacustrine plain deposits occupy the southeast portion of the current property boundary, which was initially developed for waste disposal, and the low-lying ground adjacent to the east, north, and west portion of the site. Lacustrine plain sediments are generally overlain by younger marsh deposits. Under these deposits is reported to be Cambrian sandstone bedrock.

Regional groundwater flow is toward the Yahara River, which serves as a groundwater discharge. However, the groundwater flow in the surficial aquifer was radial beneath the site at the time of the remedial investigation. The surficial aquifer and the aquifer in the bedrock are hydraulically connected. Municipal well #3 is situated about 3000 ft west of the site and is set in the sandstone bedrock as an open pipe from roughly 210 ft below ground surface to 940 ft below ground surface.

History of Contamination and Initial Response

The City of Stoughton purchased the original 40-acre site in July 1952 and annexed it in September 1952 when landfill operation began. Between 1952 and 1969 the facility was operated as an uncontrolled dump site. Common municipal waste and both dry and liquid wastes were disposed of at the site. Some sludge materials containing 2-butanone, acetone, tetrahydrofuran, toluene, and xylene mixtures were disposed of at the site from 1954 until 1962. During this period, the liquid wastes were commonly poured over garbage and burned. It was also reported that some liquid wastes were poured down holes drilled to test auger drilling equipment in the west-central portion of the landfill. In 1969, the facility began operation as a state-licensed landfill. In 1977, the Wisconsin Department of Natural Resources (WDNR) required that the site be closed according to state regulations. Closure activities included construction of a trash transfer station, placement of cover material borrowed from the northwest portion of the site and from agricultural areas, application of topsoil also derived from an agricultural area, and seeding. From 1978 to 1982 only brick, rubble, and similar construction materials were accepted at the site while closure work was performed. The landfill was officially closed in 1982.

The site was placed on the National Priorities List (NPL) in June 1986. In March 1988, the two potentially responsible parties (PRPs) named for the site entered into an Administrative Order by Consent with EPA and WDNR for the performance of a remedial investigation and feasibility study (RI/FS). Remedial investigation field activities began in March 1989. ERM-North Central was originally contracted by the Potential Responsible Party (PRP) to conduct the work related to the remedial investigation and feasibility study. ERM was replaced by ENSR Consulting and Engineering in 1990 to complete the remaining tasks of the remedial investigation and feasibility study. The Final RI Report, dated January 17, 1991, was submitted by the Stoughton City Landfill Steering Committee. The Final Report was dated June 20, 1991. A report on a preliminary ecological site assessment was issued by USEPA in July 1991.

A Proposed Plan for remedial action was released for public comment on July 12, 1991, with a 30-day comment period ending August 12, 1991. A public meeting was held on July 24, 1991 at which the Proposed Plan and the findings of the RI/FS were discussed and oral comments were taken. A Record of Decision, in which the remedy selected for the site was described, was signed September 30, 1991. An Explanation of Significant Differences (ESD), in which a change in the remedy selected was described, was issued on February 29, 1996.

One of the PRPs who had performed the RI and FS filed for bankruptcy and the other PRP said that it could not pay for implementing the entire remedy. The latter PRP settled with the United States and the State of Wisconsin through a Consent Decree entered in August 1997; this Consent Decree required this PRP to pay to the United States and to the State of Wisconsin for their response costs. Eventually EPA received some money from the former PRP in the bankruptcy proceedings. The remedial design, remedial action, and operation and maintenance were and have been implemented using these monies and Fund money.

Extent of Contamination

Results of the RI indicated that groundwater to the west of the site was contaminated with tetrahydrofuran (THF) in concentrations which exceeded the Wisconsin enforcement standard (ES) by more than one order of magnitude (660 µg/l versus 50 µg/l). Limited sampling and analyses were conducted of the wastes themselves, and the results indicated the presence of polynuclear aromatic hydrocarbons (PAHs) and phthalates. Bis(2-ethylhexyl)phthalate was detected in waste in concentrations as high as 600,000 µg/kg. Sediments in the eastern wetlands were found to contain elevated levels of aluminum, calcium, and magnesium. PAHs, phthalates, benzoic acid, cadmium, and lead were found in low concentrations in sediment samples taken from the wetlands southeast of the site.

THF was measured at MW-3D at concentrations above the ES during all three sampling rounds performed during the remedial investigation. THF was also measured in one sampling round at MW-4D and MW-5S above the Wisconsin preventive action limit (PAL) (10 µg/l). There were no federal drinking water standards for THF at the time of the RI and there are still none. The NR 140.10 of the Wisc. Adm. Code (Wisconsin Administrative Code) says, "For all substances that have carcinogenic, mutagenic or teratogenic properties or interactive effects, the preventive action limit is 10% of the enforcement standard. The preventive action limit is 20% of the enforcement standard for all other substances that are of public health concern."

Trichlorofluoromethane was measured in MW-5S and MW-5D during all sampling rounds at concentrations below the Wisconsin PAL (698µg/l). Dichlorodifluoromethane was detected in MW-3D, MW-5S, and MW-5D in concentrations from 16µg/l to 240µg/l during some sampling rounds. No federal groundwater standards existed for dichlorodifluoromethane but the state had an interim recommended PAL of 300µg/l at the time of the remedial investigation.

Elevated concentrations of metals were detected in various shallow and deep monitoring wells located in all directions away from the waste disposal area except to the northeast. The concentration of arsenic (5.2µg/l) was slightly above the PAL of 5µg/l in MW-2S in one duplicate sample. The highest concentration of barium in MW-2S (293µg/l) was above the PAL of 200µg/l. The concentration of barium was above the PAL at MW-1S; however, this concentration was not significantly above background. Selenium was detected above the PAL in upgradient well MW-1S. Chromium was measured in MW-4D below the limit of quantification but above the PAL. Concentrations of the following constituents were above the Wisconsin groundwater quality standards: iron (in MW-2S, MW-3S, MW-4D, and MW-5D) and manganese (in all wells, including the background well). Iron was also above the standard in the private well sampled for background purposes. The public welfare standards for these two substances are not health related, but rather are for aesthetics (e.g., color and fixture staining).

Site Risks

A baseline risk assessment was performed for the Record of Decision. The original assessment had to be modified when it was found that an incorrect ingestion reference dose was used for THF (the corrected reference dose at the time was 0.002 mg/kg-d, which was obtained from EPA's Environmental Criteria and Assessment Office (ECAO) (April 15, 1991), and the one originally used was 0.068 mg/kg-d). Based on the risk assumptions and routes of exposure considered (ingestion of the waste, direct skin contact and ingestion of contaminants in the surface water and sediment, direct skin contact with and ingestion of contaminated soil, drinking contaminated groundwater at the landfill, and breathing air at the landfill), the contaminants at the Stoughton City Landfill could result in unacceptable non-carcinogenic risks such as impaired organ function in both adults and children. The maximum cumulative non-carcinogenic risk was determined by EPA to be 9.5 for ingestion of water from well MW-3D, using a THF concentration in this well of 660µg/l. This is the adult hazard index (HI), with 1.0 being the acceptable upper value. About 99% of this hazard index was due to the presence of THF. Adding contributions from dermal contact and inhalation, the HI was 10. These risks were based on future residential land use scenarios within close proximity to the site and on future groundwater use at the site.

The maximum carcinogenic risks from the site (considered for both the single, worst-case well approach and reasonable maximum risk associated with the 95 percent upper confidence level [UCL]) were within the Agency's allowable risk range. The highest total site risk for the worst well approach was 9.7×10^{-5}. The EPA considers risks at Superfund sites that exceed 1×10^{-4} to be unacceptable.

Basis for Taking Action

Actual or threatened releases of hazardous substances from this site, if not addressed by implementation of the response action selected in the ROD, might present an imminent and substantial endangerment to public health, welfare, or the environment. This determination was based on the findings in the remedial investigation and the baseline risk assessment.

IV. Remedial Action

Remedy Selected

The primary purpose of the remedy selected for this site was to restrict the release of contamination, in particular, the release of contamination into groundwater. Briefly, the remedy selected in the September 30, 1991 ROD was:

- Excavation of wastes in contact with groundwater to the southeast and northeast and placement of these materials under the cap;
- Placement of a solid waste landfill cover (cap) system over the waste disposal area;
- Extraction and treatment of contaminated groundwater unless additional investigations indicated that this might not be required;
- Placement of a fence around the cap, or slightly within the edges of the cap;
- Land use restrictions to prevent the installation of drinking water wells within 1200 feet of the property boundary and to prevent residential development of the property; and
- Long-term groundwater monitoring to confirm the effectiveness of the other components of the selected remedy.

A February 29, 1996 ESD reduced the amount of wastes that were to be relocated under the cap. Further investigation of the groundwater during the remedial design indicated that it was not necessary to implement the extraction and treatment of the groundwater at the time of the construction of the cap and the other parts of the remedy.

Remedy Implementation

The closure of the Stoughton City Landfill site involved the excavation and relocation of saturated waste deposited in wetlands, construction of a multilayer soil cover system, installation of a passive gas venting system, and construction of an access road and a perimeter security fence. Construction took place between April and December 1998.

The closure included the following:

- Construction of temporary facilities and security fencing;
- Construction of a decontamination pad and development of a water management plan for water resulting from decontamination and dewatering;
- Clearing, grubbing, and stripping of existing topsoil within the limits of the cap;
- Installation of soil erosion control measures, including a temporary flood control berm along the edge of the existing wetlands;
- Demolition and on-site consolidation of existing on-site facilities and debris, including a water line and picnic shelter;

- Abandonment of some existing monitoring wells on the site;
- Removal and on-site disposal and consolidation of drummed wastes from remedial investigation activities;
- Test pit investigations to determine the limits of the wastes;
- Excavation, dewatering, and on-site consolidation of saturated wastes, including the construction of a dewatering pad;
- Construction of the multilayer soil cover system (cap) after completion of a clay test pad;
- Installation of a passive landfill gas vent system;
- Construction of a permanent access road;
- Installation of a permanent perimeter fence and gates; and
- Final grading and restoration, including construction of a storm water and erosion system.

Additional wastes were encountered during the abandonment of the existing water line and, consequently, additional test pits were excavated in areas outside the originally defined waste relocation areas. It was found that wastes to the south extended to within a few feet of Skogdalen Drive. Due to the additional wastes discovered outside the original limits and some waste found to be at a greater depth than was anticipated, the actual amount of wastes relocated was nearly 25,000 cubic yards. This resulted in the cover being raised about two feet at the high point.

The Remedial Action Report noted the total anticipated cost for construction of the landfill cap at $4,286,500. The original bid amount for the work was about $1,852,000 and change orders brought this to $2,084,000.

Construction completion for the site was achieved with the issuance of the Preliminary Close Out Report on December 15, 1998.

Institutional Controls

Institutional controls (ICs) are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure (UU/UE).

The map in Figure 1 shows the area within the fence line that does not support unlimited use and unrestricted exposure. The table below summarizes institutional controls for these restricted areas.

Table 1: Institutional Controls Summary Table

Media, remedy components & areas that do not support UU/UE based on current conditions	*Objectives of IC*	*Title of Institutional Control Instrument Implemented*
Stoughton Landfill – Constructed Subtitle C landfill cap over waste disposal area within fence.	Prohibit interference of cap and assure integrity of the landfill cap; Prohibit residential use	Restrictive covenant to be implemented
North of Stoughton Landfill on Property - Area of Site beyond landfill treated to recreational cleanup standards	Prohibit residential use	Restrictive covenant to be implemented
Groundwater – current area on Stoughton Property that exceeds groundwater cleanup standards	Prohibit groundwater use (until cleanup standards are achieved)	Restrictive covenant to be implemented
Groundwater – current area beyond Stoughton Property that exceeds groundwater cleanup standards	Prohibit groundwater use (until cleanup standards are achieved)	State of Wisconsin Chapter NR 812 (prohibits construction of well within 1200 feet of landfill)

A map which depicts the current conditions of the site and areas which do not allow for UU/UE will be developed as part of the implementation of institutional controls, IC evaluation activities or IC Plan discussed below.

The IC ROD Requirements

Cleanup goals for the site, within the fence, include containment of soils and groundwater and prohibits residential use of the site. Cleanup goals for groundwater beyond the site are based upon residential use.

The September, 1991 ROD states that the remedy includes "Land use restrictions to prevent the installation of a well within 1200 feet of the property boundary and to prevent residential development of the site." It also states that a component of the remedy is "Groundwater use in the area would be prevented by obtaining deed restrictions on the use and placement of wells in the affected area." Finally, states that the remedy includes "...the placement of institutional controls such as deed restrictions to control future land use..."

One of the elements of the deed restrictions that were to be placed on the two parcels of property at the site states, "No water wells, other than monitoring wells, shall be located on the property." In addition, the ROD calls for the prohibition of wells within 1200 feet of the property boundary. The ROD 1200 feet separation requirement is generally being met by the requirements of NR 812, Wis. Adm. Code, that a well not be constructed within 1200 feet of a landfill unless a written variance is granted by the WDNR.

The Consent Decree IC Requirements

The City of Stoughton entered into a Consent Decree (CD) with the United States of America in 1997 to settle their Superfund liability for the site. The IC section of the CD requires the City to draft and record a "Declaration of Restrictions" to prohibit recreational use within the fence installed pursuant to the ROD.

Existing ICs

Several Wisconsin regulations are governmental ICs which help to ensure the proctectiveness of the remedy. These are as follows:

- Chapter NR 812, Wisconsin Administrative Code, requires anyone who wishes to construct a well within 1200 feet of a landfill to obtain a prior written variance from WDNR.

- Chapter NR 506, Wisconsin Administrative Code, requires anyone who wishes to build on a closed or abandoned landfill to get prior approval from WDNR.

IC Evaluation and IC Plan

The ICs specified in the ROD and 1997 Consent have not been implemented. At a conference call with the Agencies on March 21, 2007 and at meeting with the Agencies on March 28, 2007, the City of Stoughton noted that it had not placed any deed restrictions on the site property parcels and the attorney who had handled the matter for the City died. Prior to the preparation of the first Five Year Review completed in April 2003, the City had expressed an interest to the Agencies to use the site for recreational/park type use. The state project manager at the time said that he would work with the people representing the City to try to remove any obstacles to using the site. In July, 2003, that state project manager prepared an exemption to the requirement in

ch. NR 506 to conditionally allow site development activities that would allow recreational use, according to a plan submitted by the City in June, 2003. This exemption does not preempt the current ROD and CD requirements applying to the area within the fence. They require that the area inside the fence may not be used for other development or recreational use. The ROD and CD would have to be revised/amended to allow such uses. Subsequently, a golf course was built on the west side of the site, outside the fence. However, no work was done within the fenced areas pending agreement with EPA, given the ROD and CD requirements and the need to resolve the deed restriction issue.

The ROD and CD require the City to place restrictive covenants on the site property to at least prevent residential development and well construction. Also, under the CD, the City has agreed to not allow any recreational use within the fenced area.

Implementing effective ICs will be required to assure protectiveness of the remedy. Long-term stewardship must be assured which includes maintaining and monitoring effective ICs. Initial IC evaluation activities have-revealed that additional steps must be taken to implement restrictive covenants on the Stoughton Landfill property.

The EPA will develop an IC Plan by October 2008 which includes planning for implementation of effective ICs, and necessary IC evaluation activities and planning for long-term stewardship. The IC plan will assure that effective ICs are implemented, monitored and maintained.

U.S. EPA will oversee the drafting and recording of the restrictive covenants on the property parcels, along with any other ICs deemed necessary, and insure long-term stewardship of the Site. To assure effective ICs are implemented, IC evaluation activities must be conducted. The IC evaluation activities include the following: Map which depicts the current conditions of the site and depicting physical areas which do not allow for UU/UE, including the information contained in Table 2,will be developed; Assure that all needed land use restrictions /objectives are stated in/covered by an effective IC; Title work that shows recording and that no other existing property rights will interfere with the site remedy or cause undue exposure; and Assuring that the restrictions are enforceable and that planning for long term stewardship is implemented.

Current Compliance: Based on inspections and interviews, EPA is not aware of site or media uses which are inconsistent with the stated objectives of the ICs. The remedy appears to be functioning as intended. No site uses which are inconsistent with the implemented ICs or the remedy IC objectives have been noted during the site inspection or via interviews.

Long Term Stewardship: Long term protectiveness at the site requires compliance with land and groundwater use restrictions to assure the remedy continues to function as intended. Long-term stewardship must be assured which includes maintaining and monitoring effective ICs. To assure proper maintenance and monitoring effective ICs, long term stewardship procedures will be reviewed and a plan developed. The plan would include regular inspection of ICs at the site and annual certification to EPA that ICs are in place and effective. Additionally, use of a communications plan and use of one-call system will be explored for long term stewardship.

System Operations and Operation and Maintenance

The WDNR is providing the operation and maintenance (O&M) required under the state's regulations for a closed landfill and the monitoring required by the ROD. This consists of groundwater monitoring, gas probe monitoring and fence, cover, drainage features and gas vent inspection and maintenance.

The WDNR has performed O&M since July of 2000. During the first five years, the WDNR paid their O&M contract $23,847 per year for their services. The work was rebid in 2005 and since then the WDNR has paid their contractor $6,422 per year for their services. Most of the cost reduction was achieved by reducing the frequency and extent of groundwater monitoring and eliminating the gas vent monitoring.

A number of monitoring wells installed by EPA during the Remedial Investigation/Feasibility Study and design phases of the project are no longer being utilized. The EPA, in consultation with WDNR, will evaluate the need for these wells for any future evaluation of the groundwater conditions at the site. The current site map, showing monitoring wells, gas vents, gas probes, the fence, gates, site topography and the access road is attached (Figure 1).

V. Progress since the Last Five-Year Review

Table 2: Actions Taken Since the Last Five-Year Review

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Groundwater Monitoring	Required changes to the monitoring program	WDNR	December 2003	Changes to the monitoring program were implemented and groundwater elevations are now reported	Early 2006
Flowing Wells	Monitor flowing wells in order to prevent possible direct contact with contaminated groundwater.	WDNR with EPA Oversight	October 2003	Five of the flowing wells are plugged and additional wells need to be plugged.	June 2007
Institutional Controls	Necessary Deed Instruments to be placed	EPA, City of Stoughton	September 2003	Planned for October 2008	

VI. Five-Year Review Process

Administrative Components

The WDNR remedial project manager began the review in October, 2007. The review consisted of: a perusal of past documents, including those documents that provided the history of the site;

an examination of the monitoring reports prepared since the last Five-Year Review and the data that they presented; notification of the community that the review was to take place; site inspection; and report preparation and review.

Community Notification and Involvement

An advertisement was placed in the Stoughton Courier Hub in October, 2007 to inform the public of the upcoming review. The advertisement also reminded the public of the remedy selected and where the repository was located. Include a copy of the ad as an attachment.

A notice will be sent out informing the public of the completion of the review and the availability of the report once the report is signed.

Document Review

For this review, the support agency project manager has gone over the Annual Groundwater Monitoring Report & Semi-Annual Inspection Reports and has consulted with EPA's Remedial Project Manager. The ROD and other past documents that have been submitted were also reviewed.

Data Review

The main objectives of the groundwater monitoring are to track the concentrations of tetrahydrofuran (THF) and dichlorodifluoromethane (DCDFM), which were identified during the earlier studies as the two substances that were of primary concern. Other organics are also tracked. Compounds of secondary concern are tetrachloroethylene (PCE) and trichloroethelyene (TCE).

After a review of the 2005 groundwater monitoring data, the program was reduced in frequency from semi annual to annual and the number of wells sampled for organics reduced. The reduction to annual sampling was justified by the length of time monitoring had occurred, the similarity of results between sampling events, generally decreasing trends in detected organics concentrations and the organics results generally being below state Enforcement Standards (ES), equivalent to MCLs. Wells that continued to show organics detected continue to be sampled.

The past eight years of groundwater monitoring results were reviewed. In summary, the following was found:

- The latest sampling event, reported on June 8, 2007, shows that all organic compounds of primary and secondary concern are below chapter NR 140 enforcement standards (ESs).

- A few chapter NR 140 Preventive Action Limit (PAL) exceedances are still being detected for the organic compounds of primary and secondary concern in the latest sampling event, specifically:
    - THF in MW3D
    - PCE in MW10I, MW14S and MW14I.

- TCE in MW9I, MW10I, MW14S and MW14I.

- The organic compounds data since 2002 was analyzed utilizing the WDNR Mann-Kendall trends analysis method for the wells still sampled for organics in 2007. All organic compounds of primary and secondary concern are within historic analytical levels that are below enforcement standards and a few above PALs. Due to exceedances of PALs, a continued VOC monitoring program is warranted. Data plots and the Mann-Kendall results are provided in appendix 1.

The ES and PAL for DCDFM is 1000 and 200 μg/l, respectively.

The ES and PAL for THF is 50 and 10 μg/l, respectively.

The ES and PAL for PCE and TCE are 5 and 0.5 μg/l, respectively.

THF and DCDFM do not have federal maximum contaminate levels (MCLs). EPA's Region 9 publishes a table of preliminary remediation goals (PRGs). In this table, concentrations in water are given that result from a specified scenario and correspond to a cancer risk of 10^{-6} for carcinogens or a hazard quotient of 1.0 for non-carcinogens [the sum of the hazard quotients (HQs), when there is more than one non-carcinogen, gives the hazard index; a HQ or HI of 1 is the maximum acceptable value]; if a substance falls into both categories, then the lower concentration is presented in the table. For THF the PRG is 1.6 μg/l, considering this to be a carcinogen (it is 160 μg/l for a cancer risk of 10^{-4}), and for DCDFM the PRG is 390 μg/l, considering this to be a non-carcinogen (it is 39 μg/l for an HQ = 0.1). Using the non-carcinogen data for THF, the PRG would be 580 μg/l (58 μg/l for HQ = 0.1); this value is based on the use of 0.21 mg/kg-d for the oral reference dose, which reportedly came from EPA's National Center for Environmental Assessment (NCEA), the successor to EPA's Environmental Criteria and Assessment Office (ECAO). As noted above, the oral reference dose used at the time of the ROD was 0.002 mg/kg-d, obtained from ECAO. At the time of the ROD, THF was not considered to be a carcinogen.

Previously, some of the passive gas vent wells were sampled, with different vents being selected each year. Sampling was discontinued because the data was not useful for determining risk from the emissions or compliance with chapter NR 445 emission standards. Because flow rates can't be determined and are variable from day to day and season to season, the tests were snapshots and are not indicative of continual emissions which will vary day by day and season by season. Not all the vents were sampled at the same time. However, any exposure risk is minimal due to air dispersion and the distance of the vents from any receptors. The emission flow rates were not quantified because no measurable flow rate from the vents could be detected. It appears that the current emissions may fall well below applicable state emission limits. The most stringent of these appears to be for tetrahydrofuran (THF) at a reported 49 pounds per year. Assuming an average (very conservative) concentration of 1,000 ppbv, 50 cfm of continuous emissions would be required to exceed the emissions standard. Passive venting would almost certainly not yield 50 cfm of flow based on the reviewed reports if the measurable flow rate is consistently not detectable.

There are three soil gas monitoring probes outside the waste area, on the south side of the site between the fill area and existing residential housing. The probes are intended to determine if landfill methane gas is migrating laterally away from the site through soil. The probes are monitored bi-monthly. The most recent rounds of results show no indication of landfill gas migrating towards the probes.

Site Inspection

The inspection of the site was conducted on October 17, 2007 by the support agency Project Manager, the support agency O&M contractor, the EPA Remedial Project Manager and the Parks Director for the City of Stoughton. The completed Five-Year Review site inspection form is attached as appendix 2. Photographs taken at the inspection by the support agency project manager are included, along with a site map photo key.

The state O&M contractor completed their regular semi-annual site inspection that day and their report is attached as appendix 3. Their photographs taken that day are also provided.

The landfill cover appears to be generally in good condition. No bare spots, signs of erosion or sparse vegetation were noted. No ponding, drainage gullies or erosion was apparent. Two animal burrows were found on the cover near well nest MW5 and gas vent GV-11. Both were filled in by the state O&M contractor. Several deep-rooted weedy shrubs were found near several of the gas vents and monitoring wells inside the fence. These were cut down by the state O&M contractor.

The storm water drainage system around the site was in good condition. No visible erosion was found. The culverts were undamaged and the riprap was not clogged.

The gas vents were found to be undamaged and no stressed vegetation was found near the vents. All the vent screens were clear and no further maintenance was needed at this time.

The fence was in good condition. No broken or removed boards on the wood slat fence were found. The chain-link fence was in good condition. Both access gates were in good condition and the padlocks operated properly. The warning sign on the front gate was missing. A new WDNR standard warning sign was subsequently installed by the state O&M contractor.

In the past, the wood slat fence had been damaged by users of the adjacent disc golf course. In June, 2007, the City of Stoughton agreed to inspect the wood slat fence next to the golf course weekly, report the results by email to WDNR and EPA and repair the fence if problems were found. This has corrected the fence damage problem.

The access road was in very good condition with no ruts, ponding or erosion noted.

In the past, 5 wells were noted as leaking water at the surface due to artesian conditions. If these wells were sampled, the monitoring report noted them as being "self purging". These are wells MW7B, 10I, 10D, 13I and 13D. In May, 2007, WDNR contracted with their O&M contractor to

plug all 5 of these wells with inflatable well plugs. In June, 2007, the plugs were installed in all 5 wells. The well plugs were effective in ending the leaking at the surface except in wells MW13I and 7B. In October, 2007 the contractor tried to re-plug these 2 wells and was able to successfully plug MW13I, but not MW7B. The state O&M contractor is committed to plugging this final well under the contract. A longer well plug will be installed to try to stop water flow.

At the inspection wells OW-2 and OW-4 were found to be leaking at the surface. WDNR plans to contract with the O&M contractor to plug these wells in the near future, unless they are abandoned.

Interviews, Meetings and Correspondence – Recreational Use and Deed Instruments

On January 23, 2006 the prior EPA and current WDNR project managers met with the City of Stoughton regarding the possible recreational use of the site. The local stakeholders expressed interest in expanding the adjacent disc golf course onto the landfill. This expansion would allow the City to host disc golf events that require 18 holes. The EPA project manager indicated that the ROD would have to be amended or an Explanation of Significant Differences (ESD) issued and the deed instrument issue resolved to allow the use. He also indicated that emissions from the gas vents would have to be looked at.

As mentioned above, a conference call and subsequent meeting took place between the City and the Agencies regarding future recreational use of the site in March, 2007. The legal and technical issues related to this possible use were discussed.

Regarding the legal issues, it was agreed that the City Attorney should work with the EPA attorney to resolve the deed instrument issue.

Regarding the technical issues, the current EPA Project Manager was concerned about the organics emissions from the passive gas vents at the site and any risk that may pose to a recreational user. Options for possibly modeling the potential risk and possible engineering solutions were discussed. The WDNR Project Manager discussed some sort of system to collect the gas and vent it from a central location where it could be accurately monitored and be a safe distance from recreational users.

The City made it clear that they had no interest in expending any significant funds to model emissions or modify the system to collect landfill gas. The EPA Project Manager committed to investigate if EPA could model the risk of the current emissions.

Subsequently, it has been found that there isn't a way to model the risk from the current passive system because there is no effective way to estimate the flow volumes from the vents nor is there a way to determine if past gas monitoring results are reflective of ongoing conditions at the site. Therefore, it appears the only way to resolve the potential risk from the gas emissions should recreational use be allowed would be some sort of engineering solution, as discussed by the WDNR Project Manager.

In July, 2007, in an email response to written minutes of the March 28, 2007 meeting, the City of

Stoughton Mayor stated:

"At this time we do not have funds to pursue any testing or remedies. We feel that it is unfortunate that we were told by both the DNR and the EPA that Amundson Park could be used again, only to be told now of further concerns and suggestions for more remedial action. Therefore, unless outside funding is available, we will not be pursuing use of the park."

At this point in time, it appears that recreational use in the fenced area will no longer be pursued. The issue of placing a deed instrument on the site property parcels by the City in accordance with the ROD remains.

VII. Technical Assessment

Question A. Is the remedy functioning as intended by the decision documents?

Yes, the review of the available information indicates that the remedy is functioning as it was intended. All of the monitoring wells currently sampled for organics are showing stable or decreasing trends except one. Based on the results, it is recommended that the annual organics monitoring program continue for at least another 5 years to allow continued evaluation of the data over that time by the agencies and report the results and make any recommendations prior to or in the next Five Year Review, to be completed by April, 2013. If increasing trends continue in that single well or other wells start to show increasing trends, then the contingency groundwater remedy described in the ROD will be considered prior to the next Five-Year Review report.

Question B. Are the exposure assumptions, toxicity data, clean-up levels, and remedial action objectives used at the time of the remedy selection still valid?

Yes, there have been no major changes in the physical conditions of the site that would affect the protectiveness of the remedy. The site is being used as anticipated (that is, the waste disposal area is not being used). Therefore, new exposure assumptions are not needed at this time.

The primary applicable or relevant and appropriate requirements (ARARs) that the site has to meet fall into two general categories: chemical specific (groundwater standards), locational specific (landfill requirements). Most of the landfill requirements have been met through the construction that has taken place. Of primary concern now is the attainment of the standards for the groundwater.

There are no site uses which are inconsistent with the implemented ICs or the remedy IC objectives have been noted during the site inspection or via interviews.

Question C. Has any other information come to light that could call into questions the protectiveness of the remedy?

No. There has been no new information that would suggest that the selected remedy is not protective.

Technical Assessment Summary

According to the data reviewed, the site inspection, and consultation with EPA's Remedial Project Manager, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy.

VIII. Issues

Table 3: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Water was found flowing from 3 monitoring wells and discharging on the ground at the inspection. Wisconsin DNR's O&M contractor already successfully plugged 4 flowing wells before the inspection and is under contract to plug one more well that was found discharging at the inspection. Two wells, OW2 and OW4, were found to be discharging at the inspection for the first time.	N	N
Based on an evaluation of the groundwater monitoring results, a single well showed an increasing trend for one of the contaminants of concern, but still below WDNR enforcement standards	N	Y
Potentially abandon wells that are no longer monitored, including wells that were or are discharging water to the surface that are no longer utilized.	N	N
The institutional controls specified in the ROD and 1997 Consent Decree with the City of Stoughton have not been recorded with the authorities. EPA's attorney will work with the City's attorney to resolve this issue within the next 6 months.	N	Y

IX. Recommendations and Follow-Up Actions

Table 4: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Flowing wells	Plug the remaining 2 wells, OW2 and OW4, by July, 2008, unless the wells are abandoned.	WDNR	EPA	July, 2008	N	N
Groundwater Quality	Based on an evaluation of the groundwater monitoring results, the monitoring program should continue in the single well or other wells start show increasing trends then the contingency groundwater remedy described in the ROD will be considered prior to the next Five-Year Review.	EPA	EPA	April, 2013 or before	N	Y
Unused Wells	Determine the abandonment of unused monitoring wells	EPA	EPA	October, 2013 or Before	N	N

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Institutional Controls Implementing effective ICs will be required to assure protectiveness of the remedy. Long-term stewardship must be assured which includes maintaining and monitoring effective ICs.	EPA will develop an IC Plan by October 2008. The plan will assure that effective ICs are implemented, monitored and maintained. The EPA will oversee the placement of the necessary effective deed restrictions on the property parcels along with any other ICs deemed necessary and long-term stewardship of the Site.	**EPA**	**EPA**	**October, 2008**	**N**	**Y**

X. Protectiveness Statement

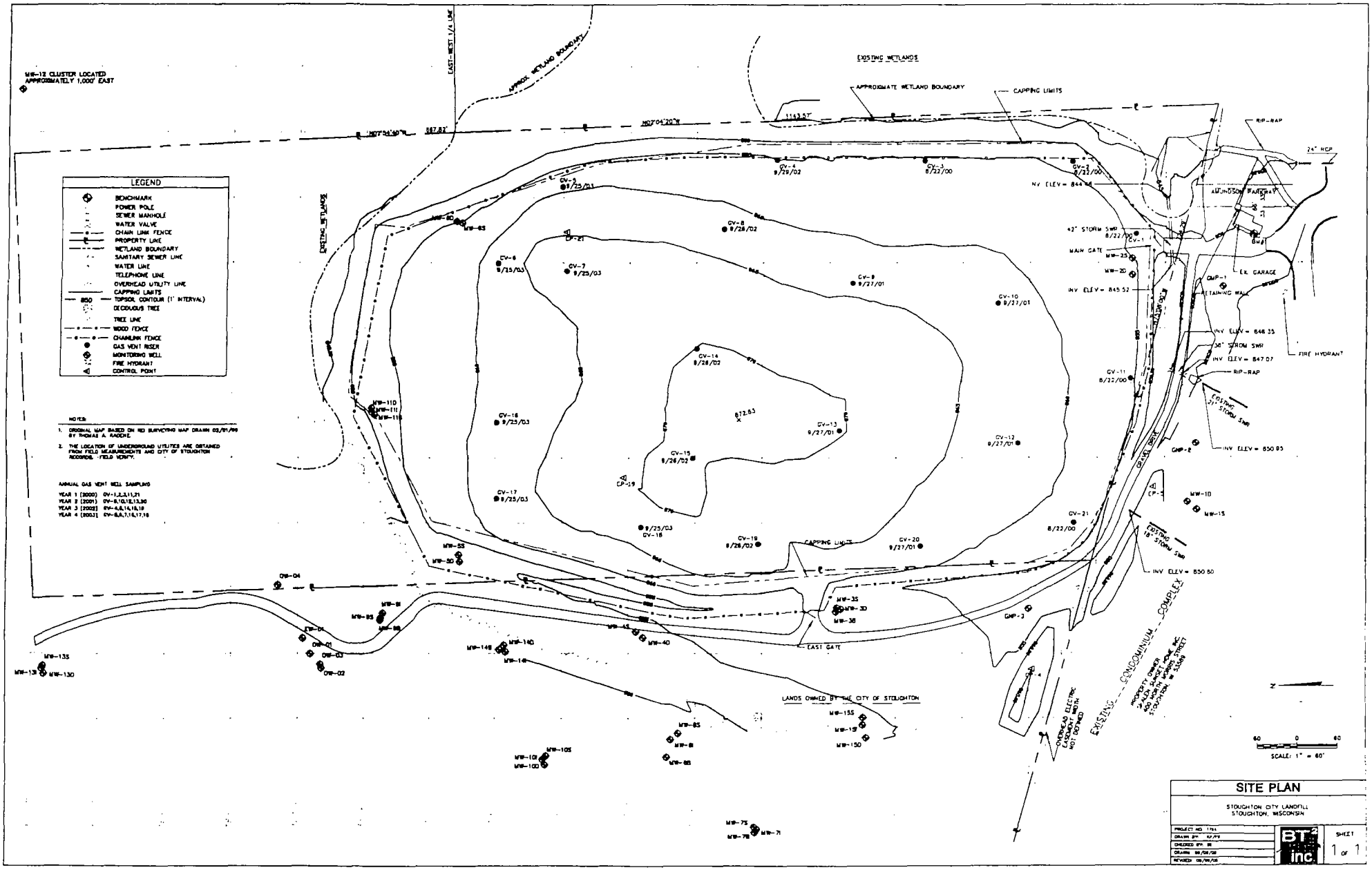
The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. However, in order for the remedy to be protective in the long-term, the institutional controls that are part of the remedy need to be implemented and if necessary groundwater monitoring results need to be assessed regularly due to increasing trends in the contaminant concentrations. Long term protection requires compliance with effective ICs which must be monitored and maintained.

XI. Next Review

The next five-year review for the Stoughton City Landfill site is required in April 2013, five years from the date of this review.

FIGURE

Figure 1: Stoughton City Landfill Site Map



APPENDIX 1

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

Notice: This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW03D

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	0.00	61.00	0.00	0.00	0.00	0.00
2	01-Apr-03	0.00	88.00	0.00	0.00	0.00	0.00
3	01-Nov-03	0.00	48.00	0.00	0.00	0.00	0.00
4	01-Apr-04	0.00	66.00	0.00	0.00	0.00	0.00
5	01-Nov-04	0.00	57.00	0.00	0.00	0.00	0.00
6	01-Apr-05	0.00	11.00	0.00	0.00	0.00	0.00
7	01-Apr-06	0.00	31.00	0.00	0.00	0.00	0.00
8	01-Apr-07	0.00	33.00	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	0.0	-14.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	0.00	43.89	0.00	0.00	0.00	0.00
	Standard Deviation =	0.000	27.859	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	#DIV/0!	0.635	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		#DIV/0! #DIV/0!	NA	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By = 0		

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES

DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
61.00	88.00	48.00
	1	-1
		-1

S Values From Lookup Table in MNA Guidance		
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASI	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

The following text is a summary of important changes from version 5/2000 of this spreadsheet, note that the following text may be deleted by the user if this space is to be used for other purposes:

Hidden Cells: All cells, rows and columns are unhidden. Several consultants were concerned that they could not "see" what was going on and formulae were not available for inspection. Now contents of a cell can be inspected by placing the cursor on that cell.

Error Messages: There is a section below the data entry screen that describes data entry errors in more detail and which cell has *that error. Thus a user can determine what and where their error is very quickly. Note that a space is seen as text in Excel formulae.*

Minor Font and Color Change: Minor changes were made to improve readability. Some text is displayed in red, such as error messages and increasing trends. Decreasing or stable trends are displayed in blue text.

Data Entry and Error Messages: When there are less than four rounds of data entered, instead of getting an "ERROR" message, only "n<4" is displayed. But, if text, a zero or a negative number is inadvertently entered, the "ERROR" message is displayed. Thus, during data entry, an "ERROR" message is only displayed when there actually is an error. Note that the date must be entered before sample results collected on that date are entered to avoid an error message.

Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW03D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0

						0
						0
						0
						0
						0
						0
				Mann Kendall Statistic (S) =		0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW03D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
66.00	57.00	11.00	31.00	33.00	0.00		Sum Rows
1	-1	-1	-1	-1			-3
-1	-1	-1	-1	-1			-6
1	1	-1	-1	-1			-1
	-1	-1	-1	-1			-4
		-1	-1	-1			-3
			1	1			2
				1			1
							0
							0
				Mann Kendall Statistic (S) =			-14

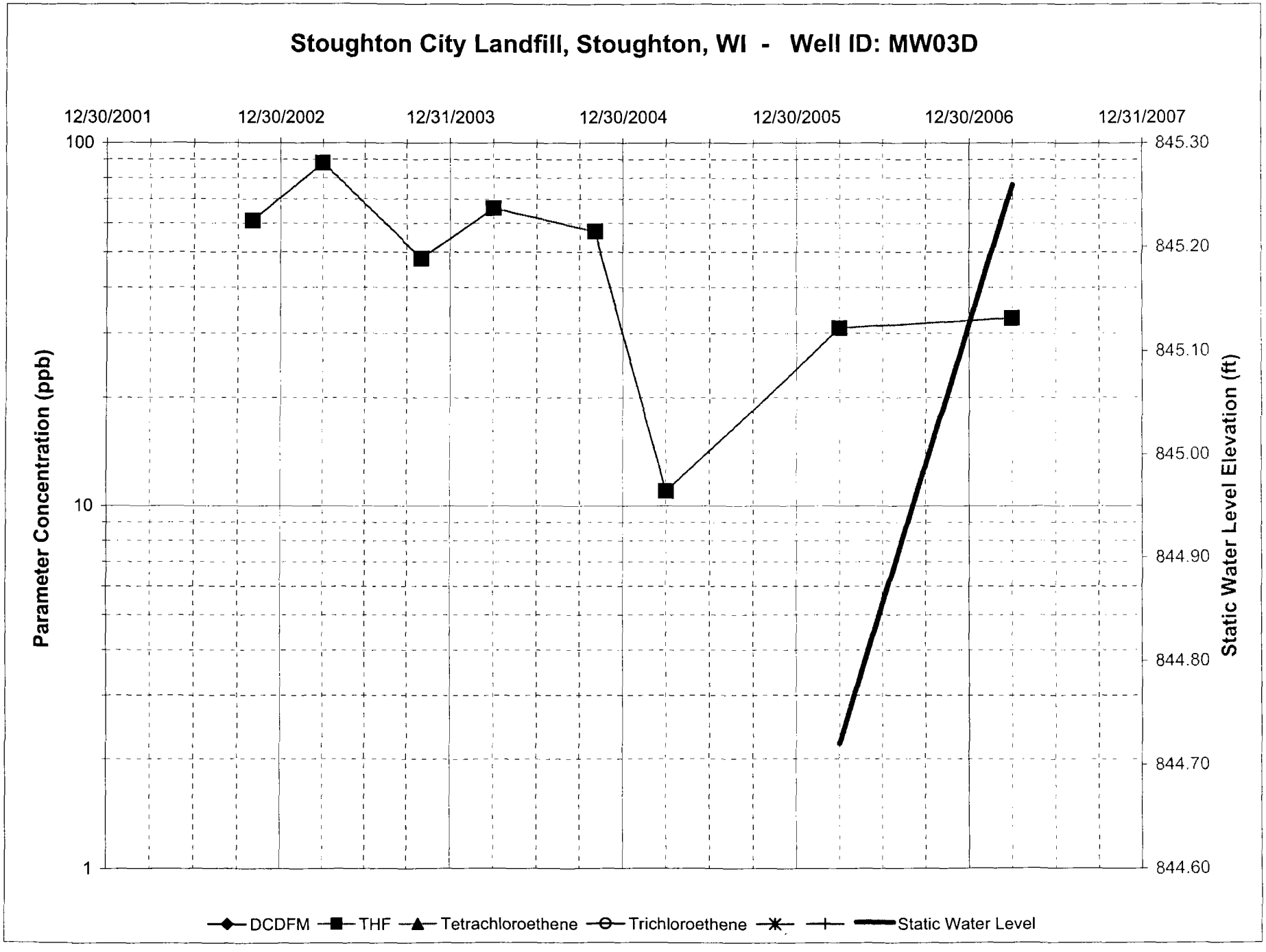
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW03D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW03D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW03D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW03D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW03D
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
100
10
1
Parameter Concentration (ppb)
845.30
845.20
845.10
845.00
844.90
844.80
844.70
844.60
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

Notice: This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

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Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW04D

Event Number	Sampling Date (most recent last)	Compound -> DCDFM Concentration (leave blank if no data)	THF Concentration (leave blank if no data)	Tetrachloroethene Concentration (leave blank if no data)	Trichloroethene Concentration (leave blank if no data)	0 Concentration (leave blank if no data)	0 Concentration (leave blank if no data)
1	01-Nov-02	0.00	2.30	0.00	0.00	0.00	0.00
2	01-Apr-03	0.00	0.50	0.00	0.00	0.00	0.00
3	01-Nov-03	0.00	0.75	0.00	0.00	0.00	0.00
4	01-Apr-04	0.00	1.10	0.00	0.00	0.00	0.00
5	01-Nov-04	0.00	2.20	0.00	0.00	0.00	0.00
6	01-Apr-05	0.00	0.50	0.00	0.00	0.00	0.00
7	01-Apr-06	0.00	2.20	0.00	0.00	0.00	0.00
8	01-Apr-07	0.00	0.50	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	0.0	-4.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	0.00	1.12	0.00	0.00	0.00	0.00
	Standard Deviation =	0.000	0.885	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	#DIV/0!	0.793	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at		#DIV/0!	**CV <= 1**	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
80% Confidence Level		#DIV/0!	**STABLE**	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By = 0		

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
2.30	0.50	0.75
	-1	-1
		1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

The following text is a summary of important changes from version 5/2000 of this spreadsheet, note that the following text may be deleted by the user if this space is to be used for other purposes:

Hidden Cells: All cells, rows and columns are unhidden. Several consultants were concerned that they could not "see" what was going on and formulae were not available for inspection. Now contents of a cell can be inspected by placing the cursor on that cell.

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Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =		0		Well =	MW04D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10		
0.00	0.00	0.00	0.00	0.00	0.00			Sum Rows
								0
								0
								0

						0
						0
						0
						0
						0
						0
			Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW04D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.10	2.20	0.50	2.20	0.50	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
1	1	0	1	0			4
1	1	-1	1	-1			1
	1	-1	1	-1			0
		-1	0	-1			-2
			1	0			1
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-4

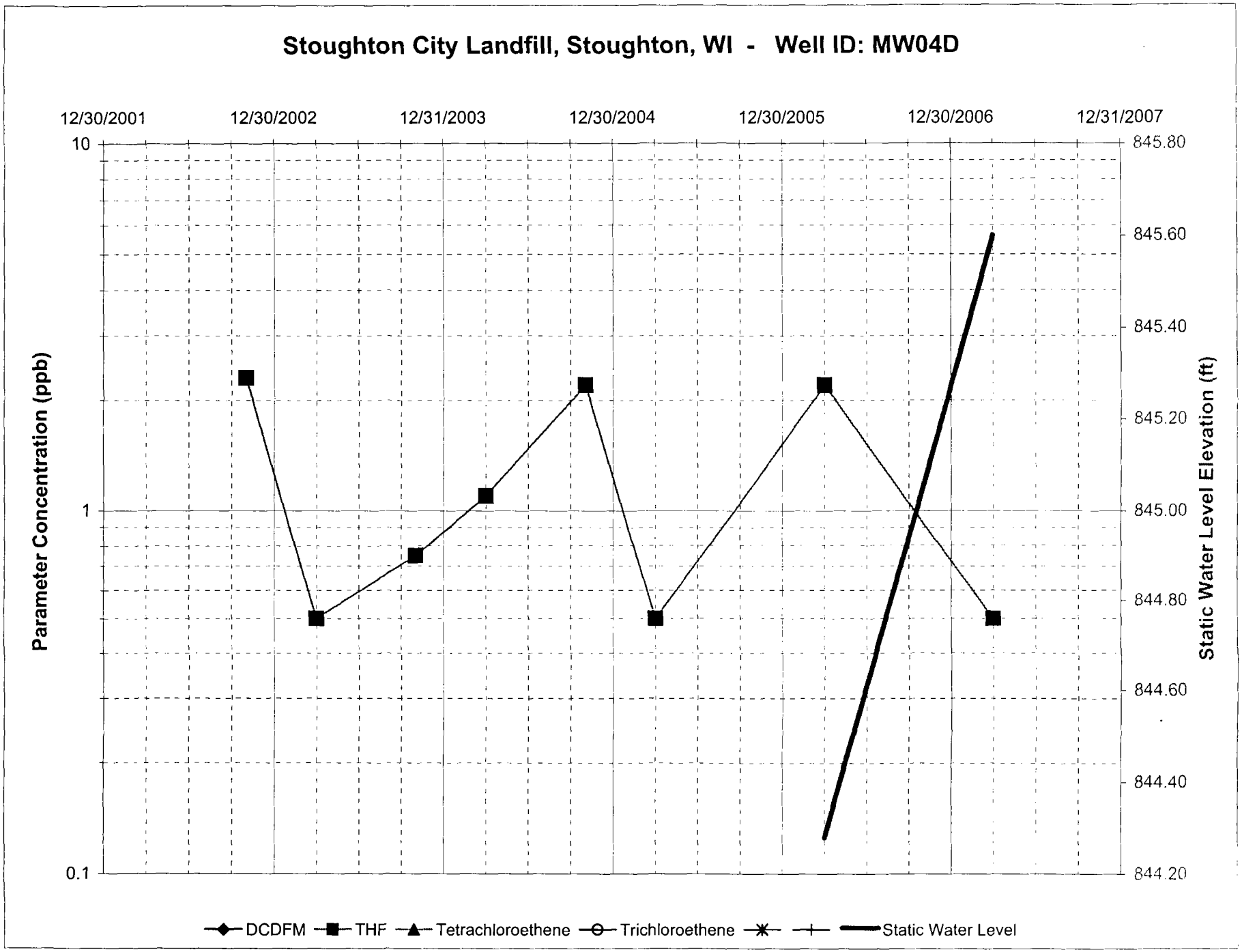
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW04D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW04D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW04D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW04D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW04D
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
10
1
0.1
Parameter Concentration (ppb)
845.80
845.60
845.40
845.20
845.00
844.80
844.60
844.40
844.20
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin
Department of Natural Resources
Remediation and Redevelopment Program

Mann-Kendall Statistical Test
Form 4400-215 (2/2001)

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Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW05D

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	5.10	3.50	0.00	0.00	0.00	0.00
2	01-Apr-03	4.60	1.20	0.00	0.00	0.00	0.00
3	01-Nov-03	4.40	1.70	0.00	0.00	0.00	0.00
4	01-Apr-04	3.70	2.00	0.00	0.00	0.00	0.00
5	01-Nov-04	0.92	1.80	0.00	0.00	0.00	0.00
6	01-Apr-05	6.20	0.50	0.00	0.00	0.00	0.00
7	01-Apr-06	5.10	3.00	0.00	0.00	0.00	0.00
8	01-Apr-07	4.10	0.50	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	-5.0	-7.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	3.79	1.58	0.00	0.00	0.00	0.00
	Standard Deviation =	2.030	1.168	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	0.536	0.740	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		**CV <= 1 STABLE**	**CV <= 1 STABLE**	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By = 0		

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
5.10	4.60	4.40
	-1	-1
		-1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
3.50	1.20	1.70
	-1	-1
		1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASI	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

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Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW05D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
3.70	0.92	6.20	5.10	4.10	0.00		Sum Rows
-1	-1	1	0	-1			-4
-1	-1	1	1	-1			-2
-1	-1	1	1	-1			-1

-1	1	1	1			2
	1	1	1			3
		-1	-1			-2
			-1			-1
						0
						0
			Mann Kendall Statistic (S) =			-5

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW05D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
2.00	1.80	0.50	3.00	0.50	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
1	1	-1	1	-1			2
1	1	-1	1	-1			1
	-1	-1	1	-1			-2
		-1	1	-1			-1
			1	0			1
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-7

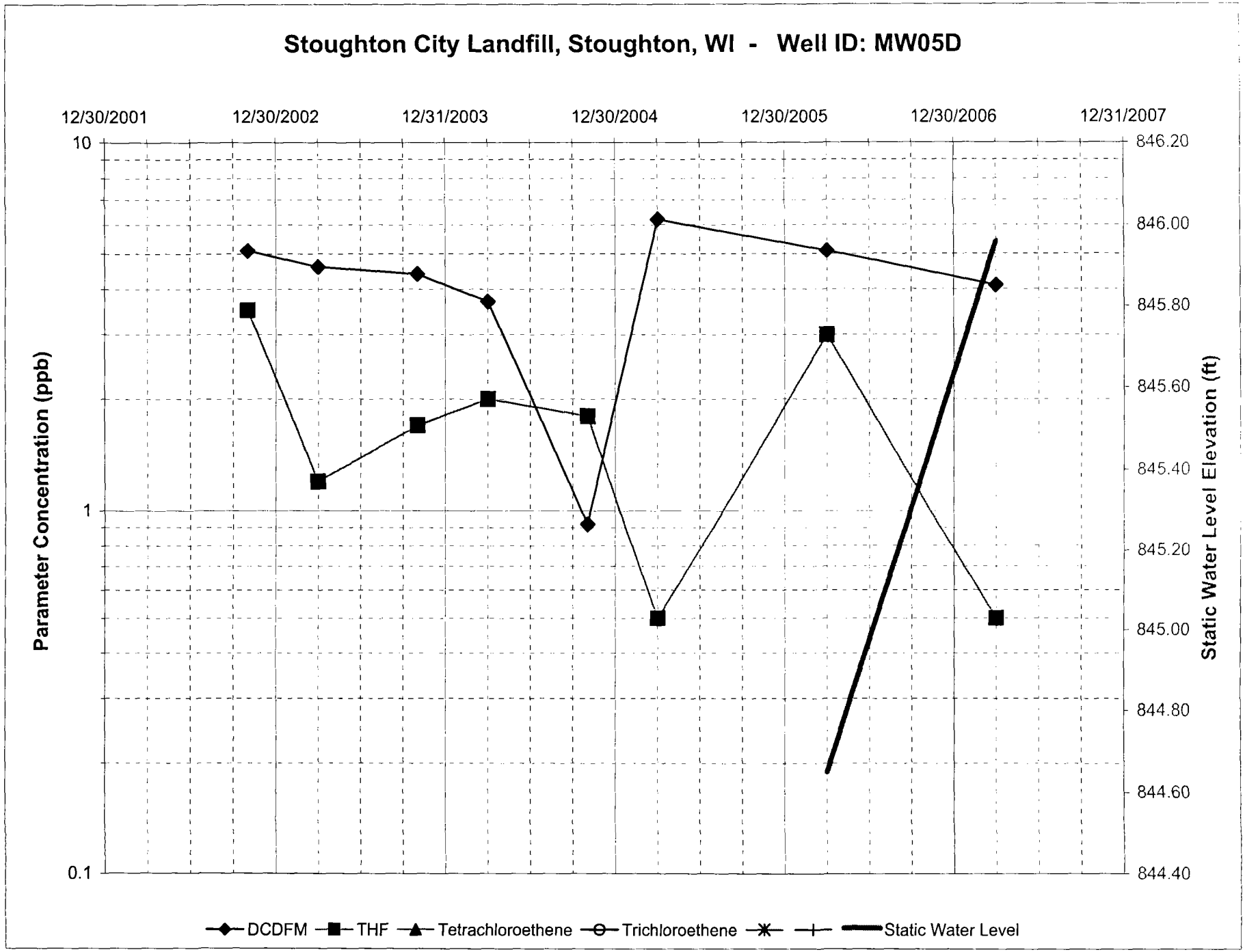
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW05D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW05D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW05D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW05D
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW05D
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
10
1
0.1
Parameter Concentration (ppb)
846.20
846.00
845.80
845.60
845.40
845.20
845.00
844.80
844.60
844.40
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW07I

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	0.00	3.40	0.00	0.00	0.00	0.00
2	01-Apr-03	0.00	0.50	0.00	0.00	0.00	0.00
3	01-Nov-03	0.00	1.20	0.00	0.00	0.00	0.00
4	01-Apr-04	0.00	0.50	0.00	0.00	0.00	0.00
5	01-Nov-04	0.00	2.00	0.00	0.00	0.00	0.00
6	01-Apr-05	0.00	0.50	0.00	0.00	0.00	0.00
7	01-Apr-06	0.00	2.40	0.00	0.00	0.00	0.00
8	01-Apr-07	0.00	2.00	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	0.0	2.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	0.00	1.39	0.00	0.00	0.00	0.00
	Standard Deviation =	0.000	1.126	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	#DIV/0!	0.811	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		#DIV/0! #DIV/0!	**CV <= 1 STABLE**	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By = 0		

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
3.40	0.50	1.20
	-1	-1
		1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

The following text is a summary of important changes from version 5/2000 of this spreadsheet, note that the following text may be deleted by the user if this space is to be used for other purposes:

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Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW07I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0

						0
						0
						0
						0
						0
						0
			Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW07I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.50	2.00	0.50	2.40	2.00	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
0	1	0	1	1			4
-1	1	-1	1	1			1
	1	0	1	1			3
		-1	1	0			0
			1	1			2
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			2

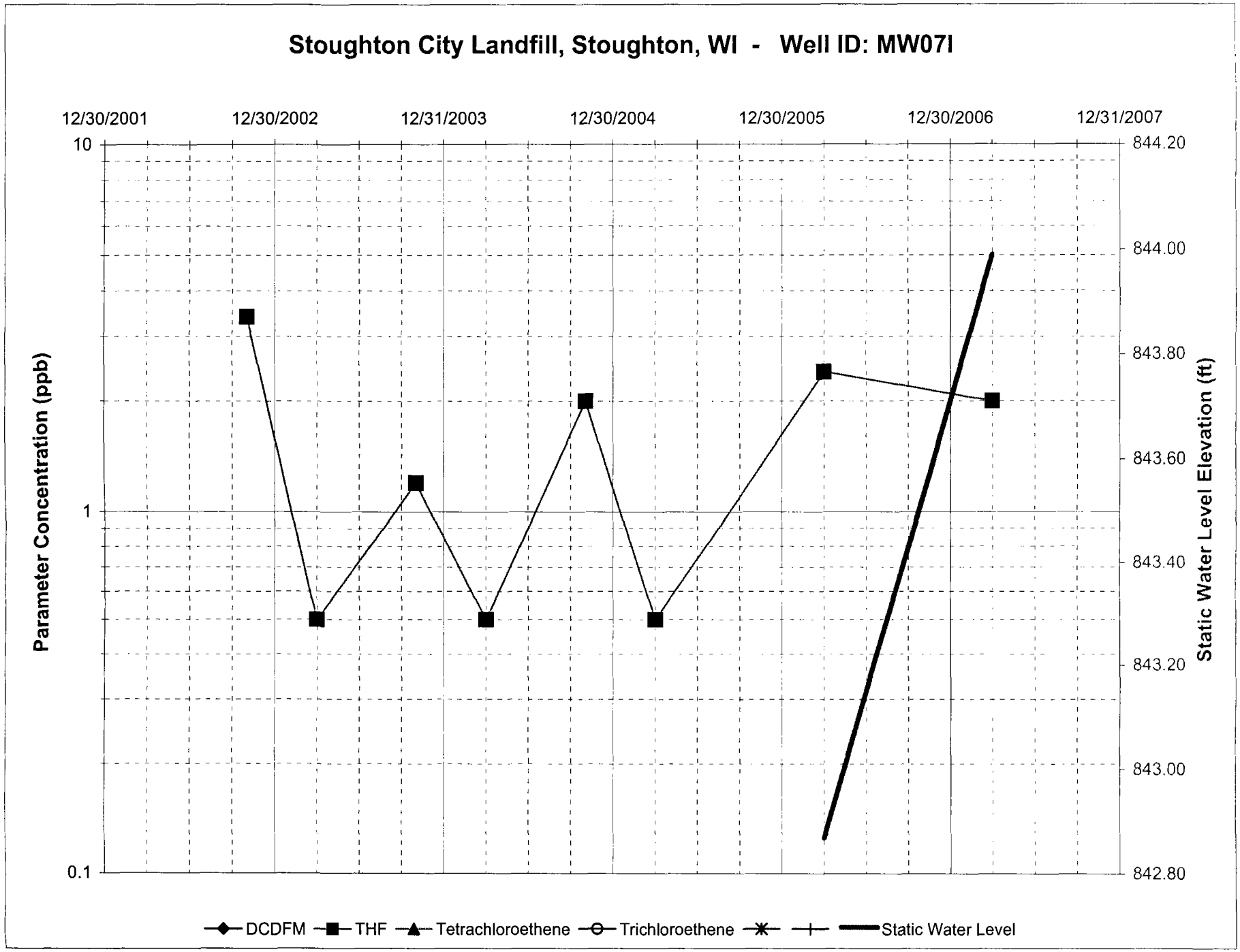
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW07I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW07I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0

								0
				Mann Kendall Statistic (S) =				0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW07I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW07I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW07I
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
10
1
0.1
Parameter Concentration (ppb)
844.20
844.00
843.80
843.60
843.40
843.20
843.00
842.80
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW08I

Event Number	Sampling Date (most recent last)	Compound -> DCDFM Concentration (leave blank if no data)	THF Concentration (leave blank if no data)	Tetrachloroethene Concentration (leave blank if no data)	Trichloroethene Concentration (leave blank if no data)	0 Concentration (leave blank if no data)	0 Concentration (leave blank if no data)
1	01-Nov-02	0.00	3.70	0.00	0.00	0.00	0.00
2	01-Apr-03	0.00	2.00	0.00	0.00	0.00	0.00
3	01-Nov-03	0.00	1.90	0.00	0.00	0.00	0.00
4	01-Apr-04	0.00	1.30	0.00	0.00	0.00	0.00
5	01-Nov-04	0.00	4.60	0.00	0.00	0.00	0.00
6	01-Apr-05	0.00	0.50	0.00	0.00	0.00	0.00
7	01-Apr-06	0.00	0.50	0.00	0.00	0.00	0.00
8	01-Apr-07	0.00	0.50	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	0.0	-17.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	0.00	1.67	0.00	0.00	0.00	0.00
	Standard Deviation =	0.000	1.577	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	#DIV/0!	0.946	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		#DIV/0! #DIV/0!	NA	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By = 0		

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR CHECKS Checks for data with values less	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
	1	-1	-1	-1	-1	-1	-1
	2	-1	-1	-1	-1	-1	-1
	3	-1	-1	-1	-1	-1	-1
	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
3.70	2.00	1.90
	-1	-1
		-1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR INCREASIN OR DECREASIN TREND @ 80 %	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
	4						
	5						
	6						
	7						
	8						
If +1, Incrsn	9	0	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR INCREASIN	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Neither	Neither	Neither	Neither

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0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =		0	Well =	MW08I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0

						0
						0
						0
						0
						0
						0
			Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW08I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.30	4.60	0.50	0.50	0.50	0.00		Sum Rows
-1	1	-1	-1	-1			-5
-1	1	-1	-1	-1			-4
-1	1	-1	-1	-1			-3
	1	-1	-1	-1			-2
		-1	-1	-1			-3
			0	0			0
				0			0
							0
							0
				Mann Kendall Statistic (S) =			-17

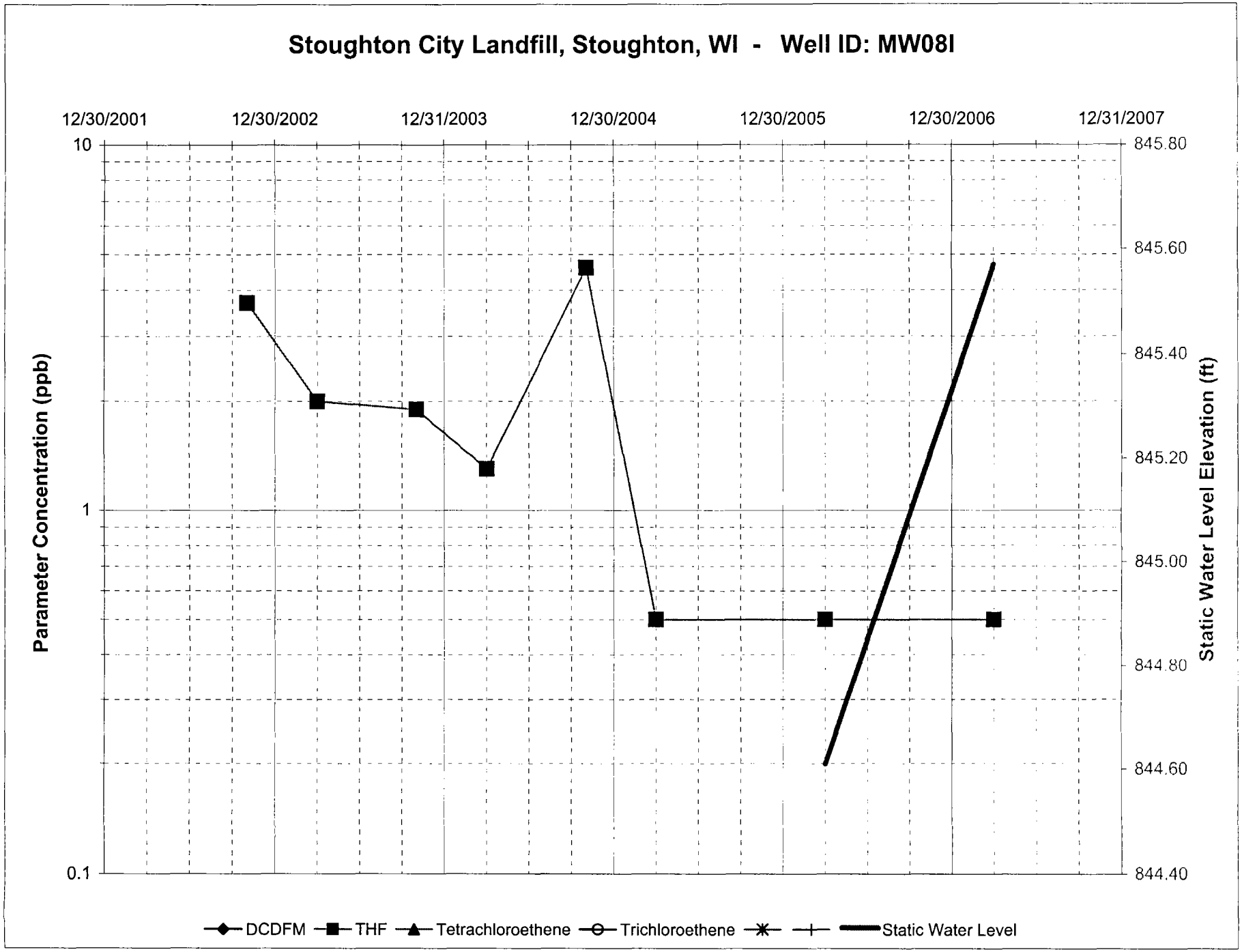
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW08I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW08I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW08I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW08I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW08I
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
10
1
0.1
Parameter Concentration (ppb)
845.80
845.60
845.40
845.20
845.00
844.80
844.60
844.40
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW09B

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	5.70	2.20	0.00	0.00	0.00	0.00
2	01-Apr-03	4.90	0.50	0.00	0.00	0.00	0.00
3	01-Nov-03	11.00	0.50	0.00	0.00	0.00	0.00
4	01-Apr-04	8.40	0.50	0.00	0.00	0.00	0.00
5	01-Nov-04	3.10	0.50	0.00	0.00	0.00	0.00
6	01-Apr-05	16.00	0.50	0.00	0.00	0.00	0.00
7	01-Apr-06	6.60	0.50	0.00	0.00	0.00	0.00
8	01-Apr-07	4.50	0.50	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	-2.0	-7.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	6.69	0.63	0.00	0.00	0.00	0.00
	Standard Deviation =	4.675	0.610	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	0.699	0.964	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		**CV <= 1 STABLE**	**CV <= 1 STABLE**	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By =	0	

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
5.70	4.90	11.00
	-1	1
		1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
2.20	0.50	0.50
	-1	-1
		0

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

The following text is a summary of important changes from version 5/2000 of this spreadsheet, note that the following text may be deleted by the user if this space is to be used for other purposes:

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Minor Font and Color Change: Minor changes were made to improve readability. Some text is displayed in red, such as error messages and increasing trends. Decreasing or stable trends are displayed in blue text.

Data Entry and Error Messages: When there are less than four rounds of data entered, instead of getting an "ERROR" message, only "n<4" is displayed. But, if text, a zero or a negative number is inadvertently entered, the "ERROR" message is displayed. Thus, during data entry, an "ERROR" message is only displayed when there actually is an error. Note that the date must be entered before sample results collected on that date are entered to avoid an error message.

Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =		0	Well =	MW09B
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
8.40	3.10	16.00	6.60	4.50	0.00		Sum Rows
1	-1	1	1	-1			1
1	-1	1	1	-1			2
-1	-1	1	-1	-1			-3

-1	1	-1	-1			-2
	1	1	1			3
		-1	-1			-2
			-1			-1
						0
						0
			Mann Kendall Statistic (S) =			-2

Stoughton City Landfill, Stoughton, WI			BRRTS =		0		Well =	MW09B
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10		
0.50	0.50	0.50	0.50	0.50	0.00			Sum Rows
-1	-1	-1	-1	-1				-7
0	0	0	0	0				0
0	0	0	0	0				0
	0	0	0	0				0
		0	0	0				0
			0	0				0
				0				0
								0
								0
				Mann Kendall Statistic (S) =				-7

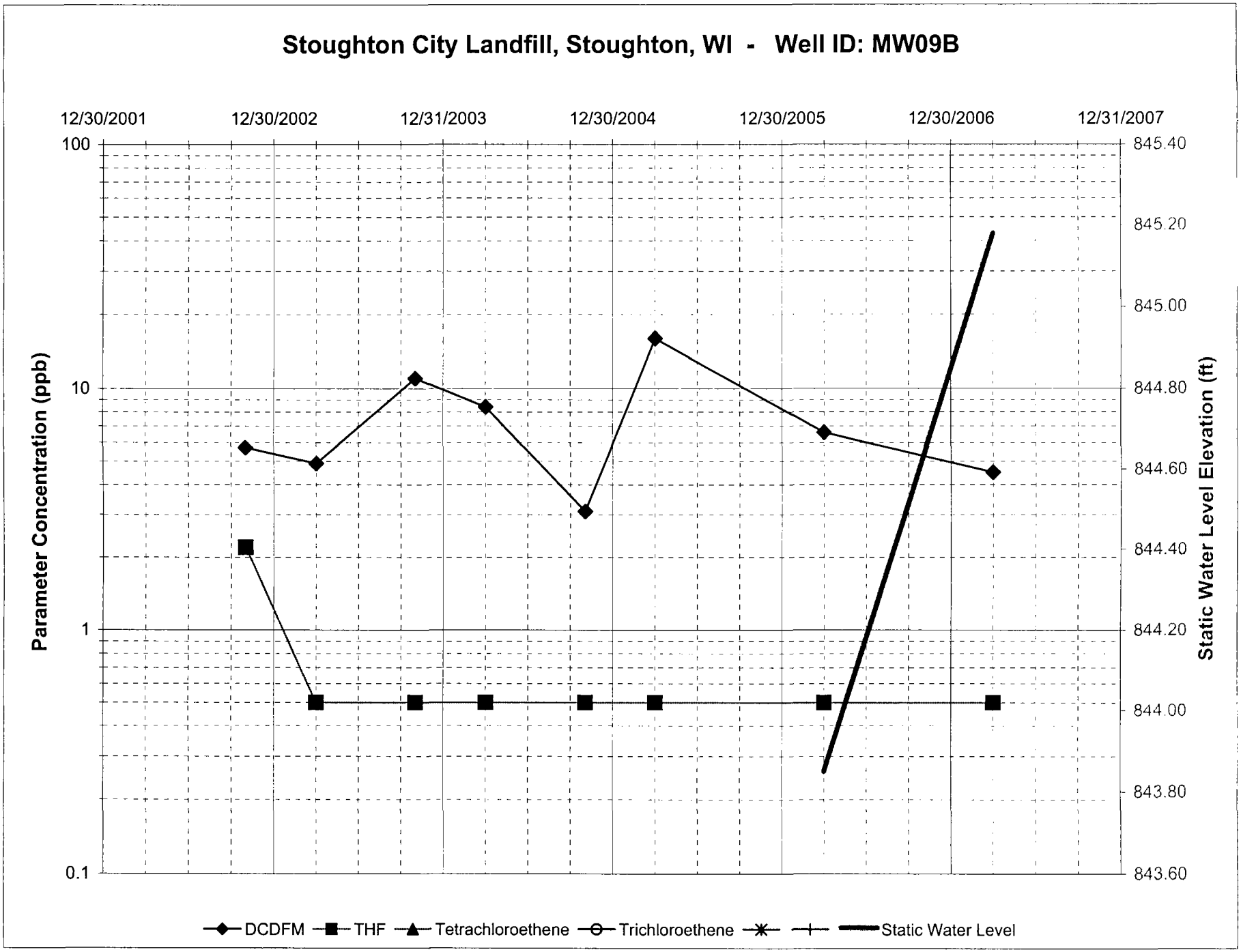
Stoughton City Landfill, Stoughton, WI			BRRTS =		0		Well =	MW09B
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10		
0.00	0.00	0.00	0.00	0.00	0.00			Sum Rows
								0
								0
								0
								0
								0
								0
								0
								0
								0
				Mann Kendall Statistic (S) =				0

Stoughton City Landfill, Stoughton, WI			BRRTS =		0		Well =	MW09B
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10		
0.00	0.00	0.00	0.00	0.00	0.00			Sum Rows
								0
								0
								0
								0
								0
								0
								0
								0
								0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09B
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09B
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW09B
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
100
10
1
0.1
Parameter Concentration (ppb)
845.40
845.20
845.00
844.80
844.60
844.40
844.20
844.00
843.80
843.60
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW09I

	Compound ->	DCDFM Concentration (leave blank if no data)	THF Concentration (leave blank if no data)	Tetrachloroethene Concentration (leave blank if no data)	Trichloroethene Concentration (leave blank if no data)	0 Concentration (leave blank if no data)	0 Concentration (leave blank if no data)
Event Number	Sampling Date (most recent last)						
1	01-Nov-02	130.00	8.20	0.00	0.95	0.00	0.00
2	01-Apr-03	100.00	7.80	0.00	1.10	0.00	0.00
3	01-Nov-03	150.00	6.30	0.00	1.40	0.00	0.00
4	01-Apr-04	96.00	6.60	0.00	1.30	0.00	0.00
5	01-Nov-04	12.00	6.70	0.00	0.58	0.00	0.00
6	01-Apr-05	120.00	1.00	0.00	0.54	0.00	0.00
7	01-Apr-06	80.00	6.30	0.00	0.80	0.00	0.00
8	01-Apr-07	66.00	3.40	0.00	1.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	-14.0	-17.0	0.0	-6.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	83.78	5.14	0.00	0.85	0.00	0.00
	Standard Deviation =	50.926	2.964	0.000	0.432	0.000	0.000
	Coefficient of Variation(CV)=	0.608	0.576	#DIV/0!	0.507	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		**DECREASING**	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		**DECREASING**	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		NA	NA	#DIV/0! #DIV/0!	**CV <= 1 STABLE**	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!

Data Entry By = GAE | Date = 09-Jan-08 | Checked By = 0

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
130.00	100.00	150.00
	-1	1
		1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
8.20	7.80	6.30
	-1	-1
		-1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	-1	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Decreasing	Decreasing	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.95	1.10	1.40
	1	1
		1

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	-1	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Decreasing	Decreasing	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

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0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
96.00	12.00	120.00	80.00	66.00	0.00		Sum Rows
-1	-1	-1	-1	-1			-5
-1	-1	1	-1	-1			-2
-1	-1	-1	-1	-1			-5

-1	1	-1	-1			-2
	1	1	1			3
		-1	-1			-2
			-1			-1
						0
						0
			Mann Kendall Statistic (S) =			-14

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
6.60	6.70	1.00	6.30	3.40	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	-1	-1			-6
1	1	-1	0	-1			0
	1	-1	-1	-1			-2
		-1	-1	-1			-3
			1	1			2
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-17

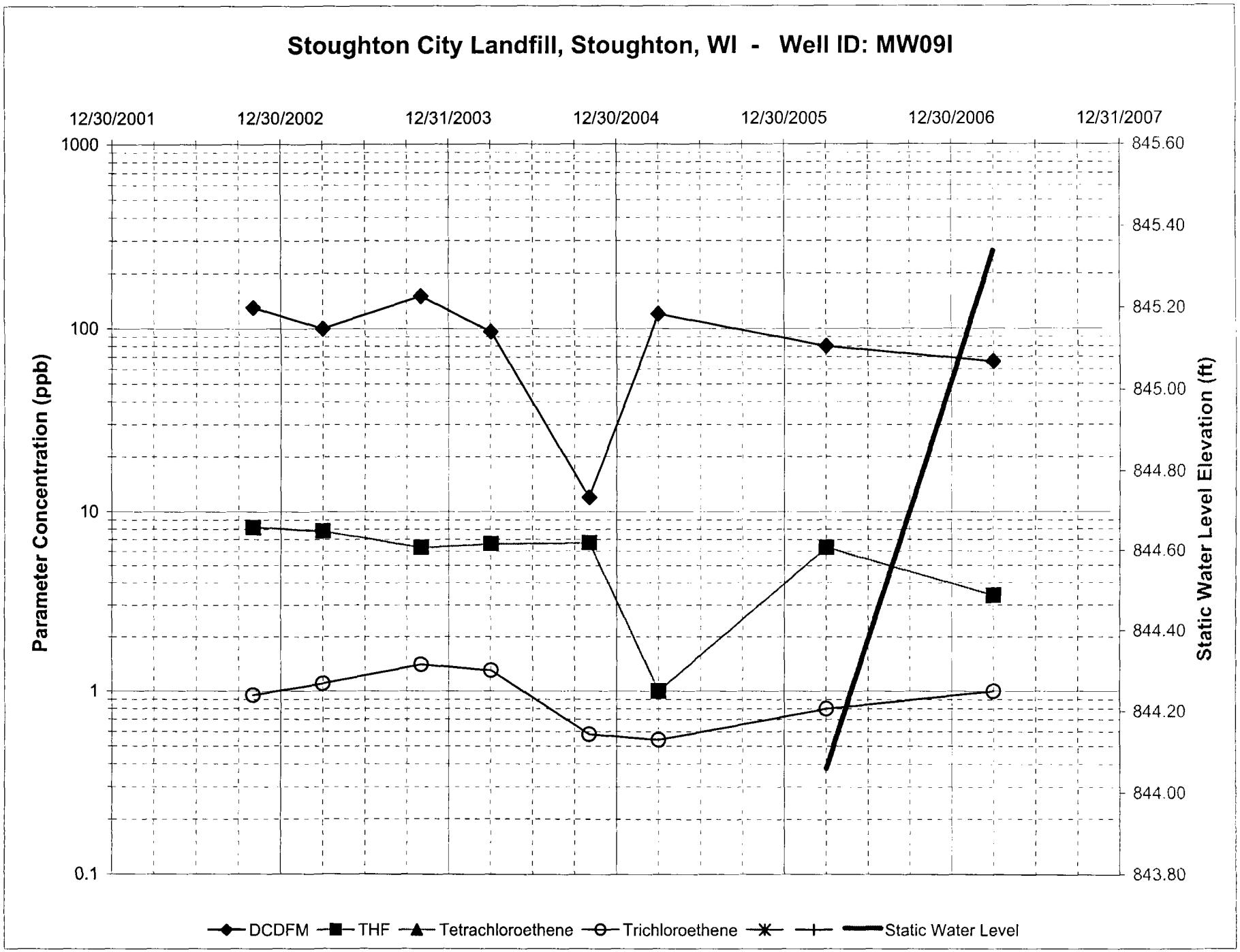
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.30	0.58	0.54	0.80	1.00	0.00		Sum Rows
1	-1	-1	-1	1			1
1	-1	-1	-1	-1			-2
-1	-1	-1	-1	-1			-5
	-1	-1	-1	-1			-4
		-1	1	1			1
			1	1			2
				1			1
							0

							0
				Mann Kendall Statistic (S) =			-6

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW09I
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
1000
100
10
1
0.1
Parameter Concentration (ppb)
845.60
845.40
845.20
845.00
844.80
844.60
844.40
844.20
844.00
843.80
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

Notice: This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW09S

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	100.00	4.40	0.00	0.00	0.00	0.00
2	01-Apr-03	100.00	14.00	0.00	0.00	0.00	0.00
3	01-Nov-03	0.50	11.00	0.00	0.00	0.00	0.00
4	01-Apr-04	130.00	11.00	0.00	0.00	0.00	0.00
5	01-Nov-04	33.00	12.00	0.00	0.00	0.00	0.00
6	01-Apr-05	220.00	2.50	0.00	0.00	0.00	0.00
7	01-Apr-06	200.00	11.00	0.00	0.00	0.00	0.00
8	01-Apr-07	120.00	2.00	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	9.0	-9.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	100.39	7.54	0.00	0.00	0.00	0.00
	Standard Deviation =	79.126	5.248	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	0.788	0.696	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		**CV <= 1 STABLE**	**CV <= 1 STABLE**	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By = 0		

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
100.00	100.00	0.50
	0	-1
		-1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
4.40	14.00	11.00
	1	1
		-1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

The following text is a summary of important changes from version 5/2000 of this spreadsheet, note that the following text may be deleted by the user if this space is to be used for other purposes:

Hidden Cells: All cells, rows and columns are unhidden. Several consultants were concerned that they could not "see" what was going on and formulae were not available for inspection. Now contents of a cell can be inspected by placing the cursor on that cell.

Error Messages: There is a section below the data entry screen that describes data entry errors in more detail and which cell has that error. Thus a user can determine what and where their error is very quickly. Note that a space is seen as text in Excel formulae.

Minor Font and Color Change: Minor changes were made to improve readability. Some text is displayed in red, such as error messages and increasing trends. Decreasing or stable trends are displayed in blue text.

Data Entry and Error Messages: When there are less than four rounds of data entered, instead of getting an "ERROR" message, only "n<4" is displayed. But, if text, a zero or a negative number is inadvertently entered, the "ERROR" message is displayed. Thus, during data entry, an "ERROR" message is only displayed when there actually is an error. Note that the date must be entered before sample results collected on that date are entered to avoid an error message.

Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
130.00	33.00	220.00	200.00	120.00	0.00		Sum Rows
1	-1	1	1	1			2
1	-1	1	1	1			2
1	1	1	1	1			5

-1	1	1	-1			0
	1	1	1			3
		-1	-1			-2
			-1			-1
						0
						0
			Mann Kendall Statistic (S) =			9

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
11.00	12.00	2.50	11.00	2.00	0.00		Sum Rows
1	1	-1	1	-1			3
-1	-1	-1	-1	-1			-6
0	1	-1	0	-1			-1
	1	-1	0	-1			-1
		-1	-1	-1			-3
			1	-1			0
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-9

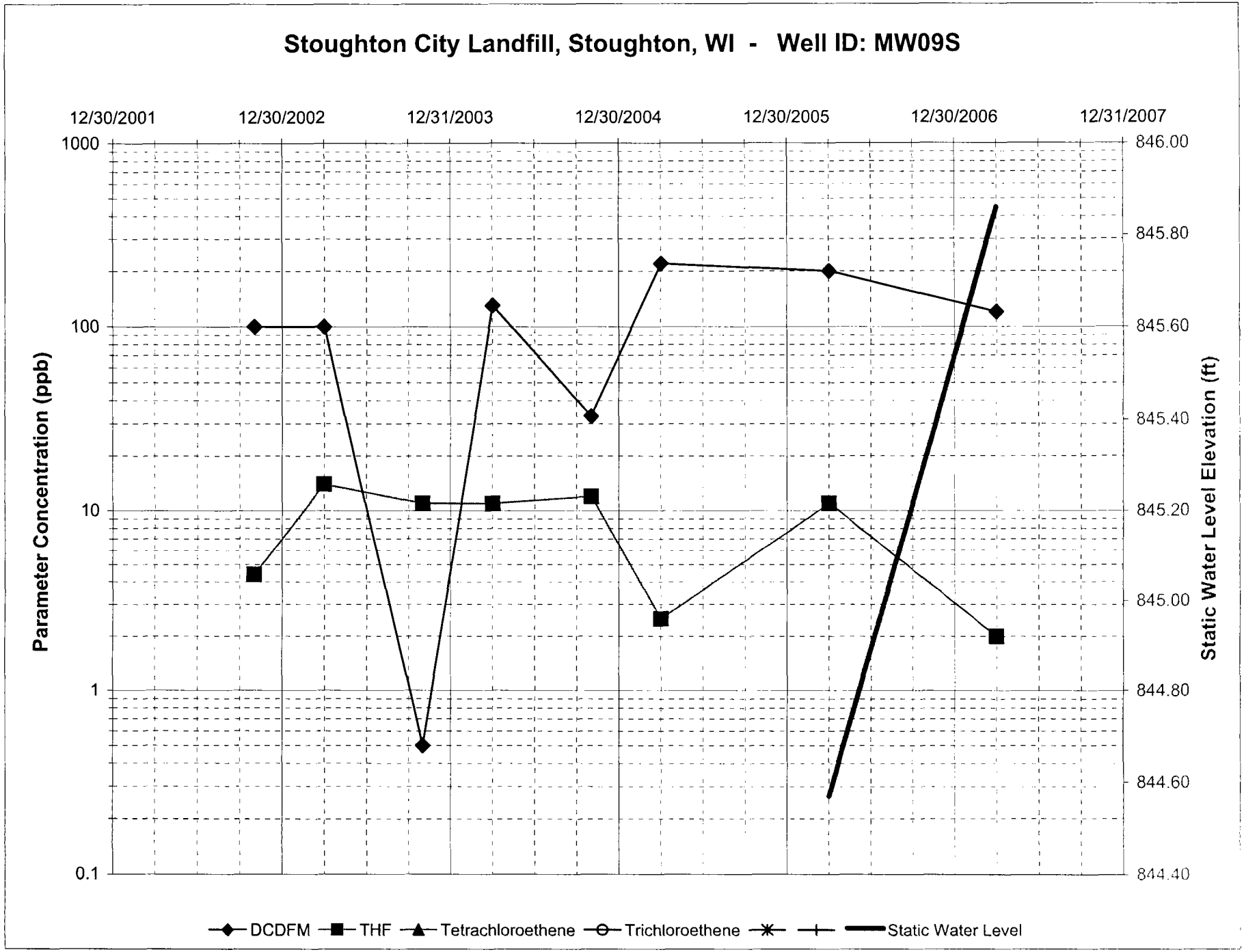
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW09S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW09S
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
1000
100
10
1
0.1
Parameter Concentration (ppb)
846.00
845.80
845.60
845.40
845.20
845.00
844.80
844.60
844.40
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW10I

Event Number	Sampling Date (most recent last)	Compound -> DCDFM Concentration (leave blank if no data)	THF Concentration (leave blank if no data)	Tetrachloroethene Concentration (leave blank if no data)	Trichloroethene Concentration (leave blank if no data)	0 Concentration (leave blank if no data)	0 Concentration (leave blank if no data)
1	01-Nov-02	130.00	11.00	2.30	1.70	0.00	0.00
2	01-Apr-03	91.00	5.50	1.70	1.20	0.00	0.00
3	01-Nov-03	79.00	5.70	2.10	1.50	0.00	0.00
4	01-Apr-04	110.00	5.10	2.30	1.50	0.00	0.00
5	01-Nov-04	120.00	4.60	2.40	1.40	0.00	0.00
6	01-Apr-05	120.00	0.50	2.30	1.10	0.00	0.00
7	01-Apr-06	99.00	3.50	2.20	1.10	0.00	0.00
8	01-Apr-07	110.00	2.70	3.00	1.20	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	0.0	-22.0	11.0	-15.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	95.44	4.29	2.03	1.19	0.00	0.00
	Standard Deviation =	39.109	3.262	0.834	0.491	0.000	0.000
	Coefficient of Variation(CV)=	0.410	0.761	0.410	0.413	#DIV/0!	#DIV/0!

Error Check, Blank if No Errors Detected

Trend ≥ 80% Confidence Level	No Trend	**DECREASING**	**INCREASING**	**DECREASING**	No Trend	No Trend
Trend ≥ 90% Confidence Level	No Trend	**DECREASING**	No Trend	**DECREASING**	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level	**CV <= 1 STABLE**	NA	NA	NA	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!

Data Entry By = GAE | Date = 09-Jan-08 | Checked By = 0

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
130.00	91.00	79.00
	-1	-1
		-1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a spac	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES

DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF Site =

Event 1	Event 2	Event 3
11.00	5.50	5.70
	-1	-1
		1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene Site =

Event 1	Event 2	Event 3
2.30	1.70	2.10
	-1	-1
		1

TEST FOR INCREASIN OR DECREASIN TREND @ 80 %	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
	4						
	5						
	6						
	7						
	8						
If +1, Incrsn	9	0	-1	1	-1	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Increasing	Decreasing	Neither	Neither

Trichloroethene Site =

Event 1	Event 2	Event 3
1.70	1.20	1.50
	-1	-1
		1

TEST FOR INCREASIN	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	-1	0	-1	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Neither	Decreasing	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

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Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =		0		Well =	MW10I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10		
110.00	120.00	120.00	99.00	110.00	0.00			Sum Rows
-1	-1	-1	-1	-1				-7
1	1	1	1	1				4
1	1	1	1	1				5

1	1	-1	0				1
	0	-1	-1				-2
		-1	-1				-2
			1				1
							0
							0
			Mann Kendall Statistic (S) =				0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
5.10	4.60	0.50	3.50	2.70	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	-1	-1			-4
-1	-1	-1	-1	-1			-5
	-1	-1	-1	-1			-4
		-1	-1	-1			-3
			1	1			2
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-22

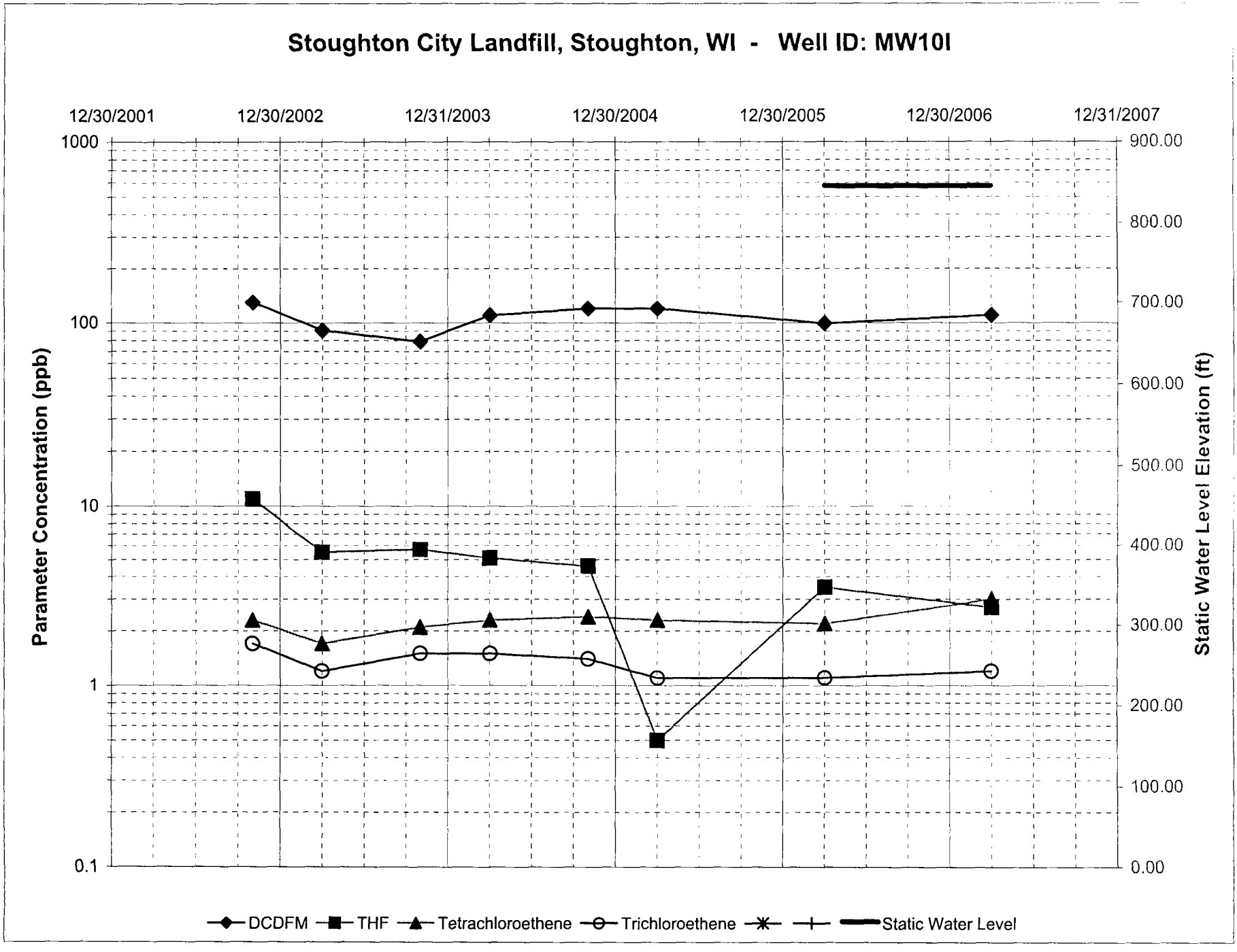
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
2.30	2.40	2.30	2.20	3.00	0.00		Sum Rows
0	1	0	-1	1			-1
1	1	1	1	1			6
1	1	1	1	1			5
	1	0	-1	1			1
		-1	-1	1			-1
			-1	1			0
				1			1
							0
							0
				Mann Kendall Statistic (S) =			11

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.50	1.40	1.10	1.10	1.20	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
1	1	-1	-1	0			1
0	-1	-1	-1	-1			-4
	-1	-1	-1	-1			-4
		-1	-1	-1			-3
			0	1			1
				1			1
							0

							0
				Mann Kendall Statistic (S) =			-15

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							.0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW10I
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
1000
100
10
1
0.1
Parameter Concentration (ppb)
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin
Department of Natural Resources
Remediation and Redevelopment Program

Mann-Kendall Statistical Test
Form 4400-215 (2/2001)

Notice: This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW10S

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	18.00	3.50	0.00	0.00	0.00	0.00
2	01-Apr-03	3.60	1.30	0.00	0.00	0.00	0.00
3	01-Nov-03	1.60	0.50	0.00	0.00	0.00	0.00
4	01-Apr-04	0.79	0.50	0.00	0.00	0.00	0.00
5	01-Nov-04	3.40	0.84	0.00	0.00	0.00	0.00
6	01-Apr-05	1.30	0.50	0.00	0.00	0.00	0.00
7	01-Apr-06	1.40	1.10	0.00	0.00	0.00	0.00
8	01-Apr-07	0.89	0.50	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	-16.0	-10.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	3.44	0.97	0.00	0.00	0.00	0.00
	Standard Deviation =	5.585	1.023	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	1.622	1.053	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		**DECREASING**	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		**DECREASING**	No Trend	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		NA	NA	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By =	0	

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
18.00	3.60	1.60
	-1	-1
		-1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
3.50	1.30	0.50
	-1	-1
		-1

S Values From Lookup Table in MNA Guidance	
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	-1	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Decreasing	Decreasing	Neither	Neither	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	-1	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Decreasing	Neither	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

The following text is a summary of important changes from version 5/2000 of this spreadsheet, note that the following text may be deleted by the user if this space is to be used for other purposes:

Hidden Cells: All cells, rows and columns are unhidden. Several consultants were concerned that they could not "see" what was going on and formulae were not available for inspection. Now contents of a cell can be inspected by placing the cursor on that cell.

Error Messages: There is a section below the data entry screen that describes data entry errors in more detail and which cell has that error. Thus a user can determine what and where their error is very quickly. Note that a space is seen as text in Excel formulae.

Minor Font and Color Change: Minor changes were made to improve readability. Some text is displayed in red, such as error messages and increasing trends. Decreasing or stable trends are displayed in blue text.

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Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =		0		Well =	MW10S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10		
0.79	3.40	1.30	1.40	0.89	0.00			Sum Rows
-1	-1	-1	-1	-1				-7
-1	-1	-1	-1	-1				-6
-1	1	-1	-1	-1				-3

1	1	1	1			4
	-1	-1	-1			-3
		1	-1			0
			-1			-1
						0
						0
			Mann Kendall Statistic (S) =			-16

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.50	0.84	0.50	1.10	0.50	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	-1	-1			-6
0	1	0	1	0			2
	1	0	1	0			2
		-1	1	-1			-1
			1	0			1
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-10

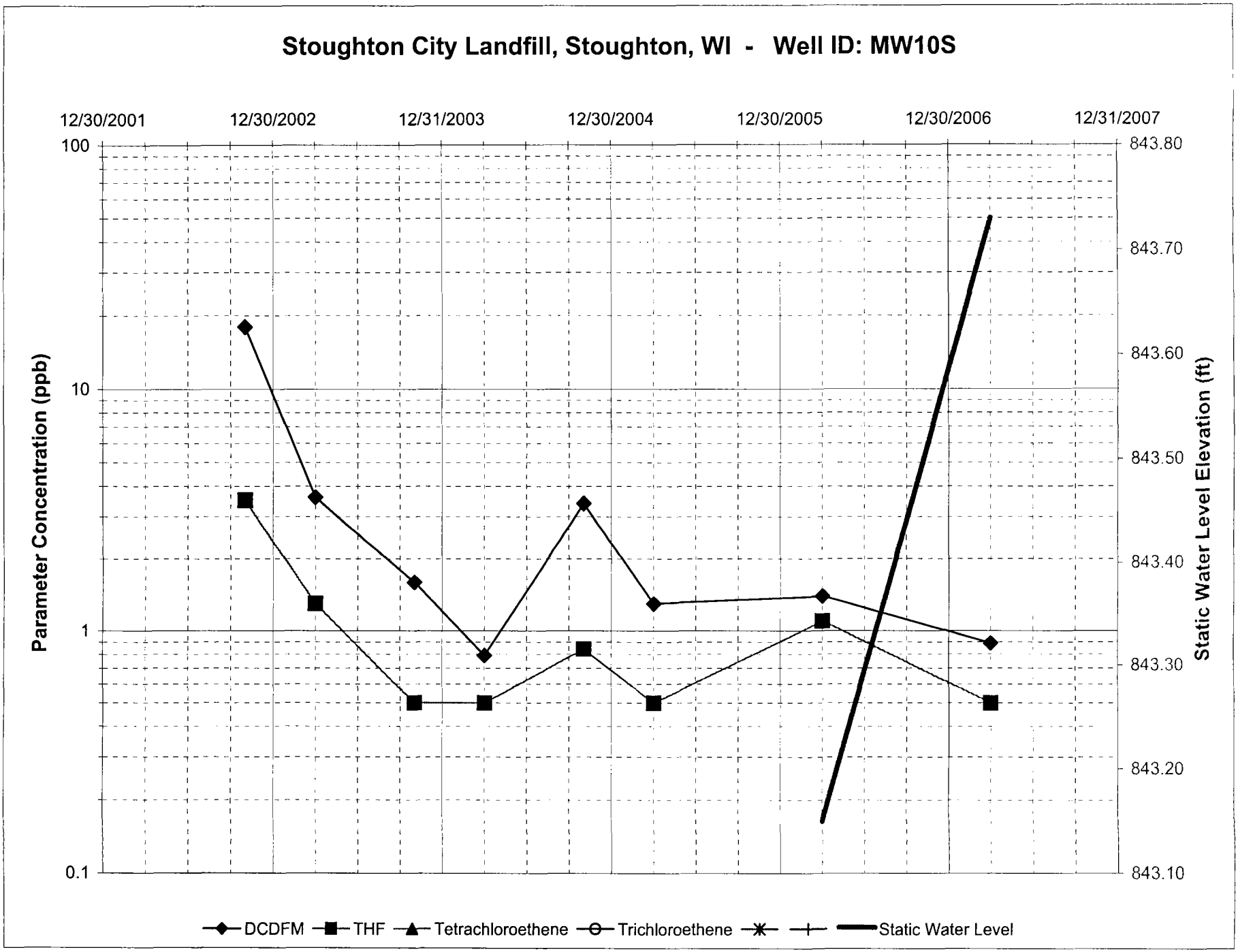
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW10S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW10S
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
100
10
1
0.1
Parameter Concentration (ppb)
843.80
843.70
843.60
843.50
843.40
843.30
843.20
843.10
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW13I

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	1.90	16.00	0.00	0.00	0.00	0.00
2	01-Apr-03	1.00	9.20	0.00	0.00	0.00	0.00
3	01-Nov-03	1.40	17.00	0.00	0.00	0.00	0.00
4	01-Apr-04	1.20	15.00	0.00	0.00	0.00	0.00
5	01-Nov-04	1.30	9.40	0.00	0.00	0.00	0.00
6	01-Apr-05	3.30	17.00	0.00	0.00	0.00	0.00
7	01-Apr-06	1.20	9.10	0.00	0.00	0.00	0.00
8	01-Apr-07	0.50	4.90	0.00	0.00	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	-7.0	-11.0	0.0	0.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	1.31	10.84	0.00	0.00	0.00	0.00
	Standard Deviation =	0.923	5.920	0.000	0.000	0.000	0.000
	Coefficient of Variation(CV)=	0.704	0.546	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	**DECREASING**	No Trend	No Trend	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		**CV <= 1 STABLE**	NA	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By = 0		

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
1.90	1.00	1.40
	-1	-1
		1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES

DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF Site =

Event 1	Event 2	Event 3
16.00	9.20	17.00
	-1	1
		1

S Values From Lookup Table in MNA Guidance

Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene Site =

Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	-1	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Neither	Neither	Neither	Neither

Trichloroethene Site =

Event 1	Event 2	Event 3
0.00	0.00	0.00

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	0	0	0	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Neither	Neither	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

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Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW13I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.20	1.30	3.30	1.20	0.50	0.00		Sum Rows
-1	-1	1	-1	-1			-5
1	1	1	1	-1			4
-1	-1	1	-1	-1			-3

1	1	0	-1			1
	1	-1	-1			-1
		-1	-1			-2
			-1			-1
						0
						0
			Mann Kendall Statistic (S) =			-7

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW13I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
15.00	9.40	17.00	9.10	4.90	0.00		Sum Rows
-1	-1	1	-1	-1			-3
1	1	1	-1	-1			2
-1	-1	0	-1	-1			-4
	-1	1	-1	-1			-2
		1	-1	-1			-1
			-1	-1			-2
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-11

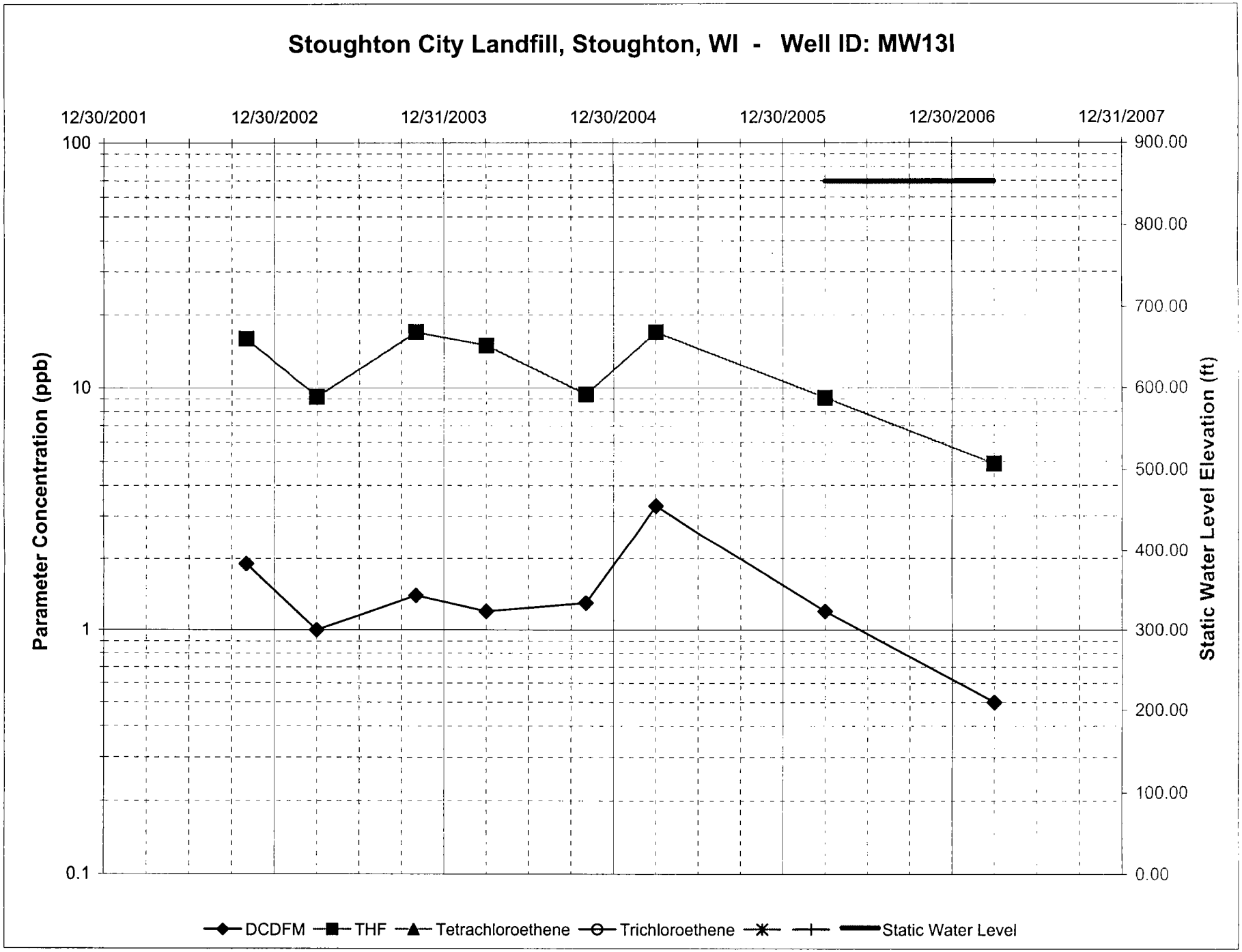
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW13I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW13I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0

							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW13I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW13I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW13I
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
100
10
1
0.1
Parameter Concentration (ppb)
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin
Department of Natural Resources
Remediation and Redevelopment Program

Mann-Kendall Statistical Test
Form 4400-215 (2/2001)

Notice: This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW14I

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	86.00	3.50	2.00	3.70	0.00	0.00
2	01-Apr-03	150.00	1.90	2.00	2.60	0.00	0.00
3	01-Nov-03	110.00	1.30	1.40	2.30	0.00	0.00
4	01-Apr-04	140.00	1.00	1.80	2.50	0.00	0.00
5	01-Nov-04	160.00	1.00	1.40	1.80	0.00	0.00
6	01-Apr-05	210.00	1.30	2.50	1.00	0.00	0.00
7	01-Apr-06	120.00	2.40	1.10	1.30	0.00	0.00
8	01-Apr-07	110.00	0.50	1.00	0.97	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	5.0	-12.0	-14.0	-24.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	120.67	1.43	1.47	1.80	0.00	0.00
	Standard Deviation =	57.827	1.046	0.730	1.107	0.000	0.000
	Coefficient of Variation(CV)=	0.479	0.730	0.498	0.616	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected							
Trend ≥ 80% Confidence Level		No Trend	**DECREASING**	**DECREASING**	**DECREASING**	No Trend	No Trend
Trend ≥ 90% Confidence Level		No Trend	No Trend	**DECREASING**	**DECREASING**	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level		**CV <= 1 STABLE**	NA	NA	NA	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!
	Data Entry By = GAE		Date = 09-Jan-08		Checked By =	0	

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
86.00	150.00	110.00
	1	1
		-1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
3.50	1.90	1.30
	-1	-1
		-1

S Values From Lookup Table in MNA Guidance		
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
2.00	2.00	1.40
	0	-1
		-1

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	0	-1	-1	-1	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Decreasing	Decreasing	Decreasing	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
3.70	2.60	2.30
	-1	-1
		-1

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	0	0	-1	-1	0	0
If -1, decrsn	10						
If 0, neither.		Neither	Neither	Decreasing	Decreasing	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

The following text is a summary of important changes from version 5/2000 of this spreadsheet, note that the following text may be deleted by the user if this space is to be used for other purposes:

Hidden Cells: All cells, rows and columns are unhidden. Several consultants were concerned that they could not "see" what was going on and formulae were not available for inspection. Now contents of a cell can be inspected by placing the cursor on that cell.

Error Messages: There is a section below the data entry screen that describes data entry errors in more detail and which cell has that error. Thus a user can determine what and where their error is very quickly. Note that a space is seen as text in Excel formulae.

Minor Font and Color Change: Minor changes were made to improve readability. Some text is displayed in red, such as error messages and increasing trends. Decreasing or stable trends are displayed in blue text.

Data Entry and Error Messages: When there are less than four rounds of data entered, instead of getting an "ERROR" message, only "n<4" is displayed. But, if text, a zero or a negative number is inadvertently entered, the "ERROR" message is displayed. Thus, during data entry, an "ERROR" message is only displayed when there actually is an error. Note that the date must be entered before sample results collected on that date are entered to avoid an error message.

Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
140.00	160.00	210.00	120.00	110.00	0.00		Sum Rows
1	1	1	1	1			7
-1	1	1	-1	-1			-2
1	1	1	1	0			4

			1	1	-1	-1	0
				1	-1	-1	-1
					-1	-1	-2
						-1	-1
							0
							0
						Mann Kendall Statistic (S) =	5

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.00	1.00	1.30	2.40	0.50	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	1	-1			-4
-1	-1	0	1	-1			-2
	0	1	1	-1			1
		1	1	-1			1
			1	-1			0
				-1			-1
							0
							0
						Mann Kendall Statistic (S) =	-12

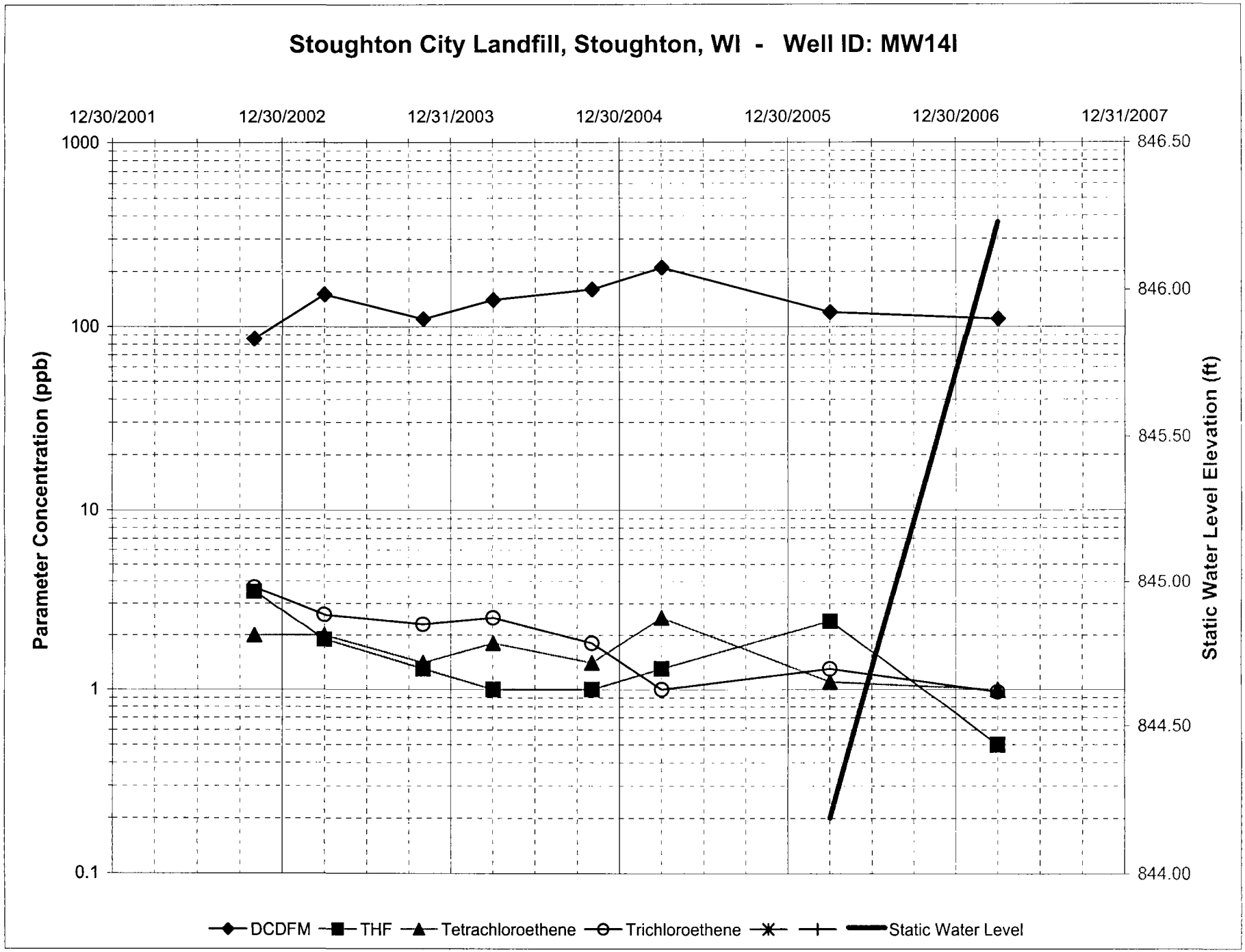
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.80	1.40	2.50	1.10	1.00	0.00		Sum Rows
-1	-1	1	-1	-1			-4
-1	-1	1	-1	-1			-4
1	0	1	-1	-1			0
	-1	1	-1	-1			-2
		1	-1	-1			-1
			-1	-1			-2
				-1			-1
							0
							0
						Mann Kendall Statistic (S) =	-14

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
2.50	1.80	1.00	1.30	0.97	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	-1	-1			-6
1	-1	-1	-1	-1			-3
	-1	-1	-1	-1			-4
		-1	-1	-1			-3
			1	-1			0
				-1			-1
							0

							0
				Mann Kendall Statistic (S) =			-24

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14I
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW14I
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
1000
100
10
1
0.1
Parameter Concentration (ppb)
846.50
846.00
845.50
845.00
844.50
844.00
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

State of Wisconsin — **Mann-Kendall Statistical Test**

Department of Natural Resources — **Form 4400-215 (2/2001)**

Remediation and Redevelopment Program

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Instructions: Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name = Stoughton City Landfill, Stoughton, WI | BRRTS No. = 0 | Well Number = MW14S

	Compound ->	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	01-Nov-02	160.00	2.80	6.20	4.10	0.00	0.00
2	01-Apr-03	170.00	1.40	5.30	3.70	0.00	0.00
3	01-Nov-03	78.00	0.50	4.20	2.70	0.00	0.00
4	01-Apr-04	77.00	0.50	4.20	1.80	0.00	0.00
5	01-Nov-04	53.00	0.50	2.90	1.20	0.00	0.00
6	01-Apr-05	120.00	0.50	3.10	1.50	0.00	0.00
7	01-Apr-06	93.00	0.50	2.80	1.40	0.00	0.00
8	01-Apr-07	46.00	0.50	2.40	0.62	0.00	0.00
9	#N/A	0.00	0.00	0.00	0.00	0.00	0.00
10							
	Mann Kendall Statistic (S) =	-14.0	-13.0	-25.0	-24.0	0.0	0.0
	Number of Rounds (n) =	9	9	9	9	9	9
	Average =	88.56	0.80	3.46	1.89	0.00	0.00
	Standard Deviation =	54.667	0.832	1.801	1.364	0.000	0.000
	Coefficient of Variation(CV)=	0.617	1.040	0.521	0.721	#DIV/0!	#DIV/0!

Error Check, Blank if No Errors Detected

Trend ≥ 80% Confidence Level	**DECREASING**	**DECREASING**	**DECREASING**	**DECREASING**	No Trend	No Trend
Trend ≥ 90% Confidence Level	**DECREASING**	No Trend	**DECREASING**	**DECREASING**	No Trend	No Trend
Stability Test, If No Trend Exists at 80% Confidence Level	NA	NA	NA	NA	#DIV/0! #DIV/0!	#DIV/0! #DIV/0!

Data Entry By = GAE | Date = 09-Jan-08 | Checked By = 0

THIS BLOCK OF CELLS IS USED TO SEARCH FOR DATA ENTRY ERRORS

DATA ERR	Event Number	DCDFM	THF	Tetrachloroethene	Trichloroethene	0	0
CHECKS	1	-1	-1	-1	-1	-1	-1
Checks	2	-1	-1	-1	-1	-1	-1
for data with	3	-1	-1	-1	-1	-1	-1
values less	4	-1	-1	-1	-1	-1	-1

DCDFM		Site =
Event 1	Event 2	Event 3
160.00	170.00	78.00
	1	-1
		-1

than zero or	5	-1	-1	-1	-1	-1	-1
text (a space	6	-1	-1	-1	-1	-1	-1
is seen as	7	-1	-1	-1	-1	-1	-1
text in Excel	8	-1	-1	-1	-1	-1	-1
Minus one (-	9	-1	-1	-1	-1	-1	-1
shown if no	10	-1	-1	-1	-1	-1	-1
error.	Data error in column?	no err	no err	no err	no err	no err	no err

THIS BLOCK OF CELLS USED TO FIND ERRORS IN DATES				
DATE ERR	Date	Text in Date?	Consecutive?	Data w no date?
CHECKS	01-Nov-02	-1	-1	-1
	01-Apr-03	-1	-1	-1
Checks	01-Nov-03	-1	-1	-1
include	01-Apr-04	-1	-1	-1
a test for	01-Nov-04	-1	-1	-1
consecutive	01-Apr-05	-1	-1	-1
dates and	01-Apr-06	-1	-1	-1
text. Minus	01-Apr-07	-1	-1	-1
one (-1)	BLANK	-1	-1	-1
shown if no	BLANK	-1	-1	-1
error.	Date Error?	no err	no err	no err

THF		Site =
Event 1	Event 2	Event 3
2.80	1.40	0.50
	-1	-1
		-1

S Values From Lookup Table in MNA Guidance		
Values of n	Smax@0.2	Smax@0.1
4	-4	-6
5	-5	-7
6	-6	-8
7	-7	-10
8	-8	-11
9	-10	-14
10	-11	-16

Tetrachloroethene		Site =
Event 1	Event 2	Event 3
6.20	5.30	4.20
	-1	-1
		-1

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						
OR	5						
DECREASIN	6						
TREND	7						
@ 80 %	8						
If +1, Incrsn	9	-1	-1	-1	-1	0	0
If -1, decrsn	10						
If 0, neither.		Decreasing	Decreasing	Decreasing	Decreasing	Neither	Neither

Trichloroethene		Site =
Event 1	Event 2	Event 3
4.10	3.70	2.70
	-1	-1
		-1

TEST FOR	Number of Rounds	DCDFM	THF	etrachloroethene	Trichloroethene	0	0
INCREASIN	4						

OR	5						
DECREASIN	6						
TREND	7						
@ 90 %	8						
If +1, Incrsn	9	-1	0	-1	-1	0	0
If -1, decrsn	10						
If 0, neither.		Decreasing	Neither	Decreasing	Decreasing	Neither	Neither

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Cells in this area are unprotected. Therefore if a user wanted to custom write code for data entry purposes that would allow linking of spreadsheets, graphing, enable easier copying and pasting, or for any other purpose, this area may be used.

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Hidden Cells: All cells, rows and columns are unhidden. Several consultants were concerned that they could not "see" what was going on and formulae were not available for inspection. Now contents of a cell can be inspected by placing the cursor on that cell.

Error Messages: There is a section below the data entry screen that describes data entry errors in more detail and which cell has that error. Thus a user can determine what and where their error is very quickly. Note that a space is seen as text in Excel formulae.

Minor Font and Color Change: Minor changes were made to improve readability. Some text is displayed in red, such as error messages and increasing trends. Decreasing or stable trends are displayed in blue text.

Data Entry and Error Messages: When there are less than four rounds of data entered, instead of getting an "ERROR" message, only "n<4" is displayed. But, if text, a zero or a negative number is inadvertently entered, the "ERROR" message is displayed. Thus, during data entry, an "ERROR" message is only displayed when there actually is an error. Note that the date must be entered before sample results collected on that date are entered to avoid an error message.

Trend Display: Instead of getting "YES" or "NO" in a specific row, the spreadsheet simply shows "Increasing" or "Decreasing" or "No Trend." Therefore, the result of the trend analysis is more obvious during data entry.

Coefficient of Variation: It was possible to inadvertently copy a zero into the Mann Kendall spreadsheet from Mann Whitney, which resulted in a coefficient of variation that was too large for the stability test to deliver correct results. The Mann Kendall spreadsheet now requires values greater than zero and will show an error message if a zero is entered.

Comparison to WDNR MNA Guidance: The algorithm shown in the MNA Guidance for calculating the Mann Kendall Statistic is also used in the spreadsheet. Therefore, a user can double check a manually calculated result against the spreadsheet.

0		Site =
Event 1	Event 2	Event 3
0.00	0.00	0.00

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
77.00	53.00	120.00	93.00	46.00	0.00		Sum Rows
-1	-1	-1	-1	-1			-5
-1	-1	-1	-1	-1			-6
-1	-1	1	1	-1			-1

-1	1	1	-1			0
	1	1	-1			1
		-1	-1			-2
			-1			-1
						0
						0
			Mann Kendall Statistic (S) =			-14

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.50	0.50	0.50	0.50	0.50	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	-1	-1			-6
0	0	0	0	0			0
	0	0	0	0			0
		0	0	0			0
			0	0			0
				0			0
							0
							0
				Mann Kendall Statistic (S) =			-13

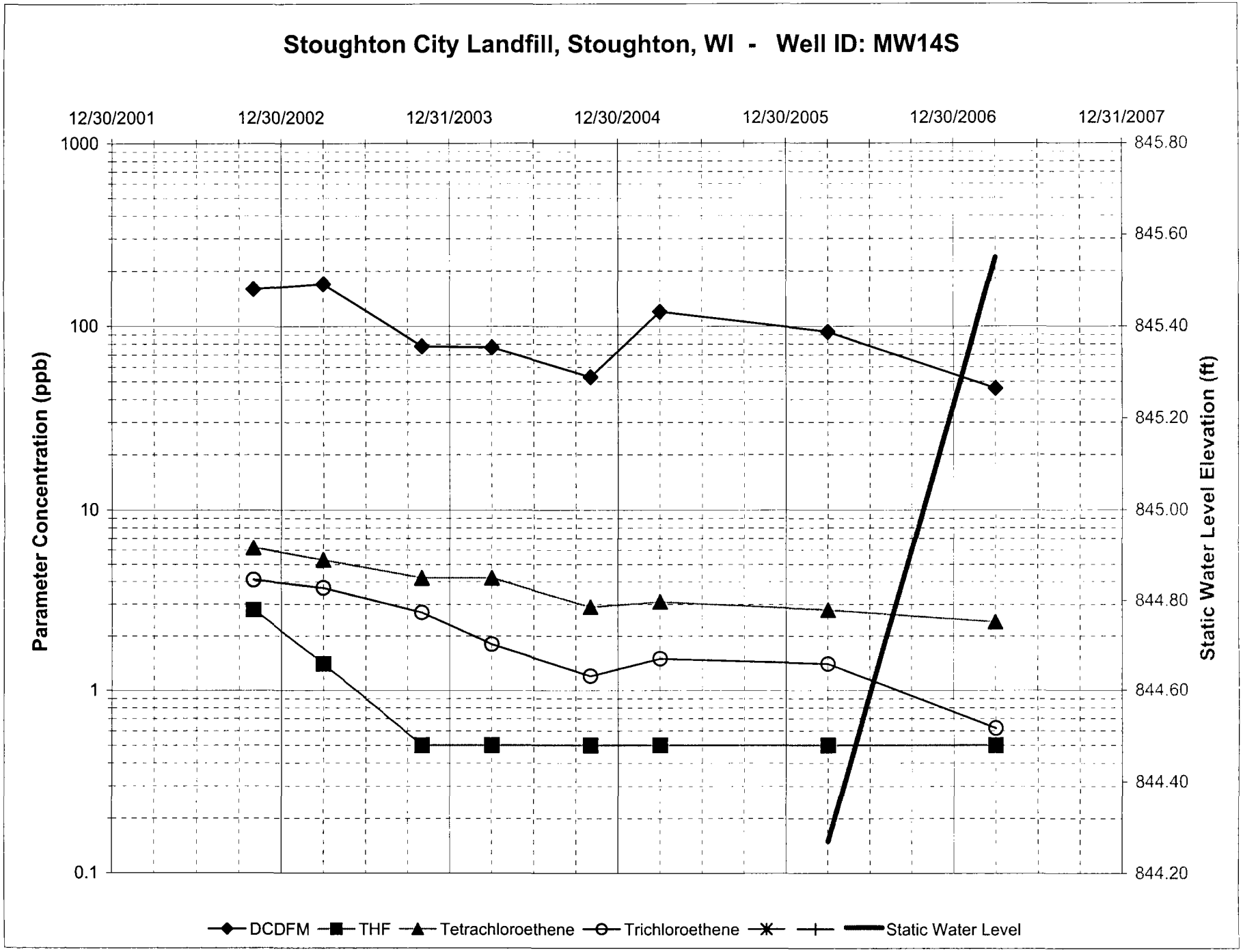
Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
4.20	2.90	3.10	2.80	2.40	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	-1	-1			-6
0	-1	-1	-1	-1			-4
	-1	-1	-1	-1			-4
		1	-1	-1			-1
			-1	-1			-2
				-1			-1
							0
							0
				Mann Kendall Statistic (S) =			-25

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
1.80	1.20	1.50	1.40	0.62	0.00		Sum Rows
-1	-1	-1	-1	-1			-7
-1	-1	-1	-1	-1			-6
-1	-1	-1	-1	-1			-5
	-1	-1	-1	-1			-4
		1	1	-1			1
			-1	-1			-2
				-1			-1
							0

							0
				Mann Kendall Statistic (S) =			-24

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0

Stoughton City Landfill, Stoughton, WI			BRRTS =	0		Well =	MW14S
Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	
0.00	0.00	0.00	0.00	0.00	0.00		Sum Rows
							0
							0
							0
							0
							0
							0
							0
							0
							0
				Mann Kendall Statistic (S) =			0


Stoughton City Landfill, Stoughton, WI - Well ID: MW14S
12/30/2001
12/30/2002
12/31/2003
12/30/2004
12/30/2005
12/30/2006
12/31/2007
1000
100
10
1
0.1
Parameter Concentration (ppb)
845.80
845.60
845.40
845.20
845.00
844.80
844.60
844.40
844.20
Static Water Level Elevation (ft)
DCDFM
THF
Tetrachloroethene
Trichloroethene
Static Water Level

APPENDIX 2

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION

Site name: Stoughton City LF	**Date of inspection:** 10/17/07
Location and Region: Stoughton, WI Reg 5	**EPA ID:** WID980901219
Agency, office, or company leading the five-year review: WI DNR G. Edelstein	**Weather/temperature:** Partly Sunny, Upper 50s

Remedy Includes: (Check all that apply)

- [X] Landfill cover/containment
- [X] Access controls fence
- [X] Institutional controls
- [ ] Groundwater pump and treatment
- [ ] Surface water collection and treatment
- [X] Other Waste consolidation - Passive LF gas collection storm water controls/drainage
- [ ] Monitored natural attenuation
- [ ] Groundwater containment
- [ ] Vertical barrier walls

Attachments: [ ] Inspection team roster attached [X] Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Gary A Edelstein, PE — Waste Mgt Engineer — 10/17/07
   (Name — Title — Date)
   Interviewed [ ] at site [ ] at office [ ] by phone Phone no. 608-267-7563
   Problems, suggestions; [X] Report attached See comments inside

2. **O&M staff** Steven Smith — Env. Specialist — 10/17/07
   (Name — Title — Date)
   Interviewed [X] at site [ ] at office [ ] by phone Phone no. 608-216-7339
   Problems, suggestions; [X] Report attached See comments inside
   Steven Smith works for O&M Contractor

Note: WI DNR is responsible for site O&M. This is accomplished by a contractor working for the WI DNR. The City of Stoughton has agreed informally to perform addition fence inspections and maintenance

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department; office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply

Agency City of Stoughton Parks Dept
Contact Tom Lynch — Director — 10/17/07 — _____
Name — Title — Date — Phone no
Problems; suggestions; ☒ Report attached See comments inside

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no
Problems; suggestions; G Report attached _____

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no
Problems; suggestions; G Report attached _____

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no
Problems; suggestions; G Report attached _____

4. **Other interviews** (optional) G Report attached

Note: Tom Lynch attended the inspection
Kyle Rogers, EPA RPM attended the inspection

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents

☒ O&M manual	☒ Readily available	☒ Up to date	G N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	G N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	G N/A

Remarks: Kept by WI DNR as well as O&M contractor

2. Site-Specific Health and Safety Plan G Readily available G Up to date G N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date G N/A

Remarks: Kept by WI DNR as well as O&M contractor

3. O&M and OSHA Training Records ☒ Readily available G Up to date G N/A

Remarks: Kept by O&M contractor

4. Permits and Service Agreements

G Air discharge permit	G Readily available	G Up to date	G N/A
G Effluent discharge	G Readily available	G Up to date	G N/A
G Waste disposal, POTW	G Readily available	G Up to date	G N/A
G Other permits	G Readily available	G Up to date	G N/A

Remarks: All N/A

5. Gas Generation Records G Readily available G Up to date ☒ N/A

Remarks: Passive system, so N/A

6. Settlement Monument Records G Readily available G Up to date ☒ N/A

Remarks: None maintained

7. Groundwater Monitoring Records ☒ Readily available ☒ Up to date G N/A

Remarks: Kept by WI DNR as paper as well as electronic
Also kept by O&M contractor

8. Leachate Extraction Records G Readily available G Up to date ☒ N/A

Remarks:

9. Discharge Compliance Records

G Air	G Readily available	G Up to date	☒ N/A
G Water (effluent)	G Readily available	G Up to date	☒ N/A

Remarks:

10. Daily Access/Security Logs G Readily available G Up to date ☒ N/A

Remarks: No daily access or activities

IV. O&M COSTS

1 **O&M Organization**

G State in-house
G PRP in-house
G Federal Facility in-house
G Other_____

X Contractor for State
G Contractor for PRP
G Contractor for Federal Facility

2 **O&M Cost Records**

X Readily available X Up to date
G Funding mechanism/agreement in place
Original O&M cost estimate_____ G Breakdown attached

The total O&M Contract is $13,014.00 for 2 years for 9/05-10/07

Total annual cost by year for review period if available

From_____ To_____ _____ G Breakdown attached
Date Date Total cost

From_____ To_____ _____ G Breakdown attached
Date Date Total cost

From_____ To_____ _____ G Breakdown attached
Date Date Total cost

From_____ To_____ _____ G Breakdown attached
Date Date Total cost

From_____ To_____ _____ G Breakdown attached
Date Date Total cost

3 **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS G Applicable G N/A

A. Fencing

1 **Fencing damaged** G Location shown on site map G Gates secured G N/A

Remarks No damage noted. City is inspecting weekly

B. Other Access Restrictions

1 **Signs and other security measures** G Location shown on site map G N/A

Remarks WI DNR Sign is missing at front Gate. Will be replaced.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — G Yes ☒ No G N/A
Site conditions imply ICs not being fully enforced — G Yes ☒ No G N/A

Type of monitoring (e.g., self-reporting, drive by) Monitored by WI DNR
Frequency As needed
Responsible party/agency
Contact G Edelstein — WM Engineer — 10/17/07 — 608-267-7563
Name — Title — Date — Phone no.

Reporting is up-to-date — G Yes G No ☒ N/A
Reports are verified by the lead agency — G Yes G No ☒ N/A

Specific requirements in deed or decision documents have been met — G Yes ☒ No G N/A
Violations have been reported — G Yes ☒ No G N/A
Other problems or suggestions: G Report attached
Deed restrictions to prevent building construction or well construction on the CC property were required by the ROD. The 1997 CD with the city requires no recreational use.

2. **Adequacy** ☒ ICs are adequate G ICs are inadequate G N/A
Remarks

D. General

1. **Vandalism/trespassing** G Location shown on site map ☒ No vandalism evident
Remarks Fence vandalism noted in part. Not a problem now - City is inspecting and fixing damage

2. **Land use changes on site** ☒ N/A
Remarks None

3. **Land use changes off site** ☒ N/A
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable G N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate G N/A
Remarks

B. Other Site Conditions

Remarks_____

VII. LANDFILL COVERS G Applicable G N/A

A. Landfill Surface

1. **Settlement** (Low spots) G Location shown on site map ☒ Settlement not evident
Areal extent_____ Depth_____
Remarks_____

2. **Cracks** G Location shown on site map ☒ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____

3 **Erosion** G Location shown on site map ☒ Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Holes** ☒ Location shown on site map G Holes not evident
Areal extent_____ Depth_____
Remarks Three animal burrows noted and will be repaired

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☒ No signs of stress
G Trees/Shrubs (indicate size and locations on a diagram)
Remarks Recently mowed and in good condition Small shrubs near vents will be removed

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
Remarks_____

7. **Bulges** G Location shown on site map ☒ Bulges not evident
Areal extent_____ Height_____
Remarks_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident
- G Wet areas — G Location shown on site map — Areal extent_____
- G Ponding — G Location shown on site map — Areal extent_____
- G Seeps — G Location shown on site map — Areal extent_____
- G Soft subgrade — G Location shown on site map — Areal extent_____

Remarks_____

9 **Slope Instability** G Slides G Location shown on site map ☒ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches G Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** G Location shown on site map ☒ N/A or okay
Remarks_____

2. **Bench Breached** G Location shown on site map ☒ N/A or okay
Remarks_____

3. **Bench Overtopped** G Location shown on site map ☒ N/A or okay
Remarks_____

C. Letdown Channels G Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** G Location shown on site map ☒ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** G Location shown on site map ☒ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** G Location shown on site map ☒ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** G Location shown on site map ☒ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☒ No obstructions
G Location shown on site map Areal extent_____
Size_____
Remarks_____

6 **Excessive Vegetative Growth** Type_____
☒ No evidence of excessive growth
G Vegetation in channels does not obstruct flow
G Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☒ Applicable G N/A

1. **Gas Vents** G Active ☒ Passive
G Properly secured/locked ☒ Functioning G Routinely sampled ☒ Good condition
G Evidence of leakage at penetration G Needs Maintenance
G N/A
Remarks_____

2. **Gas Monitoring Probes**
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☒ Properly secured/locked ☒ Functioning G Routinely sampled ☒ Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

4 **Leachate Extraction Wells**
G Properly secured/lockedG Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance ☒ N/A
Remarks_____

5. **Settlement Monuments** G Located G Routinely surveyed ☒ N/A
Remarks_____

E. Gas Collection and Treatment G Applicable ☒ N/A

1. **Gas Treatment Facilities**
   G Flaring G Thermal destruction G Collection for reuse
   G Good condition G Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   G Good condition G Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   G Good condition G Needs Maintenance G N/A
   Remarks_____

F. Cover Drainage Layer G Applicable ☒ N/A

1. **Outlet Pipes Inspected** G Functioning G N/A
   Remarks_____

2. **Outlet Rock Inspected** G Functioning G N/A
   Remarks_____

G. Detention/Sedimentation Ponds G Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ G N/A
   G Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   G Erosion not evident
   Remarks_____

3. **Outlet Works** G Functioning G N/A
   Remarks_____

4. **Dam** G Functioning G N/A
   Remarks_____

H. Retaining Walls G Applicable G N/A

1 **Deformations** G Location shown on site map G Deformation not evident
Horizontal displacement_____ Vertical displacement_____
Rotational displacement_____
Remarks_____

2. **Degradation** G Location shown on site map G Degradation not evident
Remarks_____

I. Perimeter Ditches/Off-Site Discharge G Applicable G N/A

1 **Siltation** G Location shown on site map G Siltation not evident
Areal extent_____ Depth_____
Remarks_____

2. **Vegetative Growth** G Location shown on site map G N/A
G Vegetation does not impede flow
Areal extent_____ Type_____
Remarks_____

3. **Erosion** G Location shown on site map G Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4 **Discharge Structure** G Functioning G N/A
Remarks_____

VIII. VERTICAL BARRIER WALLS G Applicable G N/A

1 **Settlement** G Location shown on site map G Settlement not evident
Areal extent_____ Depth_____
Remarks_____

2. **Performance Monitoring** Type of monitoring_____
G Performance not monitored
Frequency_____ G Evidence of breaching
Head differential_____
Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES G Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines G Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   G Good condition G All required wells properly operating G Needs Maintenance G N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   G Good condition G Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   G Readily available G Good condition G Requires upgrade G Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines G Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
   G Good condition G Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   G Good condition G Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   G Readily available G Good condition G Requires upgrade G Needs to be provided
   Remarks_____

C. Treatment System G Applicable X G N/A

1. **Treatment Train** (Check components that apply)
   - G Metals removal G Oil/water separation G Bioremediation
   - G Air stripping G Carbon adsorbers
   - G Filters_____
   - G Additive (*e.g.*, chelation agent, flocculent)_____
   - G Others_____
   - G Good condition G Needs Maintenance
   - G Sampling ports properly marked and functional
   - G Sampling/maintenance log displayed and up to date
   - G Equipment properly identified
   - G Quantity of groundwater treated annually_____
   - G Quantity of surface water treated annually_____
   - Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - G N/A G Good condition G Needs Maintenance
   - Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   - G N/A G Good condition G Proper secondary containment G Needs Maintenance
   - Remarks_____

4. **Discharge Structure and Appurtenances**
   - G N/A G Good condition G Needs Maintenance
   - Remarks_____

5. **Treatment Building(s)**
   - G N/A G Good condition (esp. roof and doorways) G Needs repair
   - G Chemicals and equipment properly stored
   - Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   - G Properly secured/lockedG Functioning G Routinely sampled G Good condition
   - G All required wells located G Needs Maintenance G N/A
   - Remarks_____

D. Monitoring Data

1. Monitoring Data
   - X Is routinely submitted on time X Is of acceptable quality

2. Monitoring data suggests: Increasing trends in one well
   - G Groundwater plume is effectively contained G Contaminant concentrations are declining

See text of 5 year report for monitoring data discussion.

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
G Properly secured/locked ☒ Functioning ☒ Routinely sampled G Good condition
G All required wells located ☒ Needs Maintenance G N/A
Remarks Two wells needed repairs for caps/locks. will be done
See additional comments below about artesian wells

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
See text of 5 Year review report for detailed discussion

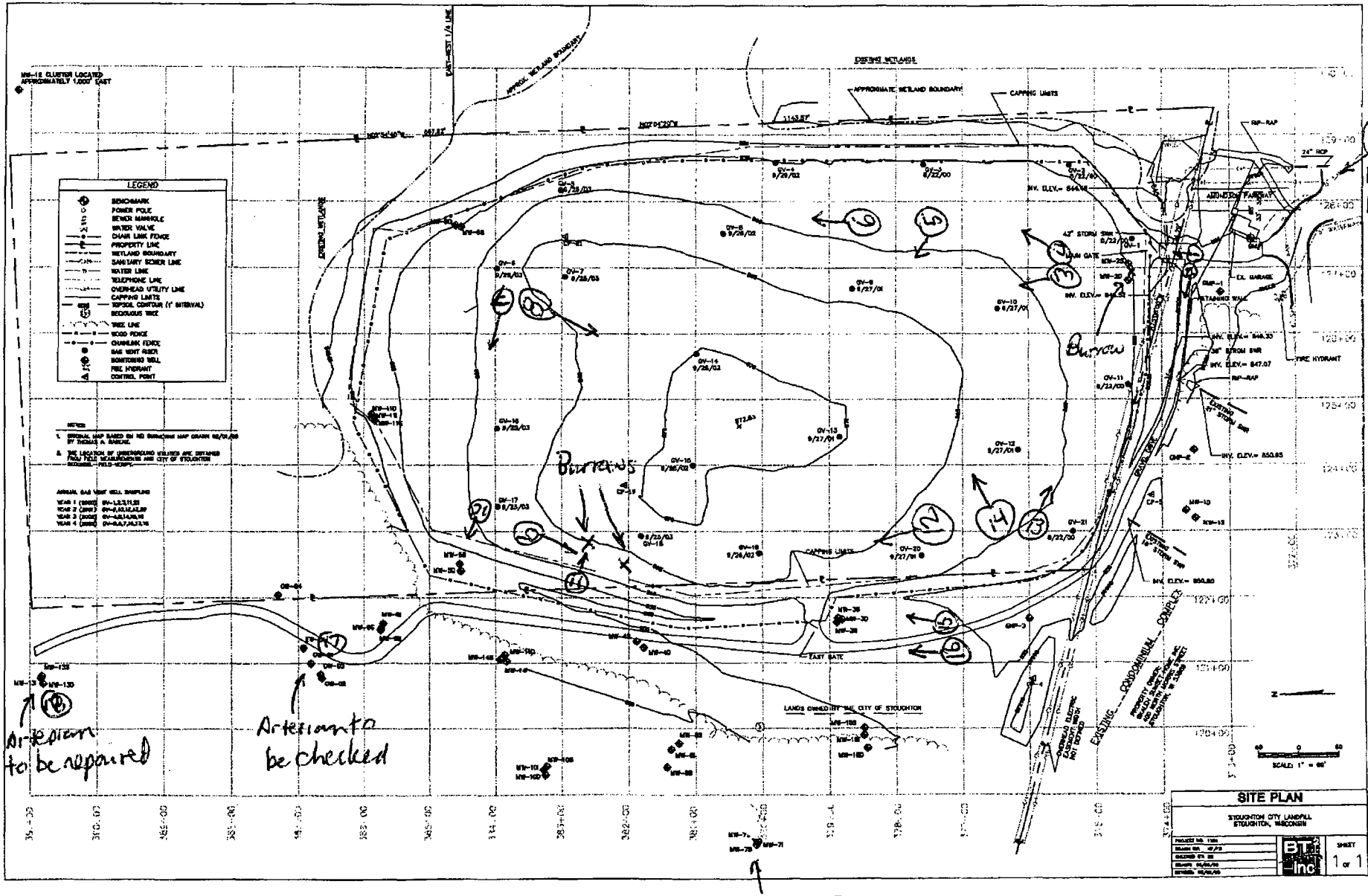
B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
See text of 5 year review report for detailed discussion.
monitoring
Three wells under artesian conditions are still leaking to the surface. The O&M contractor will attempt to repair 1 of them & they are under contract to repair and inspect the other 2 to determine what repairs are needed.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Stoughton City LF Inspection
10/17/07 Photo Key L. Edelstein



APPENDIX 3

December 3, 2007

DEC - 7 2007

Mr. Gary Edelstein
WDNR South Central Region Office
3911 Fish Hatchery Road
Fitchburg, WI 53711

SUBJECT: **Semiannual Facility Inspection Report**
Task #2
Stoughton City Landfill
FID #113005950 – License #133
U.S. EPA ID #WID980901219
WDNR Purchase Order #NMF00000591
BT² Project #1764

Dear Mr. Edelstein:

This letter provides the Semiannual Facility Inspection Report for the Stoughton City Landfill site. We conducted the facility inspection at the site on October 17, 2007. Also present at the site for the inspection were Mr. Kyle Rodgers of the U.S. EPA and Mr. Gary Edelstein of the WDNR.

Semiannual Facility Inspection

BT², Inc. performed the semiannual facility inspection at the site on October 17, 2007 (**Attachment A**). The following inspection items were noted:

Bi-Monthly Gas Monitoring – The bi-monthly monitoring of the three perimeter gas probes was conducted on June 13, August 6, and October 17, 2007. Based on the monitoring results, it does not appear that any landfill gas is migrating to the north of the landfill. The completed Bi-Monthly Gas Monitoring Reports are included in **Attachment A**.

Landfill Cover – The landfill cover was mowed on October 6, 2007. The original scheduled date for the mowing in August was postponed due to heavy rains. The quality of the vegetative cover across the landfill was good. No bare spots, signs of erosion or sparse vegetation were found. No ponding, drainage gullies, or other retainment of water was apparent on the cover. Two animal burrows were found on site near monitoring well nest MW5 and gas vent GV-11. Both burrows were filled in and photographed. Several deep-rooted weedy shrubs were found near several of the gas vents and monitoring wells inside the security fence. All were cut down and photographed. The photographs are included in **Attachment B**.

Stormwater Management System – No visible erosion was found in the drainage channels. The culverts were undamaged and the riprap was not clogged.

Landfill Gas Venting System – No damage was found at any of the gas venting wells and no stressed vegetation was found near the wells. All 21 gas venting well screens were clear and no further maintenance is needed at this time.

Perimeter Security Fencing – No new broken perimeter fence boards were found. The chain-link fencing on the north and east sides of the site are in good condition. Both access gates are in good condition and the padlocks operated properly. Both padlocks were sprayed with WD-40 The sign on the front gate was missing. A new sign (supplied from the WDNR) will be installed at the next site visit

Monitoring Wells and Wellhead Covers – No signs of tampering, or damage were found at any of the site monitoring wells The padlock for well MW14D was replaced with a BI^2 keyed padlock

Access Road – The site access road was in very good condition with no ruts, ponding, or erosion noted

Maintenance Issues

During the site inspection, observation wells OW-2 and OW-4 were found to be seeping water The slip cap for well EW-1 is also in need of repair The costs for these well repairs will be addressed in a future Change Order. Monitoring wells MW7B and MW13I had expandable well plugs installed inside the stainless steel well risers to stop water from flowing from the wells The well plug installed in MW13I stopped the water flow while the plug in MW7B was unable to stop the flow of water A longer well plug will be installed in well MW7B to try to stop the flow of water at the next site visit

If you have any questions about the report or any other aspect of the project, please call us at (608) 224-2830.

Sincerely,
BI^2, Inc.

Steven B Smith
Environmental Specialist

Leslie A Busse, P.E.
Project Manager

Enclosed: Attachment A – Inspection Report and Bi-Monthly Gas Monitoring Reports
Attachment B – Site Photographs

cc: Mr Kyle Rodgers – USEPA Region V

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ATTACHMENT A

Inspection Report and Bi-Monthly Gas Monitoring Reports

Operation and Maintenance Periodic Inspection Report
Stoughton City Landfill
Stoughton, Wisconsin

Inspector: S.Smith
Company: BT² Inc.
Project: Stoughton City LF
Location: Stoughton, WI
Date/Time: 10/7/07 08:45
Project No: #1764

Weather	PcAly cloudy	Clear	P. Cloudy	Cloudy	Fog
Temperature	~56°F	High	F	---	---
Wind	Medium	Calm	Medium	High	---
Precipitation	None	Rain	Light	Moderate	Heavy
		Snow	Light	Moderate	Heavy

Type of Inspection: Routine ☒ Special ☐

Persons/Equipment Present: S.Smith – Landtec GEM2000 LFG Meter; Thermo PID (+1); Tom – City of Stoughton, Greg Edelstein – WDNR, Kyle Rogers – U.S. EPA

General Description of Site Conditions: Mowed recently (about 2wks. ago).

Specific Inspection Items	Potential Problem Areas	Status*	Notes
Perimeter Security Fencing	Broken boards/vandalism	(1)	NO broken boards. fence in good condition
Entrance Gate and Locking Mechanism	Lock broken/missing, mechanism inoperative	(1)	missing front gate sign. Locks good.
Monitoring Wells and Wellhead Covers	Signs of tampering, casing damaged, lock missing or damaged	(2)	Replaced padlock on MW14D. Installed well plugs in MW7B, MW13I. Need to install well plugs in GW-2 and GW-4
Final Cover Vegetation	Bare spots, stressed vegetation, deep-rooted vegetation	(1)	Great shape.
Final Cover Slope (explain below)	Gullies, lack of vegetation, subsidence, ponding	(1)	NO ponding or gullies
Evidence of Burrowing Animals	Damage to final cover, evidence of waste	(2)	Animal burrow near MW5 west again. Animal burrow beside GW-11. Filled both in.
Stormwater Drainage Channels	Gullies, erosion, debris, culvert blocked	(1)	Good condition. NO blockages seen.
Landfill Gas Venting System	Damaged vent risers, stressed vegetation	(1)	All gas risers in good shape.
Access Road	Ponding, rutting, erosion	(1)	Access road in great shape.

*(1) Acceptable - No Maintenance Required. (2) Not Acceptable - Identify Required Maintenance

Summary of Deficiencies and/or Corrective Actions: Need to install well plugs in GW-2 and GW-4

Signature of Inspector: Steve Arnick

Date: 10/7/07

Bi-Monthly Report
Gas Monitoring Probes
Stoughton City Landfill
BT² Project #1764

Probe	% LEL (as Methane)	% Oxygen	% CO_2	PID (ppm)	Pressure (inches H_2O)
GMP-1	0.0	20.2	0.8	0.0	+0.02 ~~+0.14~~
GMP-2	0.1	20.6	0.2	0.0	+0.05
GMP-3	0.2	20.3	0.3	0.0	+0.05

Instruments Used: Landtec GEM2000 LFG Meter, Thermo PID #1

Operator: S. Smith, BT² Inc. Date: 10/17/07 (11am)

Weather Data

Barometric Pressure: 28.95" Hg (by GEM), 29.90" Hg (weather.gov) Temperature: 60.1°F

Humidity: 67% Dewpoint: 48.9°F Wind: 9.2 mph from S

Ground Surface: Damp from dew Conditions: ~~Overcast~~ Clear

Bi-Monthly Report
Gas Monitoring Probes
Stoughton City Landfill
BT² Project #1764

Probe	% LEL (as Methane)	% Oxygen	% CO_2	PID (ppm)	Pressure (inches H_2O)
GMP-1	0.0	20.7	0.0	0.0	0.00
GMP-2	0.1	20.6	0.0	0.0	0.00
GMP-3	0.1	20.6	0.0	0.2	0.00

Instruments Used: Ladtec GEM2000, Thermo PID(#1)

Operator: S. Smith, BT² Date: 8/6/07 (11am)

Weather Data

Barometric Pressure: 29.89" Hg Temperature: 70°F

Humidity: 84% Dewpoint: 64.9°F Wind: Calm

Ground Surface: Wet Conditions: Overcast

Bi-Monthly Report
Gas Monitoring Probes
Stoughton City Landfill
BT² Project #1764

Probe	% LEL (as Methane)	% Oxygen	% CO_2	PID (ppm)	Pressure (inches H_2O)
GMP-1	0.0	20.6	0.0	0.0	0.00
GMP-2	0.0	20.7	0.0	0.0	+0.01
GMP-3	0.0	20.6	0.0	0.0	+0.01

nstruments Used: Landtec GEM2000, Thermo PID

Operator: S. Smith, BT² Date: 6/13/07 (11:30)

Weather Data

Barometric Pressure: 30.12" Hg Temperature: 81° F

Humidity: 41% Dewpoint: 55.9° Wind: Calm

Ground Surface: Clear + Dry Conditions: Scattered clouds

ATTACHMENT B

Site Photographs

GV-9; viewed looking west. View following removal of deep-rooted woody vegetation

MW-11 well nest; viewed looking north. View following removal of deep-rooted woody vegetation.

GV-11; viewed looking south. View following removal of deeper rooted woody vegetation.

GV-11; viewed looking east. View following filling of the animal burrow.

Front gate at the end of Amundson Parkway showing missing front gate sign.

MW7B. View showing continued water seepage following installation of well plug to 4’ below grade.

MW7B

OW-4, view showing water seepage.

PVC well EW-1.

View showing cap.

MW13I; viewed looking west. View of the well following installation of well plug. No water seepage.