Procedures for Preparing and Submitting Landfill Environmental Monitoring Data to the Waste and Materials Management Program

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Waste & Materials Management
P.O. Box 7921
Madison, WI 53707-7921

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Appendices

These procedures detail the steps necessary to report landfill environmental monitoring results to the Department of Natural Resources (DNR) Waste and Materials Management Program's Groundwater and Environmental Monitoring System (GEMS) database.

All environmental monitoring results, including groundwater, surface water, leachate, lysimeter and gas, are required to be electronically reported to the DNR in Madison within 60 days of the end of the sampling period (s. NR 507.26, Wis. Adm. Code). Incorrect and/or incomplete data submittals will not be accepted and DNR will ask the sender to correct and resubmit the data.

Please note: DNR required water supply well monitoring results (i.e., private wells) must be submitted in electronic format to the DNR along with the other required facility monitoring results within 60 days as mentioned above. *However, the results of all DNR required water supply well sampling must also be reported within 10 days of receipt* directly to the DNR regional office in which the landfill is located (s. NR 507.26(2)). The water supply results sent to the regional office must be accompanied by two copies of a cover letter highlighting any values that attain or exceed the enforcement standards in NR 140, Table 1.

If you have questions about preparing and reporting data, please contact the Waste and Materials Management Program at (608) 266-2111. If you have questions about landfill environmental monitoring requirements, sampling techniques or other technical issues, please contact the DNR hydrogeologist or engineer who is assigned to your site.

What to Submit, Where to Send Submission and Submittal Preparation

Mail a single copy of landfill environmental monitoring results on either CD or diskette to the following address:

For United States Postal Service, mail to: GEMS Data Submittal Contact – WA/5
                  Wisconsin Department of Natural Resources
                  P.O. Box 7921
                  Madison, WI 53707-7921

For FedEx, UPS, hand deliveries, etc. send to: GEMS Data Submittal Contact – WA/5
                  Wisconsin Department of Natural Resources
                  101 South Webster St.
                  Madison, WI 53703

Do not send a duplicate copy to the site hydrogeologist or engineer unless specifically requested to do so. In some cases the hydrogeologist or engineer may request that some data be sent directly to them and not submitted to GEMS at all.

Please do not include a hard copy of the electronic data with your submission unless specifically requested. The submission should include:
- the data in electronic form on either CD or 3.5" diskette;
- a signed certification form (see link below);
- a list of exceedances, if any;
- an explanation of the cause and significance of any exceedances and
- a cover letter, if written.

If possible, use a CD due to the lower likelihood of sustaining damage in the mail. If you submit data for multiple reporting periods (and/or multiple sites) together, please make sure it is clear on the exceedance list(s) which substances were exceeded at which reporting period and/or site. You may create lists of exceedances in various ways, but please include at least one version that lists the exceeded substances by parameter (i.e., not by well or date) for each license per report period per site (see example below). Do not include J-flagged results in the list of exceedances unless they exceed the preventive action limit or enforcement standard. Make sure to point out any changes in exceedances that have occurred since the previous reporting period.

Exceedance Table by Well

Well	Parameter	Result	PAL	ES	Exceedance Type (PAL or ES)
MW-1	Tetrachloroethylene	0.69 J	0.5	5	PAL
	Trichlorethylene	0.95	0.5	5	PAL
MW-5	Tetrachloroethylene	5.3	0.5	5	ES
MW-6	Alkalinity, tot filtered	455	440		PAL
	Trichloroethylene	0.55 J	0.5	5	PAL

Exceedance Table by Parameter

Parameter
Tetrachloroethylene
Trichloroethylene
Alkalinity, tot filtered

Environmental Monitoring Data Certification Form 4400-231:

This is a "fill and print" form. It does not allow you to save or e-mail an electronic version of the form or its data. Use your tab or enter keys to navigate through the form fields. Many of the fields have a limit to the number of printed characters they will accept. When you have finished filling out the form, print it and be sure to make an extra copy for your own files.

Please make sure the Certification Form is complete before mailing. A facility representative must sign and date the form. It is important to include the name, phone number and e-mail address of the data preparer in the event that problems with the submission need to be resolved. If the actual data preparer is not listed, someone who can respond to inquiries about the data should be listed. This can be the person who signs the form as the facility representative.

Please **do not include the following**.
- The certification form, list of exceedances or any other hardcopy document on the CD or diskette; i.e., in electronic form. Include only data files on the CD or diskette.
- Duplicate copies of the same data file: that is, one copy each in either of the two accepted formats; text or comma delimited. Do not include a version of the data file in Excel format. Excel is not an acceptable format for uploading data into GEMS.
- The results for more than one facility in a single file unless it is not technically feasible to include facilities on individual files due to software or programming constraints.

Also, **do not** e-mail the landfill environmental monitoring data to the DNR unless specifically requested by staff or as indicated in a previous plan approval. If not specifically requested, the data will not be uploaded.

It is **acceptable to do the following**.
- Include multiple files per CD or diskette.
- Submit field and lab data for a given facility on separate files, or to submit data for different point types, groundwater monitoring wells or gas wells for example, on separate files, although it is easier to upload the data into GEMS if it is consolidated on a single file.
- Report multiple reporting periods (or sampling events) for a given site on a single file, although it is preferred that data for individual reporting periods be submitted on separate files.
- Include only one signed certification form covering multiple report periods for a given site as long as the report periods are submitted together and listed on the certification form.

CD or Diskette Labeling Requirements

Please include the following on the CD or diskette label:
- name of lab, consultant, municipality or facility submitting the disk
- facility license number
- facility name
- name(s) of the file(s) on the CD or diskette
- reporting period(s)
- name and phone number of data preparer

File Naming Instructions

Please use the following convention for naming each file on the CD or diskette:

File Name Element	For example	Use
3-letter month	June	jun
2-digit year	2006	06
(dash)	-	-
5 digit license number	123	00123 (zero fill to 5 digits)
3-letter file extension	.txt /.prn or .csv	.txt /.prn or .csv

For example, if the file contained the June 2006 data for license number 123 in comma delimited format, the file name would be **jun06-00123.csv.**

If the reporting period covers more than one month, i.e.,1st Qtr. 2006 (January through March), use the last month of the range. In this case, the name would be mar06-00123.csv. In the case of annual reporting, i.e. July 2005 to June 2006, the name would be jun06-00123.csv. In the case of noncontiguous sampling, i.e. March, May and August 2006, the file name would be aug06-00123.csv.

If wells are sampled after the designated reporting period due to unforeseen circumstances (e.g., inclement weather), use the last month of the designated report period, not the month in which the sampling actually occurred. If the report period was July through September and some or all sampling was delayed until October, the file name would be sep06-00123.csv, not oct06-00123.csv.

If you need more than one file to contain all the data for a reporting period and license number, add a letter directly after the license number, starting with "b" and following in sequence for each file thereafter. For example, if three files were required to contain the data for the June 2006 sampling for license 123 using the .csv format, the name of the first file would be jun06-00123.csv; the second jun06-00123b.csv and the third jun06-00123c.csv.

If the file contains data for more than one license for the same reporting period, use a plus sign to separate the license numbers, for example, jun06-00123+04242.csv.

License/Monitoring and Sample Point Identification Numbers Needed Prior to Submission

In order to prepare a submission, you will need two types of DNR issued identification numbers. If you have not done so already, ask the DNR hydrogeologist assigned to your facility for a five-digit license or monitoring ID for the facility and a 3-digit DNR sample point identification number for each monitoring point. (For a description of how DNR hydrogeologists and engineers assign point identification numbers to monitoring points, see Appendix I.)

For new facilities or newly created points, you will need to complete and submit the following forms to the hydrogeologist for each sample point (including replacements) at the site before the point can be "activated" in GEMS:

- Monitoring Well Construction Form (4400-113A)
- Monitoring Well Development Form (4400-113B)
- Soil Boring Log Information Form (4400-122)

In addition, supply the following form for each monitoring point that is a private water supply well:
- Groundwater Monitoring Inventory Form (3300-67)

List all monitoring points for your facility, and submit one form to the hydrogeologist:
- Groundwater Monitoring Well Information Form (4400-89)

Update this form each time a new point is added to the monitoring system. Mail one copy of each of these forms to the DNR hydrogeologist assigned to the site. If you are working with non-groundwater monitoring points, you may need to obtain the forms from, and submit the information to, the DNR engineer assigned to the site. To request any of these forms contact the Waste and Materials Management Program at 608-267-2111.

Procedures for Formatting Files and Data Element Definitions

File Formatting Types and Comparisons

The GEMS database can accept data in only two file formats: comma delimited (aka comma separated values or csv) or fixed width text. Excel files cannot be directly uploaded into GEMS—they must first be converted into csv files or flat (aka fixed width) text files. Text files are usually the output from data management systems, although they may also be created from Excel spreadsheets. Csv files can be created using a text editor such as Microsoft Notepad or Helious TextPad. More complex word processing programs such as Microsoft Word may provide satisfactory results, but are more likely to insert unintended characters into the file.

A list of the data elements (fields) required by either format in the order in which they must appear is presented below. Definitions and formatting requirements for comma delimited or text files are presented in Table 1; Data Elements List and Definitions (Comma Delimited; .csv file) and Table 2; Data Elements and Definitions (Fixed width; .txt or .prn file), respectively, located later in these instructions.

Data Elements List

1	License Number/Monitoring ID	Required for every record
2	DNR Sample Point ID Number	Required for every record
3	DNR Parameter Number	Required for every record
4	Sample Date	Required for every record
5	Multiple Sample Identifier	Required for every record
6	Agency	Required for every record
7	Result Value	
8	Qualifier	
9	Quality Control Flag 1	
10	Quality Control Flag 2	
11	Quality Control Flag 3	
12	Limit of Detection	
13	Limit of Quantitation	
14	Reporting Limit	
15	Reporting Period Date	Required for every record
16	Lab Analysis Date	
17	Lab Sample Number	
18	Analysis Method Number/Description	
19	Lab Certification ID Number	Optional for most field parameters

Comma Delimited File (.csv) Formatting Definition

Delimited data files use specific characters (delimiters) to separate values. The delimiters can vary. But, in the case of comma delimited formatting, the required delimiter is obviously a comma. The file extension .csv, which identifies comma delimited files, stands for comma separated variable. Each data element, or field, must be separated by a comma. The fields do not need to occur within predefined spacing. In the example of comma delimited data below, the first two commas separate the License # field (02976), DNR Point ID field (053, 052 and 997) and Parameter Code field (01057 and 00940).

```
02976,053,01057,070328,01,1,,N,M,M,M,0.053,0.18,1.0,070301,070406,8
02976,053,00940,070328,01,1,14,,M,M,M,1.1,3.5,5.0,070301,070403,8820410
02976,052,00940,070328,01,1,5.8,,M,M,M,1.1,3.5,5.0,070301,070403,882041
02976,997,00940,070328,01,1,,N,M,M,M,1.1,3.5,5.0,070301,070403,88204102
```

The data below is a continuation of the four records above that would normally appear contiguously on a single line but must be shown truncated here due to limited page width.

```
82041024,SW846 6020,405132750
24,EPA 300.0,405132750
023,EPA 300.0,405132750
0,EPA 300.0,405132750
```

How to Create Comma Delimited Files

Three different ways are presented in this documentation to create comma delimited files
- from an Excel spreadsheet;
- from a preformatted Excel template available on this site (preferred); and
- "manually" from Microsoft Notepad or another text editor, such as Helios TextPad

The data elements (fields) required for the comma delimited file, the order in which they appear in a record, and their definitions are presented in Table 1. Review the formatting requirements in Table 1 prior to creating a file. Of the three methods listed, the second, the preformatted Excel template, is the easiest to use since it will automatically validate some aspects of your data, saving you from time-consuming corrections later. However, the validation function will not work if data is pasted into the template, thus you may choose to use the template only for small amounts of data readily entered manually.

How to create a comma delimited file from an Excel spreadsheet:
- Create an Excel spreadsheet with 19 columns representing each of the 19 electronic submittal data elements (fields) listed, and in the order presented, in Table 1.
- Enter data into the spreadsheet for the data records to be submitted in the format specified in Table 1. The spreadsheet must <u>not</u> contain any column headings or any other "extraneous" text, characters or line breaks.

- The following fields listed in Table 1 require the use of leading zeros: Sample Date, Multiple Sample Identifier, Reporting Period, and Lab Analysis Date. (**Note**: Leading zeros formerly required for the License/Monitoring Number, DNR Sample Point ID and Parameter Number are no longer required.) In order to retain leading zeros, which Excel spreadsheets normally do not retain, a "Custom Format" must be created. To create this format, highlight the column to be formatted; select Format > Cells > the Number tab > Custom under "Category." In the box directly under "Type" enter a zero for each digit of the expected number, i.e.,the Multiple Sample Identifier requiring two digits, would be 00.

- Once you have completed the spreadsheet, you <u>must</u> save it as a comma delimited file. (Excel spreadsheets are not accepted.) To do so, click "Save As" under the "File" menu. The "Save As" dialogue box appears. Create a file name using the protocol presented previously under File Naming Instructions. Click the "Save as type" drop-down box, scroll down to "CSV (Comma delimited) (*.csv)" and highlight it. The file name extension will now appear as .csv. Click "Save." A dialogue box stating "The selected file type does not support workbooks that contain multiple sheets" will appear. Click "Okay." Another dialogue box will appear asking if "….you want to keep the workbook in this format?" Click "Yes." The comma delimited file will now appear in your directory. **Note:** A CSV file cannot be created by simply changing the Excel file extension to .csv. The "File | Save As" command <u>must</u> be used.

- **WARNING:** To view data in a comma delimited file, <u>do not</u> open the file directly by clicking on it because leading zeros from those fields that require them may be lost. Even though the file is in comma delimited format, if it is opened without using a text editor such as Microsoft Notepad or some other editor, the file will open in Excel. Since Excel does not retain leading zeros unless a custom format is created, leading zeros will be lost if the Save button is clicked. To open the file using Notepad, highlight the file to be opened, click on the "File" menu, highlight "Open With" and click on "Notepad." **Note**: Some computers may be configured differently. You should see that commas have been inserted between each column of data and that double quotes have been used to enclose columns of data that contain a comma as a value.

How to create a comma delimited file from a preformatted Excel template:
An Excel template with the columns required for the 19 data fields listed in Table 1 is available. This template validates data for character length and/or other data requirements when values are entered using the keyboard. The validation rules will not work if you paste values from another source into the template, though they will work if you paste values from within the same column of the same template. A warning will appear if you enter too many characters into a field or violate another validation rule.

Note: Enter data elements into the template in the order listed in Table 1. Use a blank template each time you create a new file.

<div align="center">

Click the following link to download the template for <u>comma.xltx</u>.

</div>

A dialogue box will appear, asking if you want to open or save this file. We recommend that you click "Open" and always access the template from the Internet (do not click "Save") to avoid missing any updates to the template. A Security Warning dialogue box appears. Click "Enable Macros." The template has two tabs, identified as the Data Sheet and the Parameter List. The Data Sheet should be displayed; if not, click on its tab.

By clicking anywhere in a column, the column name and a brief definition will appear. Normal Excel editing functions such as Fill Down and Clear Contents may be used to manipulate data.

Columns A, B, G, L, M, N, Q, R and S are all validated by the maximum character length defined in Table 1. If you exceed the maximum length, an error box will appear that states the maximum number of digits allowed and allows you to retry or cancel the entry. After 10 characters have been entered, Columns L, M and N representing LOD, LOQ and RL, respectively, give the warning: "This field must be 10 characters or less."

Columns F, H, I, J and K all have a drop-down list that contains the permitted values for their respective fields. For Col. H (Result Qualifier), two values, "N" and "J," are listed in the drop-down box, but a blank, indicative of detect, is also permitted for this field. Similarly, columns I, J and K (Quality Control Flags) also have a blank as a permitted value (QC flags not required for field data, etc.). Column C (Parameter Number) is checked against a list of permitted parameters but does not have a drop-down list box. **Note:** The list of parameters is included in the template on the worksheet entitled Parameter List.

The template will automatically add the leading zero in column E (Multiple Sample Identifier) even if you paste values from another source. If you are pasting Sample, Reporting Period or Lab Analysis dates into the template from a source where the dates are recorded in the conventional format, e.g., "02/15/07," use the Paste Special command (with Values selected), not Paste; otherwise the dates will not appear in the correct comma delimited format with the year first as "070215."

The template will check the validity of dates entered in Columns D (Sample Date), O (Reporting Period Date) and P (Lab Analysis Date). In other words, the Lab Analysis Date should be on or after the Sample Date. Similarly, the Sample Date should occur during the same month, or following, the Reporting Period Date month, although there are exceptions (see Appendix II). When the worksheet is completed, you may check the validity of all the dates using the "Circle Invalid Data" icon on the Auditing toolbar. If the Auditing

toolbar is not visible, you can display it by choosing "Formula Auditing" from the "Tools" menu and clicking on "Show Formula Auditing Toolbar."

Once you have completed the template, you <u>must</u> save it as a comma delimited file. Follow the directions under "How to create a comma delimited file from an Excel spreadsheet," above.

How to create a comma delimited file manually from Notepad or Word:
- You must inset a comma between each data element. If no data are available for a given data element (a field is blank), place a comma after the last comma from the previous data element. For example, from the first record of the sample data shown above, `01,1,,N,M,M,M,0.053…`, between column F, which contains the value for agency, "1," and column H, which contains the result qualifier "N" for non detect, is column G, the result value, which in the case of a non detect is blank, as represented by the absence of any entry between the two commas. (This is only necessary if there are any additional data elements in the record for which data needs to be reported.)
- The end of each record must contain a hard carriage return. A record may not start with a comma but may end with one or more commas.
- Data elements that could contain one or more "embedded" commas, such as Lab Sample Number or Analysis Method Number/Description, in their value must be enclosed in double quotes (putting data elements without embedded commas in double quotes, though not necessary, will not cause any problems).
- Data elements defined as "Numeric" values do not require leading zeros and should contain a fixed decimal point when applicable. Commas should not be used to separate thousands. (Enter 12000 not 12,000).
- Column headings or any other "extraneous" text, characters or line brakes must <u>not</u> be present in comma delimited files.
- In the Result Value, Limit of Detection, Limit of Quantitation and Reporting Limit fields, only report trailing zeros to the right of the decimal point if they are significant. Values cannot be presented in exponential format. No more than 7 digits after the decimal point can be entered for the result value. You cannot enter any digits after the decimal point in other numeric fields.
- Create a file name using the convention described previously under File Naming Instructions.

Table 1: Data Elements List and Definitions (Comma Delimited; .csv file)

#	Excel Col.#	Data Element	Max. Length	Format	Data Element Definition
1	**A**	**License/Monitoring Number**	5	Numeric	5-digit number assigned to facility by DNR (includes leading zeros)
2	**B**	**DNR Sample Point ID Number**	3	Numeric	3-digit number assigned to the sampling point by the DNR, including leading zeros. Trip blanks are reported as point ID 999 and field blanks are reported as point ID 997.
3	**C**	**DNR GEMS Parameter Number**	5	Numeric	5-digit parameter code, including leading zeros. For more information about the codes or access to code tables on this Web site, see **Appendix III** or contact the DNR at (608) 266-2111.
4	**D**	**Sample Date (YYMMDD)**	6	Date (yymmdd)*	Date sample was collected in the field.
5	**E**	**Multiple Sample Identifier**	2[a]	Character	01 for first sample, 02 for duplicate, 03 for triplicate, etc., and 09 for laboratory replicates. Report multiple trip blanks as multiple samples of point ID 999. For example, use 02 in this field for a second trip blank result. For more information see **Appendix IV**.
6	**F**	**Agency**	1	Numeric	Number indicating who took the sample (1=Facilty, 2=DNR, 3=EPA).
7	G	Result Value	12	Numeric	Result value can be anywhere in this field. If the result is below the Limit of Detection (LOD), this column should be **blank** and N should be entered in column 8. If the parameter number refers to a comment indicating field conditions or sample characteristics, such as a dry well or sample odor, value should be **0** (zero) if observed, or **blank**; and N in column 8, if not observed. There should **never** be a value in this field and an N in column 8. For more information see **Appendix III**.
8	H	Result Qualifier	1	Character	**N** if the parameter was **not** detected at or above the LOD or RL, **J** for results **between** the LOD and LOQ, or **blank** for results **at** or **above** the LOQ or RL. If the parameter number refers to a comment indicating field conditions or sample characteristics, such as a dry well or sample odor, enter an N if the condition or characteristic is not observed or leave blank and enter a 0 (zero) in column 7 if the condition or characteristic is observed. For more information see **Appendix III**.
9	I	Quality Control Flag I	1	Character	Only report a QC Flag I failure (**F**) for a sample in which a parameter

						is detected, if the concentration of the parameter in the associated method blank, trip blank or field blank exceeds the highest of any of the following values for that parameter: • the limit of detection; or • 5 % of the lowest applicable regulatory limit for the parameter; or • 10 % of the measured concentration in the sample. **M** if the concentration of the parameter in the associated method blank, trip blank or field blank does not exceed the highest of any of those same values. **Note**: When reporting field blank and trip blank results, leave the QC Flag I field empty (do not enter an M or F).**
10	J	Quality Control Flag II	1	Character		**F** if the sample failed the analytical method's preservation and holding time requirements, **M** if the sample met those requirements.
11	K	Quality Control Flag III	1	Character		**F** if the sample failed the quality control standards specified by the analytical method or the requirements of NR 149.48. **M** if the sample met those requirements.
12	L	Limit of Detection	10	Numeric		LOD for the parameter. This is a 10-character field with a floating decimal point (e.g., 0.2 or 0.01). Required for each parameter with a public health-related groundwater standard in Table 1, NR 140. For more information see **Appendix V**.
13	M	Limit of Quantitation	10	Numeric		LOQ for the parameter. This is a 10-character field with a floating decimal point. Required for each parameter with a public health-related groundwater standard in Table 1, NR 140. For more information, see **Appendix V**.
14	N	Reporting Limit	10	Numeric		Alternative RL for the parameter, (i.e., not an LOD or LOQ). This is a 10-character field with a floating decimal point (e.g., 201.0 or 5.0). Allowed for parameters that do not have public health-related groundwater standards in Table 1, NR 140, and for results from non-groundwater samples (e.g., leachate, lysimeter, gas, and gas condensate). For more information, see **Appendix V**.
15	**O**	**Reporting Period (YYMMDD)**	6	Date (yymmdd)*		First day of the month for the month in which the sampling is required, e.g., October 2006 appears as 061001. For more information, see **Appendix II**.
16	P	Lab Analysis Date (YYMMDD)	6	Date (yymmdd)*		Date of lab analysis.
17	Q	Lab Sample Number	9	Character		Unique, lab-assigned number for the sample.
18	R	Analysis Method Number or Description	15	Character		Number or description of the method used to analyze the sample for the specified parameter (can be numbers and/or text).
19	S	Lab Certification ID Number	9	Character		DNR issued lab certification identification number for the lab that analyzed the sample. Lab certification or registration is required for labs that perform analyses included in the fields of accreditation in NR 149.13. **Lab certification or registration is not required if the analysis is not performed by a lab (e.g., most field parameters).**

[a] First digit should always be zero.
* If you're using the Excel template we've created, you must enter the dates in a standard format, i.e., mm/dd/yyyy. The template will convert the date you enter to the specified format unless you paste data into the field.
Note: Data elements in **BOLD** are required for every record. The Lab Certification ID Number is optional for most field parameters.
** QC Flag I qualifiers (M or F) apply to results for environmental samples, not to results for any blank samples associated with them. The purpose of the QC Flag I "F" qualifier is to identify environmental sample results that may be biased high because of contamination detected in associated blank samples. The purpose of the blanks is to determine how the associated environmental sample results should be qualified (i.e., as either meeting or failing the QC Flag I criteria). Before November 10, 2009, the only criterion for the QC Flag I qualifier was whether a parameter detected in an environmental sample was also detected in an associated method, trip or field blank above the LOD. Effective November 10, 2009, we added criteria that also consider the lowest applicable regulatory limit for the parameter and the measured concentration of the parameter in each environmental sample. On November 10, 2009, we notified GEMS users of the new relaxed criteria for reporting QC Flag I qualifiers. On January 22, 2010 we emailed GEMS users to clarify the meaning of the November 10, 2009 notification as it applies to samples with no detect results.

Fixed Width Text File (.txt or .prn) Formatting Definition

Fixed width text files differ from comma delimited files by having the data elements or fields separated by spaces or white space. Each data element can only be a specified number of characters long and must begin with a specified number of characters from the left hand margin. The example below shows data submitted for License # 893, DNR point ID 108, and parameter codes: 940, 1046, 22413 for sample date June 28, 2006. Each record contains the necessary data elements for lab analyzed samples. The fields and their formatting are explained in the following text and table.

```
6    008931080094006092801 1   110              MMM           .65  2.15          06090106100340751…
6    008931080104606092801 1   1.64             MMM           .012 .041          06090106092940751…
6    008931082241306092801 1   613              MMM           .057 .190          06090106092940751…
```

The data below is a continuation of the three records above which would normally appear contiguously on a single line but must be shown truncated here due to limited page width.

```
…EPA 9251                                   157066030
…EPA 6010B                                  157066030
…SM 2340B                                   157066030
```

How to Create Fixed Width Text Files

Three different ways to create fixed width text files are presented in this documentation:
- From an Excel spreadsheet
- From a preformatted Excel template available on this site
- "Manually" from Microsoft Notepad

How to create a fixed width format file from an Excel spreadsheet:
- Arrange the columns (fields) of the Excel spreadsheet so they appear in the order as presented in Table 2: 26 columns representing each of the 19 electronic submittal data elements (fields), six blanks (spaces containing no data), and the first field containing the number "6."
- Format the fields as specified in Table 2. The spreadsheet must not contain any column headings or any other extraneous text, characters or line breaks.
- The following fields listed in Table 2 require leading zeros: Sample Date, Multiple Sample Identifier, Reporting Period and Lab Analysis Date. (Leading zeros are no longer required for the License/Monitoring Number, DNR Sample Point ID and Parameter Number.) To retain leading zeros, which Excel spreadsheets normally do not retain, create a "Custom Format" by highlighting the column to be formatted; select Format > Cells > the Number tab > Custom under "Category." In the box directly under "Type," enter a zero for each digit of the expected number. For example, the Multiple Sample Identifier, which must be two digits long, would be 00. (If you are entering data into the spreadsheet manually one cell at a time, format these columns as text and the leading zeros will be retained as the values are entered.)
- Once all the columns are in the correct order and format, the data in each column must be spaced appropriately. Specify the width for each column by the number of spaces indicated under the Column Width field in Table 2. Thus, the first field, containing the number "6," will have a column width of one; the second field, containing the first of six blanks, will have a column width of three, representing spaces two, three and four. The number entered into the column width box translates, one-to-one, into the number of spaces that will appear in the text file. The column widths for each of the 26 fields are listed in Table 2.
- Use the "Save As" command to save the spreadsheet as a fixed width text file. The fields should appear within the correct spaces.

How to create a fixed width text file from a preformatted Excel template:

An Excel template is available with columns required for the 26 fields listed in Table 2 already set up and predefined based on either character length or other validation rules. If you enter too many characters into a field or violate other validation rules, a warning will appear. (The warnings do not appear when you paste data into the spreadsheet.)

Note: Enter data elements into the template in the order listed in Table 2. You may paste data into the template one or more columns at a time (data does not need to be entered one cell at a time). Use a blank template each time you create a new file.

Click the following link to download the template text.xltm.

A dialogue box will appear asking if you want to open or save this file. We recommend that you click "Open" and always access the template from the Internet (do not click "Save") to avoid missing any updates to the template. A Security Warning dialogue box appears. Click "Enable Macros." The template has two tabs, identified as the Data Sheet and the Parameter List. The Data Sheet should be displayed; if not, click on its tab.

By clicking anywhere in a column, the column name and a brief definition will appear. You may use normal Excel editing functions such as Fill Down and Clear Contents to manipulate data.

In the template, columns C (col. 5-9 in table 2), D (10-12), K (30-41), Q (53-57), R (58-62), S (63-67), V (80-88), W (89-103) and Y (138-146) are all validated by the maximum character length defined in Table 2 when data are entered using the keyboard. Take care with values pasted into the spreadsheet as they are not validated in the same way as keyboard-entered values. If the maximum length

is exceeded, an error box will appear that states the maximum number of digits allowed, and allows the user to retry or cancel the entry.

In the template, columns E (col. 13-17 in table 2), G (24-25), I (27), L (42), M (43), N (44), and O (45) all have a drop-down list that contains the permitted values for their respective fields. For the Result Qualifier, two values, "N" and "J," are listed in the drop-down box, but a blank (representing a detect) is also permitted for this field. Similarly, Quality Control Flags I, II and III also have a blank as a permitted value. **Note:** A list of parameters is included in the template on the worksheet named Parameter List.

The template will automatically add the leading zero required for the Multiple Sample Identifier regardless of whether it is keyed in when data is entered using the keyboard.

The template will check the validity of dates entered in Columns F (Sample Date), T (Reporting Period Date) and U (Lab Analysis Date), corresponding to columns 18-23, 68-73 and 74-79 in Table 2, respectively. In other words, the Lab Analysis Date should be on or after the Sample Date. Similarly, the Sample Date should occur during the same month, or after, the month of the Reporting Period Date (for exceptions, see Appendix II). When the worksheet is completed, you may check the validity of all the dates using the "Circle Invalid Data" icon on the Auditing toolbar. If the Auditing toolbar is not visible, display it by choosing "Formula Auditing" from the "Tools" menu and clicking on "Show Formula Auditing Toolbar."

When the newly created file is complete, use the "Save As" command to save the spreadsheet as a fixed width text file.

How to create fixed width text files "manually" from Microsoft Notepad
Fixed width files must be formatted as follows using a text editor such as Microsoft Notepad. To find Notepad click on" Start," select "Programs," select "Accessories," click on "Notepad."
- Every record must begin with the number "6".
- The end of each record must contain a hard return.
- The Sample Date, Multiple Sample Identifier, Reporting Period and Lab Analysis Date fields must contain leading zeros. The MSI is two characters in length, including the leading zero. An MSI with a value of 1, for example, would be entered as 01 in columns 24-25.
- In the Result Value, Limit of Detection, Limit of Quantitation and Reporting Limit fields, trailing zeros to the right of the decimal point should only be reported if they are significant.
- Be especially aware that dates must be in the form YYMMDD without any punctuation. For example, if the date you are trying to report is December 1, 2000, you would enter that date as 001201.

Table 2: Data Elements and Definitions (Fixed Width; .txt/.prn file)

Data elements in **BOLD** are required for every record. The he Lab Certification ID Number is not required if the analysis was for a field parameter and it was not performed in a lab.

Field Spacing	Data Element	Column Width	Data Element Definition
1	6	1	The number 6 must be in column 1 of every record.
2-4	Blank	3	
5-9	**License/Monitoring Number**	**5**	5-digit number assigned to facility by DNR (includes leading zeros).
10-12	**DNR Sample Point ID Number**	**3**	3-digit number assigned to the sampling point by the DNR, including leading zeros. Trip blanks are reported as point ID 999 and field blanks are reported as point ID 997.
13-17	**DNR GEMS Parameter Number**	**5**	5-digit parameter code, including leading zeros. For more information about the codes or access to code tables on this Web site, see **Appendix III** or contact the DNR at (608) 266-2111.
18-23	**Sample Date (YYMMDD)**	**6**	Date sample was collected in the field.
24-25	**Multiple Sample Identifier**	**2**	01 for first sample, 02 for duplicate, 03 for triplicate, etc., and 09 for laboratory replicates. Report multiple trip blanks as multiple samples of point ID 999. For example, use 02 in this field for a second trip blank result. For more information see **Appendix IV**.
26	Blank	1	
27	**Agency**	**1**	Number indicating who took the sample (1=Facility, 2=DNR, 3=EPA).
28-29	Blank	2	

Column	Field	Width	Description
30-41	Result Value	12	Result value can be anywhere in this field. If the result is below the Limit of Detection (LOD), these columns should be **blank** and N should be entered in column 42. If the parameter number refers to a comment indicating field conditions or sample characteristics, such as a dry well or sample odor, value should be **0** (zero), if observed, or **blank**; and N in column 42, if not observed. There should **never** be a value in this field and an N in column 42. Report only significant figures. Do not zero-fill. For more information see **Appendix III**.
42	Result Qualifier	1	**N** if the parameter was **not** detected at or above the LOD or RL, **J** for results **between** the LOD and LOQ, or **blank** for results **at** or **above** the LOQ or RL. If the parameter number refers to a comment indicating field conditions, such as a dry well, enter an N if the comment does not apply or leave blank if the comment applies. For more information, see **Appendix III**.
43	Quality Control Flag I	1	Only report a QC Flag I failure (**F**) for a sample in which a parameter is detected, if the concentration of the parameter in the associated method blank, trip blank or field blank exceeds the highest of any of the following values: - the limit of detection; or 5 % of the lowest applicable regulatory limit for the parameter; or 10 % of the measured concentration in the sample. **M** if the concentration of the parameter in the associated method blank, trip blank or field blank does not exceed the highest of any of those same values. **Note**: When reporting field blank and trip blank results, leave the QC Flag I field empty (do not enter an M or F).**
44	Quality Control Flag II	1	**F** if the sample failed the analytical method's preservation and holding time requirements, **M** if the sample met those requirements.
45	Quality Control Flag III	1	**F** if the sample failed the quality control standards specified by the analytical method or the requirements of NR 149.48, **M** if the sample met those requirements.
46-52	Blank	7	
53-57	Limit of Detection*	5	LOD for the parameter. This is a 5-character field with a floating decimal point. (e.g., 0.2 or 0.01). Required for each parameter with a public health-related groundwater standard in Table 1, NR 140. For more information, see **Appendix V**.
58-62	Limit of Quantitation*	5	LOQ for the parameter. This is a 5-character field with floating decimal point. Required for each parameter with a public health-related groundwater standard in Table 1, NR 140. For more information, see **Appendix V**.
63-67	Reporting Limit*	5	Alternative RL for the parameter (i.e., not an LOD or LOQ). This is a 5-character field with a floating decimal point (e.g., 201.0 or 5.0). Allowed for parameters that do not have public health-related groundwater standards in Table 1, NR 140, and for results from non-groundwater samples (e.g., leachate, lysimeter, gas, gas condensate). For more information, see **Appendix V**.
68-73	**Reporting Period (YYMMDD)**	**6**	First day of the month for the month in which the sampling is required, e.g., October 2006 appears as 061001. For more information, see **Appendix II**.
74-79	Lab Analysis Date (YYMMDD)	6	Date of lab analysis.
80-88	Lab Sample Number	9	Unique, lab-assigned number for the sample.
89-103	Analysis Method Number or Description	15	Number or description of the method used to analyze the sample for the specified parameter (can be numbers and/or text).
104-137	Blank	34	
138-146	Lab Certification ID Number	9	DNR issued lab certification identification number for the lab that analyzed the sample. Lab certification or registration is required for labs that perform analyses included in the fields of accreditation in NR 149.13. **Lab certification or registration is not required if the analysis is not performed by a lab (e.g., field parameters).**
147-159	Blank	13	

*Unlike the comma-delimited format which will accept more than 5 characters for the LOD, LOQ and RL fields, fixed-width (text) format only allows for five. If the LOD, LOQ or RL fields require more than five characters, enter the first five digits and include a note with the submission indicating the excluded digits. DNR staff will enter the excluded digits into GEMS "manually." Values greater than five digits for LOD, LOQ and RL are likely to result from the use of dilution with leachate or lysimeter samples.

** QC Flag I qualifiers (M or F) apply to results for environmental samples, not to results for any blank samples associated with them. The purpose of the QC Flag I "F" qualifier is to identify environmental sample results that may be biased high because of contamination detected in associated blank samples. The purpose of the blanks is to determine how the associated environmental sample results should be qualified (i.e., as either meeting or failing the QC Flag I criteria). Before November 10, 2009, the only criterion for the QC Flag I qualifiers was whether a parameter detected in an environmental sample was also detected in an associated method, trip or field blank above the LOD. Effective November 10, 2009, we added criteria that also consider the lowest applicable regulatory limit for the parameter and the measured concentration of the parameter in each environmental sample. On November 10, 2009, we notified GEMS users of the new relaxed criteria for reporting QC Flag I qualifiers. On January 22, 2010 we emailed GEMS users to clarify the meaning of the November 10, 2009 notification as it applies to samples with no detect results.

Appendix I: Organizing GEMS Sample Point ID Numbers for Facilities Submitting Electronic Data

Introduction

The purpose of this guidance is to provide suggestions for organizing point identification (ID) numbers in the Groundwater and Environmental Monitoring System (GEMS) and assigning them to monitoring devices, for waste facilities that are required to do environmental monitoring and electronic data reporting to the department.

Background on GEMS

GEMS is the Waste and Materials Management (WMM) Program's computer database that stores and retrieves data submitted to the DNR in a required, specified electronic format from regulated waste facilities such as landfills and composting facilities.

GEMS stores data collected from a specific monitoring device at a facility by linking those data to a sample point ID number, assigned exclusively to that monitoring device point name (e.g., MW-1 might be given a sample point ID such as 201). Each monitoring device is assigned its own point ID number unique for <u>that facility</u>.

Entering New Facilities onto GEMS

This guidance is aimed primarily at assigning GEMS ID numbers for new facilities as they are being sited (for example, during the feasibility review for a new landfill). Typically a proposed new facility is given a facility monitoring number early in the siting process and that number is entered into GEMS. Then WMM staff assign sample point ID numbers in GEMS to the monitoring points as they are installed (e.g., for the geotechnical investigation) or as part of baseline monitoring. Assigning point IDs to groundwater monitoring wells early in the process allows the applicant to submit any necessary baseline groundwater monitoring results in an electronic format as they are generated.

Having electronic baseline groundwater monitoring data facilitates the calculation and review of proposed preventive action limits (PALs) and/or alternative concentration limits (ACLs). For a landfill, the assigned engineer and hydrogeologist would work together to assign the remaining GEMS sample point ID numbers for the other monitoring devices at the facility. The facility monitoring number would then become the facility's license number (if it were a licensed facility) and future data collected from the monitoring devices at the facility could be submitted to the DNR in electronic format for storage in GEMS. Please note that not all monitoring data must be submitted to GEMS; some are submitted with annual reports, etc.

Existing Facilities

Most established facilities already have monitoring devices installed and assigned sample point ID numbers in GEMS. Redoing the numbering scheme for existing monitoring points is generally not recommended and may confuse a facility if changed, but this guidance provides a reference for assigning GEMS ID numbers to new monitoring points.

Sequencing Point ID Numbers

Table 3: Suggested Protocol for Assigning GEMS Sample Point ID Numbers (see below) illustrates how to organize the GEMS sample point ID numbers for a particular facility. There may need to be some variation depending on the type of facility and the number of specific monitoring devices required at the facility. However, following this general pattern will provide consistency for others who look at the environmental monitoring data collected at the facility, and for consultants, lab technicians and facility owners who format the data for electronic download.

The order in which monitoring devices are assigned point ID numbers does not have to follow the sequential numbering system selected by the facility owner or applicant; however, it can be confusing if there is not some obvious relationship. Unless there is a compelling reason not to do so, the order of the point numbers should relate logically to the system used by the applicant or facility owner. For example, MW-1, MW-2, MW-3, MW-4 might be assigned the point ID numbers 102, 104, 106, 108.

Water Supply Wells

In order to expedite the review of data from private water supply wells, list them before groundwater monitoring wells for new landfills, and leave a gap before starting the monitoring well sequence to accommodate additional private wells in the monitoring plan. In addition, since private well owners change, rather than naming a private well by the last name of the owner, it may be more useful to name it by its PW number and the street address. For example, a private well PW-2 owned by John Smith at 4685 Hawthorn Ave. could be given the name : "PW2: 4685Hawth." Renaming water supply wells at sites already established in GEMS may prove useful, as long as the Point IDs don't change.

For the protection of public health, private water supply wells are a high priority and listing them first reflects that priority. For existing sites with established numbering systems, water supply wells should still be grouped together for ease of reviewing the data.

Leaving Placeholders for Replacements Monitoring Points

Some monitoring points, such as groundwater monitoring wells or gas extraction wells, are likely to be damaged and replaced during the active life and long-term care period of the facility. When developing the initial monitoring system, leaving gaps in the numbering sequence will allow you to sequentially insert replacements in the same numbering group as the originals. As a guideline, use only even numbered ID numbers when initially assigning point ID numbers. As replacement monitoring points are installed, the odd point numbers can be assigned to those replacements. For large facilities with many monitoring points, leaving many placeholders may not be possible and if a monitoring device is replaced more than once it may have to be out of order. Leaving empty placeholders is not as important as it once was, since GEMS has more sorting options than it did in its early days; however, if leaving some placeholders for replacement points can be done, it is still recommended. A replacement monitoring point should be considered a new point in GEMS and provided a new point ID number to differentiate it from the original monitoring point. Coordinate with the site operator to avoid confusion in this situation.

Properties that have Two or More Monitored Facilities

It is not uncommon to have an old, partially engineered landfill on the same property as a new, engineered landfill. Solid waste landfills may also be co-located with demolition landfills or composting facilities. Each facility usually has its own assigned license number and monitoring requirements. While each facility is physically distinct, the local groundwater regime is usually common to all of the facilities on a single property. Therefore, place each facility with a different monitoring ID or license number into GEMS separately. Organize selection of point ID numbers to accommodate two or more separately monitored facilities on the same property. As some monitoring points will be for a given facility alone, others can be linked to provide the ability to look at all data pertinent to the facility in question. Additionally, it allows "Schedules and Groups" developed from a given monitoring plan to be placed into GEMS in a manner that allows the "Compliance Report" to be effectively used. Monitoring requirements for a given point may be different at one facility than at another facility to which a point is linked. This is particularly obvious when there is an unlicensed/approved small size C&D landfill located next to a licensed MSW landfill where a well(s) is linked.

Whenever possible, for each facility assign the "same" point ID number to monitoring points, such as groundwater monitoring wells, that are linked between multiple facilities. This will avoid having multiple point IDs in existence for the same given monitoring point.

Other than for those linked points, assign the point IDs so it is not easy to confuse monitoring points between licensed facilities located on the same property. For example, if the property owner creates a data file to be submitted and downloaded to GEMS for multiple facilities on that property and two or more facilities use ID number 102, then the owner could mistakenly enter data meant for one 102 into another 102, even though license numbers would be different. This confusion can easily be prevented if the monitoring IDs are split into an upper or lower half; or into thirds; or any other consistent split. Each individual facility could then be assigned its point ID numbers within these subdivided ranges. For example, the monitoring wells at the unlined landfill could be assigned the point ID numbers 102, 104, 106, 108, . . ., while the monitoring wells around the lined landfill could be assigned the point ID numbers 202, 204, 206, 208….

Most multi-facility properties will have monitoring programs already assigned. The system suggested above can be implemented for all new required monitoring devices, for devices assigned in an approval that do not yet exist, and for devices that have been assigned but for which no data exist in GEMS. If a point has no data, it should be possible to delete the current point ID number and assign a new one (data could also be transferred to a new point ID, but it may be more time consuming than it is worth if many data transfers are necessary).

Nested Wells

For points in similar locations but with vertical separation, such as a monitoring well nest of groundwater monitoring wells or gas probes, select a single convention for numbering each member of the nest. In general, the members should be ordered from top (highest screen elevation) to bottom (lowest screen elevation), regardless of the alphanumeric names of the members. If done consistently, this allows convenient comparison of groundwater elevations, gradients or contamination patterns among members of well nests using our standard computer outputs. For example, the water table observation well might be assigned point ID number 010. The 30-foot piezometer might be assigned point 012; and the 50-foot piezometer might be assigned point 014.

Table 3: Suggested Protocol for Assigning GEMS Sample Point ID Numbers

Range of Point ID Numbers	What's being Monitored?	Monitoring Devices Assigned to the Range
001-399	Groundwater	• Water Supply Wells (generally use "001 to 099") • Groundwater Monitoring Wells and Piezometers
400-499	Leachate and Gas Condensate	• Leachate Collection Tanks • Leachate Sumps • Leachate Headwells • Gas Condensate Collection Tanks • Secondary Containment Sampling Points • Monitoring Wells Inside a Containment Wall
500-549	Below Landfill Liner	• Lysimeters • Gradient Control Headwells • Gradient Control Sampling Points
550-799 700	Landfill Gas	• Gas Probes – outside limits of waste • Gas Probes – inside limits of waste • Gas Extraction Wells • Gas System – Blower Sampling • Site Conditions – ambient air temp, barometric pressure, etc.
800-849	Settlement	• Settlement Hubs or Points (Many settlement points may coincide with gas extraction wells, in which case it is not necessary to assign duplicate ID numbers.) • Other Surface Elevation Points
850-899	Surface Water	• Surface Water Monitoring Points
900-999 997 999	Blanks, Duplicates and Other QA/QC Samples	• General • Field Blank • Trip Blank

Appendix II: Report Period Dates

The reporting period is always recorded as the first day of the month for the month in which sampling is required. Regardless of the sampling frequency (annual, semiannual, quarterly, etc.), the sampling schedule in the facility's plan of operation or related documents requires sampling to occur in a specific month or months. If sampling cannot be performed during the required month due to unforeseen circumstances such as inclement weather, enter the reporting period month as the month that sampling was originally scheduled. For example, if a site is scheduled to be sampled in September but due to unforeseen circumstances does not occur until October, the report period date would be reported as September 1 (the sample dates would all be in October, at least for those wells that were sampled in October). This convention also applies to the opposite situation: a facility needs to be sampled in the month prior to the normally scheduled sampling month.

Appendix III: DNR GEMS Parameter Codes

The GEMS database accepts results for more than 800 parameters. Of these, about 77% are organic, 14% are inorganic, 6% are physical, 1% are biological, 1% are radiological, and 3% are unspecified (percentages calculated in 2007). To view the parameter codes in PDF format, sorted by parameter name, parameter code, CAS Code, or parameter abbreviation, click on the links below:

Parameter Table Sorted by Parameter Name.pdf
Parameter Table Sorted by Parameter Code.pdf
Parameter Table Sorted by CAS Code.pdf
Parameter Table Sorted by Parameter Abbreviation.pdf

Click on the link below to access a table of parameter codes that can be imported into a spreadsheet or database:

Parameter Table for importing.csv

Click on the link below to access a table of parameter code changes that have been made since the tables were last updated:

Parameter Table Changes.pdf

The fields in these tables include the Parameter Code, Parameter Name, CAS Number, Units, Parameter Abbreviation, and NR 140 Preventive Action Limit (PAL) and Enforcement Standard. Please be sure to report, or convert to, as necessary, all data in the correct units specified in the Parameter Tables. Please also be aware that the required units and other parameter information may occasionally change. The DNR will make every effort to communicate such changes to GEMS data submitters, which includes posting the most recent parameter changes table. Users may want to review each update of the table for the parameters they report.

The following eight parameter codes describe physical characteristics of the sample or status of the well and require either a "yes" or "no" response.

P-code	P-code Description
00001	Comment, Sample Odor
00002	Comment, Sample Color
00003	Comment, Sample Turbidity
00004	Comment, Well Broken
00005	Comment, Well Frozen
00006	Comment, Well Dry (Grndwtr or Surf Wtr Mon Only)
00007	Comment, Other
00008	Comment, Well Obstructed

To report the presence of odor, color or turbidity in a sample (p-codes 00001-00003) leave the Result Qualifier field blank and enter a 0 (zero) in the Result Value field (see Tables 1 and 2 above for additional details). If odor, color or turbidity are not present in the samples, the Result Qualifier field should contain an "N" and the Result Value field should be blank. **Note:** Only presence or absence of odor, color or turbidity can be reported to GEMS using these qualitative parameter codes: 00001, 00002 and 00003. Any attempt to use these codes to record other observations such as "slight color" or "moderate odor" in the Result Qualifier or Result Value fields will result in rejection of the data. Quantitative results, such as color or turbidity readings from meters, should instead be reported using the other quantitative parameter codes available for color or turbidity: 92537 Turbidity, Quantitative (NTU); 00077 Color (Standard Units, Alpha); and, 00080 Color (Platinum-Cobalt units).

If a well is broken, frozen, dry or obstructed (p-codes 00004-00006 and 00008), leave the Result Qualifier field blank and enter a 0 (zero) in the Result Value field (see Tables 1 and 2 above for additional details). **Note:** Ambient field or ground conditions such as wet, dry or frozen ground should not be reported to GEMS. If p-code 00007 (Comment, Other) is used to provide some other information about a point not specified by other p-codes, please note that there is no field in GEMS provided to record comments. You will have to convey your comments by other means to the DNR staff assigned to the site if the staff is to know what is being indicated. Use of p-code 00007 is discouraged, although it may be useful in some cases.

Acceptable result value entries for Barometric Pressure Trend (parameter code 46381) are -1, 0 and +1, representing negative, stable and positive. Entering a negative or plus sign without a "1" will result in a warning. The entries should appear in the Result Value field not the Result Qualifier field.

The only values that can be entered in the Result Qualifier field are:
- "N" for no detect or characteristic not observed;
- "J" for result values between LOD and LOQ;
- blank, indicating a detect or characteristic observed (must include a zero in the Result Value field for observed characteristics); and
- ">" used to describe staff gauges that are overtopped.

Appendix IV: Reporting Data for the Following Sample Types: Blanks, Field Duplicates, Lab Replicates, Chemically Unpreserved VOCs/GRO and Other

Only three types of blanks—field blanks, trip blanks and pour blanks—may be reported *directly* to GEMS (but method blanks, as discussed below, are reported *indirectly* to GEMS. Matrix spikes, surrogates, etc. are also reported *indirectly* as outlined in the last paragraph of this appendix.)

Field blanks are also commonly called field rinsate blanks, decontamination blanks and equipment blanks. They are used to evaluate the effectiveness of decontamination of sampling equipment (e.g., portable pumps, bailers, etc.), usually when the equipment is not dedicated to a sample point or disposed after one use. A field blank is a sample of the reagent-grade water supplied by the lab after it is used in the field to rinse decontaminated sampling equipment. The frequency for collecting field blanks should be specified in the solid waste facility's approved sampling plan. For a facility without an approved plan specifying frequency, the required frequency for groundwater samples, collected to determine compliance with the NR 140 groundwater standards, is "one field blank for every 10 or fewer samples collected." Except, "field blanks are not required if dedicated sampling equipment or disposable sampling equipment is used."

Enter 997 in the DNR Sample Point ID field to report field blanks to GEMS not associated with a given point. Enter 01 in the Multiple Sample Identifier (MSI) field for the first field blank. For an additional field blank(s) collected on the same sample date, enter the next higher number(s) (i.e., 02, 03, etc., up to and no higher than 06) in the MSI field. Alternatively, field blanks collected after a specific sample point should be reported in association with that point. To do this, enter 07 in the MSI field to indicate field blank and enter the appropriate number in the DNR Sample Point ID field for the sample point the field blank is collected after.

Note: When reporting field blank results, leave the QC Flag I field empty (do not enter an M or F). Before November 10, 2009, the only criterion for the QC Flag I qualifiers was whether a parameter detected in an environmental sample was also detected in an associated method, trip or field blank above the LOD. Effective November 10, 2009, we added criteria that also consider the lowest applicable regulatory limit for the parameter and the measured concentration of the parameter in each environmental sample. (For a description of the new relaxed criteria, see the Table 1 or 2 discussion of the Quality Control Flag I data element.). On November 10, 2009, we notified GEMS users of the new criteria for the QC Flag I qualifiers.

Trip blanks are used to determine if any volatile samples may have been contaminated by shipping and field handling. A trip blank is a lab-prepared sample of reagent-grade water that is taken from the lab to the sampling site and returned to the lab unopened, in the cooler with the volatile samples. The frequency for collecting trip blanks should be specified in the solid waste facility's approved sampling plan. For a facility without an approved plan specifying this frequency, the required frequency for groundwater samples, collected to determine compliance with the NR 140 groundwater standards, is "one trip blank per sample batch, that is, at least one per sampling event and one per cooler."

Enter 999 in the DNR Sample Point ID field to report trip blanks to GEMS. Enter 01 in the MSI field for the first trip blank. For an additional trip blank(s) collected on the same sample date, enter the next higher number(s) (i.e., 02, 03, etc., up to and no higher than 06) in the MSI field.

Note: When reporting trip blank results, leave the QC Flag I field empty (do not enter an M or F). Before November 10, 2009, the only criterion for the QC Flag I qualifiers was whether a parameter detected in an environmental sample was also detected in an associated method, trip or field blank above the LOD. Effective November 10, 2009, we added criteria that also consider the lowest applicable regulatory limit for the parameter and the measured concentration of the parameter in each environmental sample. (For a description of the new relaxed criteria, see the Table 1 or 2 discussion of the Quality Control Flag I data element.). On November 10, 2009, we notified GEMS users of the new criteria for the QC Flag I qualifiers.

Pour blanks are used to determine if any samples have been contaminated in the field from the exposure to air when a sample is poured into a sample collection container. A pour blank is created when reagent grade water from the lab is poured into a sample container in the field. Pour blanks are not required but may be reported to GEMS at the discretion of the facility and with the knowledge of the DNR hydrogeologist assigned to the facility.

Enter a dedicated 900 series number (other than 995, 997 and 999), selected by the DNR hydrogeologist, in the DNR Sample Point ID field to report pour blanks to GEMS. Enter 01 in the MSI field for the first pour blank. For an additional pour blank(s) collected on the same sample date, enter the next higher number(s) (i.e., 02, 03, etc., up to and no higher than 06) in the MSI field.

Method blanks are used to determine if any samples may have been contaminated by the lab analytical process. A method blank is a lab-prepared sample of reagent-grade water, which is processed through all preparation steps and the analytical method at the same time and in the same manner as the samples are processed. The frequency for preparing and analyzing method blanks should be specified in the analytical method or NR 149.48. Section NR 149.48(3)(b) says "Method blanks shall be processed at a frequency of at least one per preparation batch. … "

Unlike field and trip blank results, method blank results are not directly reported to GEMS. Instead, a method blank result only helps to determine which QC Flag I qualifier (M or F) gets reported to GEMS for results from environmental samples the method blank is associated with. Before November 10, 2009, the only criterion for the QC Flag I qualifiers was whether a parameter detected in an environmental sample was also detected in an associated method, trip or field blank above the LOD. Effective November 10, 2009, we added criteria that also consider the lowest applicable regulatory limit for the parameter and the measured concentration of the parameter in each environmental sample. (For a description of the new relaxed criteria, see the Table 1 or 2 discussion of the Quality Control Flag I data element.). On November 10, 2009, we notified GEMS users of the new criteria for the QC Flag I qualifiers.

Field duplicates are used to evaluate the precision of the sampling process. Field duplicates are two or more independent samples collected from the same sample point and as close as possible to the same time. They are stored in separate containers and are analyzed independently. The frequency for collecting field duplicates should be specified in the solid waste facility's approved sampling plan. For a facility without an approved plan specifying frequency, the required frequency for groundwater samples, collected for compliance with the NR 140 groundwater standards, is "one field duplicate for every 10 or fewer samples collected."

Enter 01 in the MSI field for each parameter from the first sample. Enter 02, 03, etc., for each parameter from the duplicate, triplicate, etc. samples, respectively. No more than eight field duplicates can be accepted by GEMS. Duplicate samples must be reported with a valid DNR Sample Point ID Number. GEMS will not accept "blind" duplicates with missing or invalid Sample Point IDs.

Lab replicates are subsamples taken from the same sample container in the lab and analyzed independently for the same constituent(s). To determine whether an NR 140 groundwater quality Preventive Action Limit (PAL) or Enforcement Standard (ES), which is less than the limit of detection, has been attained or exceeded, NR 140.14(3)(b) requires analytical and statistical confirmation of an analytical result that is between the limit of detection and the limit of quantitation. This analytical confirmation involves preparing a lab replicate and analyzing it by an equivalently sensitive analytical method or by the same analytical method. Enter 09 in the MSI field to report an NR 140-required, lab replicate analytical confirmation result to GEMS for the sample point in question.

Chemically unpreserved VOC or Gasoline Range Organics (GRO) samples may be analyzed if the required acid preservative reacts with the water samples to generate gas or heat. Gas or heat generation is expected to increase the loss of volatiles from the samples. To report chemically unpreserved VOC or GRO sample results to GEMS: 1) Enter F in the Quality Control Flag II field; and 2) Enter the word Unpreserved or an abbreviation at the end of the Analysis Method Number/Description field (i.e., after the analysis method number/description entry in that field). The F in the Quality Control Flag II field indicates the sample failed the applicable preservation or holding time requirements.

To report properly preserved samples, enter an M in the Quality Control II field. The M indicates the sample met the applicable preservation and holding time requirements. This assumes the holding time requirement was also met.

Other sample data are not reported directly to GEMS such as known standards, lab replicates not required by NR 140.14(3)(b)1., spiked samples, blind standards and surrogates. Instead, enter an F in the Quality Control Flag III field if the sample failed the quality

control standards specified by the analytical method or the requirements of NR 149.48 (Quality Control Requirements for Chemical Testing). Enter an M in that field if the sample met those standards. Also, see the similar discussion of method blanks above.

Appendix V: Limits of Detection, Limits of Quantitation and Reporting Limits

The terms limit of detection (LOD) and limit of quantitation (LOQ) are defined in NR 149.03 (www.legis.state.wi.us/rsb/code/nr/nr149.pdf). In general, an LOD is the lowest concentration of an analyte that can be determined to be statistically different from a blank with 99% confidence. An LOQ is the lowest concentration of an analyte for which quantitative results can be obtained with a specified degree of confidence. LODs and LOQs are matrix, method and analyte specific. DNR discusses methods for determining the LOD and LOQ in the Analytical Detection Limit Guidance and Laboratory Guide for Determining Method Detection Limits (Guide), DNR PUBL-TS-056 (http://dnr.wi.gov/regulations/labcert/documents/guidance/-LODguide.pdf.)

For the purposes of lab certification, the department has chosen the method detection limit (MDL) to be the LOD. The MDL procedure claims that finding a concentration equal to the MDL in a sample is 99% likely to be a true detect, or that there is only a 1% chance that a concentration of an analyte equal to the MDL would be a false positive. The MDL procedure requires analyzing a set of replicates through an entire analytical procedure. Typically seven replicates of an inert matrix, such as distilled water, are fortified with analyte and their precision is measured by computing the standard deviation. The standard deviation is then multiplied by the Student-t factor (3.143 for seven replicates) and the resulting product is the MDL.

NR 507.26(3)(b)1. requires reporting of the LOD and LOQ for each parameter with a public health-related groundwater standard (NR 140, Table 1; www.legis.state.wi.us/rsb/code/nr/nr140.pdf). This requirement applies to only groundwater sample test results (it does **not** apply to leachate, lysimeter, gas and gas condensate sample results). Enter guide-determined LODs and LOQs, for those parameters for groundwater samples, in the Limit of Detection and Limit of Quantitation fields, respectively. The LOQ needs to be reported with the LOD for Table 1 substances in groundwater because when a substance has a NR 140 preventive action limit (PAL) or enforcement standard (ES) that is between the laboratory's LOD and LOQ, the PAL or ES is considered to be attained or exceeded when its concentration in a sample is at or above the LOQ. If an analyte concentration is determined to be between the LOD and LOQ, enter the concentration in the Result Value field and the letter "J" in the Result Qualifier field.

Reporting limits used by environmental laboratories are commonly above the LOD and LOQ - that is, less "sensitive" - due to interference from matrix effects or impurities in the sample that make analyte detection using the LOD, difficult. The reporting limit may or may not be statistically determined or may be an estimate that is based on the experience and judgment of the analyst.

For the purpose of GEMS data reporting, we use the term "reporting limit" to refer to a reporting limit other than an LOD or LOQ determined using the Analytical Detection Limit Guidance and Laboratory Guide for Determining Method Detection Limits (Guide), DNR PUBL-TS-056. For this use, we are defining a reporting limit as the lowest concentration above which numerical results are reported. An example of such a reporting limit is the concentration of the lowest calibration standard, or a project-specified concentration. Enter this type of reporting limit in the Reporting Limit field. These reporting limits may be reported instead of LODs and LOQs for parameters that do not have NR 140 Table 1 standards, and for any parameters in non-groundwater samples (e.g., leachate, lysimeter, gas and gas condensate). These reporting limits may also be reported in addition to LODs and LOQs.

Appendix VI: Resubmitting Data Already in GEMS

Occasionally facilities will submit, or will need to submit, data that has been previously uploaded to GEMS. This may happen for various reasons but most typically occurs when data for a linked point is submitted on two separate files, one file for each of the two sites that the linked point "shares," or for data that needs to be revised. In most cases the result value originally submitted was incorrect. Very often, along with the records that need correction, the revised submission will include additional records that are also in GEMS but do not need to be corrected.

For both types of situations, the data will be uploaded into GEMS and will override the records corresponding to records already in the database. In the case of records that have new, corrected values, the new values will displace the original values submitted originally. This is a straightforward process but is made difficult if the newly submitted record meant to replace the original in GEMS has an entry in some field other than the result value field that has been inadvertently modified from the original. For instance, if the method code or description listed in a revised record differs in any way, GEMS will not recognize the corresponding original record in the database and any differences will have to be corrected before the data can be overwritten.

A common example is when identical field data is resubmitted as part of a revision and the method number or description for the originally submitted records was entered as "Not Reported" and the method number or description in the revised records is recorded as "Not Required." The entry in the revised records, "Not Required," will need to be manually changed to "Not Reported" by the GEMS technician before the data can be uploaded.

Pay special attention to the report period dates for revised data. If the date in a revised record has been inadvertently changed from its corresponding record already in GEMS, GEMS will accept the revised record as a separate and unique record. It is important to crosscheck the data thoroughly for any records that may already exist in GEMS, to ensure the information in all the fields (other than fields you are correcting) is identical to what you have previously submitted, or what is being submitted in duplicate, in the case of linked points.