

Illinois Environmental Protection Agency  
Bureau of Air, Permit Section  
Springfield, Illinois

Project Summary for an  
Application from  
Winnebago Reclamation Services for a  
Construction Permit for a  
West Expansion Unit at the  
Winnebago Landfill  
Near Rockford, Illinois

Source Identification and Application Numbers

I.D. No.: 201801AAF

Application No.: 13090005

Schedule

Public Comment Period Begins: December 6, 2014

Public Hearing: January 20, 2015

Public Comment Period Closes: February 19, 2015

Illinois EPA Contacts

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## **I. INTRODUCTION**

Winnebago Reclamation Services has applied for an air pollution control construction permit for a new waste disposal area, the West Expansion Unit. The permit would address this new disposal area, which would be located west of the existing disposal areas at the Winnebago Landfill. The permit would also address the gas collection and control system that would be installed to control landfill gas (LFG) generated by this new disposal area.

The Illinois EPA has reviewed this application and made a preliminary determination that the application for the proposed project meets applicable requirements. However, before issuing a construction permit, the Illinois EPA is providing a public comment period to receive comments on this action. The Illinois EPA has also prepared a draft of the construction permit that it would propose to issue for public review and comment.

## **II. BACKGROUND**

The Winnebago Landfill is a municipal solid waste (MSW) landfill developed for the disposal of household waste, commercial waste and other types of wastes that do not have to be handled as hazardous waste. The Winnebago Landfill currently has one operating waste disposal area, the North Expansion Unit, which is anticipated to reach capacity in the near future.<sup>1</sup> The two other waste disposal areas at this landfill, the Northern and Southern Units, are closed. The LFG collected from these waste disposal areas is currently being flared.<sup>2</sup>

As a general matter, MSW landfills are stationary sources of emissions from fugitive particulate matter resulting from earth moving and vehicle traffic on roadways at the landfill. MSW landfills are also sources of emissions resulting from biological degradation of waste materials deposited in the landfill. The resulting landfill gas (LFG) is composed primarily of methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>).<sup>3</sup> Much lower levels of other constituents are also present in LFG, including hydrogen sulfide (H<sub>2</sub>S) and nonmethane organic compounds (NMOC).<sup>4</sup>

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<sup>1</sup> The design waste capacity of the North Expansion Unit is about 10.8 million cubic yards.

<sup>2</sup> Until recently, LFG collected from the Northern and Southern Units was being used as fuel in a gas-to-energy facility operated by Winnebago Energy Center, a separate company from Winnebago Reclamation Services. That facility is no longer operating.

<sup>3</sup> Carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) are produced from MSW by microorganisms that are adapted for anaerobic conditions. After waste is deposited, gas generation proceeds through four phases. The first phase is aerobic (i.e., with oxygen available from air trapped in the waste) and the primary gas produced is CO<sub>2</sub>. The second phase is characterized by oxygen depletion, resulting in anaerobic conditions, with large amounts of CO<sub>2</sub> and some hydrogen (H<sub>2</sub>) produced. In the third phase, methane production begins, with an accompanying reduction in the amount of CO<sub>2</sub> produced. In the fourth phase, gas production of CO<sub>2</sub> and methane becomes fairly steady.

<sup>4</sup> As applied to emissions of LFG, nonmethane organic compounds (NMOC) is generally synonymous with volatile organic material (VOM). A portion the NMOC is composed of various organic hazardous air pollutants (HAP). NMOC also commonly contains ozone

In new landfills, like the Winnebago Landfill, wells or collectors are placed in the buried waste to collect the LFG that is generated. The collected LFG is controlled by burning in a flare if it is not used as fuel.<sup>5</sup> Combustion of LFG converts H<sub>2</sub>S and other sulfur compounds in LFG to sulfur dioxide (SO<sub>2</sub>). Combustion also destroys the organic compounds and methane in the LFG creating additional CO<sub>2</sub>. Both SO<sub>2</sub> and CO<sub>2</sub> are pollutants that are of less concern than the various constituents in LFG from which they originated.<sup>6</sup>

Combustion of LFG also results in the emissions of carbon monoxide (CO) and particulate matter (PM and PM<sub>10</sub>), all of which are products of incomplete combustion. Nitrogen oxide (NO<sub>x</sub>) is also formed during combustion from nitrogen in the air. The magnitude of the emissions from an MSW landfill is dependent on the rate at which LFG is generated by the landfill, the composition of the LFG and the effectiveness and performance of the gas collection and control system.

### III. PROPOSED PROJECT

Winnebago Reclamation Services has applied for an air pollution control construction permit for its proposed West Expansion Unit. The West Expansion Unit would be located west of the existing disposal areas at the landfill. It would have a design capacity of about 8.3 million cubic yards. Winnebago Reclamation Services indicates that based on current waste acceptance rates, the Waste Expansion Unit would receive waste for less than five years.

The construction permit would address emissions from the West Expansion Unit and the LFG gas collection and control system that would be installed to control these emissions. This system would include temporary and permanent gas collectors and piping to collect LFG and a new flare adjacent to the disposal area. A second flare would also be allowed to be installed to provide reserve flaring capacity. A sulfur removal system would be installed to lower the sulfur content of the

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depleting substances, i.e., organic compounds associated with depletion of stratospheric ozone.

<sup>5</sup> The LFG collected from an MSW landfill may also be used as fuel, typically for generation of electricity in engines at a gas-to-energy facility associated with the landfill. When LFG is used as fuel at such a facility, the gas-to energy facility and the landfill are considered to be part of a single source for purposes of applicability of permit requirements pursuant to 40 CFR 52.21(b) (6), 35 IAC 211.6130, and Section 39.5(1) of Illinois' Environmental Protection Act.

<sup>6</sup> CO<sub>2</sub> and methane are both greenhouse gases that contribute to global warming and climate change. In this regard, one benefit from the collection and control of LFG is a reduction in methane emissions. While combustion of methane forms CO<sub>2</sub>, CO<sub>2</sub> has a lower global warming potential than methane.

A direct comparison of the significance of methane and CO<sub>2</sub> as they contribute to global warming can be made based on the "global warming potential" of methane. The USEPA's current value for the global warming potential of methane is 25. After considering the amount of CO<sub>2</sub> that is generated by combustion of methane, i.e., 2.75 tons of CO<sub>2</sub> per ton of methane, the impact on global warming of direct methane emissions without combustion is about 9 times the impact of the CO<sub>2</sub> emissions from methane that is combusted.

collected LFG prior to being flared. Equipment would also be installed to prepare or condition the LFG that is processing by the sulfur removal system.

A small diesel engine generator would also be installed to provide emergency electrical power for the gas collection and control system for the West Expansion Unit.<sup>7</sup>

Winnebago Reclamation Services has proposed an enhanced program to collect gas from the West Expansion Unit. This program would include use of temporary horizontal gas collectors in areas where the depth of deposited waste is suitable for use of such collectors and early installation of permanent gas collection wells. The program would also include accelerated installation of final cover material, which will also act to improve the effectiveness of collection of LFG.

To address the overall effectiveness of these measures, Winnebago Reclamation Services has proposed to meet thresholds for the levels of methane measured at the surface of the landfill that are more stringent than would apply under applicable rules.<sup>8</sup> It has proposed a threshold of 300 ppm for the level of methane at any point at the surface of the landfill, as would be determined by periodic traverses of the surface of the landfill. It has also proposed a threshold of 50 ppm for the average level of methane for different segments or grids of the landfill, each of which would be about one acre in area. This threshold is based on a threshold in rules for MSW landfills adopted in 2010 by California's Air Resources Board (CARB).<sup>9, 10</sup> Levels of methane

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<sup>7</sup> The rated electrical output of the engine-generator set would be about 360 KW.

<sup>8</sup> The levels of methane that are measured at the surface of an MSW landfill indicate the effectiveness with which LFG gas is being controlled because higher levels of methane indicate less effective collection of LFG with more LFG being emitted directly to the atmosphere. High levels of surface methane may be associated with deficiencies in the operation of a LFG collection system, e.g., insufficient suction or vacuum at wells. They may also be associated with cracks in the cover material that enable LFG to pass more easily to the atmosphere.

<sup>9</sup> Methane Emissions from Municipal Solid Waste Landfills, 17 CCR 95460 through 95476 (California Code of Regulations, Title 17, Chapter 1, Subchapter 10, Article 4, Subarticle 6, Sections 95460 to 95476).

California's Air Resources Board (CARB) adopted these rules to directly address methane emissions of MSW landfills as required by state law designed to reduce California's emissions of greenhouse gases.

<sup>10</sup> CARB's rules for MSW landfills set a 500 ppm threshold for "any point" on the surface of the landfill, commonly referred to as the "instantaneous surface standard". These rules also set a 25 ppm threshold for the average concentration of methane for over each grid area, commonly referred to as the "integrated surface standard".

For the integrated surface standard, Winnebago Reclamation Services has proposed a higher threshold value, 50 ppm instead of 25 ppm. This is because the threshold would apply to all areas of the landfill with waste except the active face. The threshold in the CARB's rules would only apply in areas in which a gas collection system has been installed. In addition, it is appropriate to consider differences in the conditions under which the CARB's rules for MSW landfills are applied and the conditions that exist in Northern Illinois. The level of annual precipitation in Northern Illinois is generally much higher than the levels of precipitation in California. The annual precipitation in Northern Illinois is two to three times the precipitation in Southern California. This is a significant difference in climatic conditions. It means that the integrated surface standard in CARB's rules for MSW

above either of these thresholds would trigger requirements for corrective actions followed by further measurements for surface methane in a manner that is consistent with requirements for corrective actions under applicable rules.

Winnebago Reclamation Services has proposed to install the sulfur removal system to be able to keep the SO<sub>2</sub> emissions of the West Expansion Unit below the level at which they would be considered significant under the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21. As discussed, the SO<sub>2</sub> emissions of an MSW landfill result from the combustion of sulfur compounds in the LFG, primarily hydrogen sulfide. The sulfur removal system would remove hydrogen sulfide from collected LFG before it is flared by passing the LFG through a vessel filled with a sorbent material. The amount of collected LFG that would be processed by this system would have to be managed so that it is sufficient to keep the SO<sub>2</sub> emissions of the West Expansion Unit within the limits set by the permit.

#### **IV. APPLICABLE EMISSION STANDARDS**

The existing Winnebago Landfill is subject to the federal New Source Performance Standards (NSPS) for Municipal Solid Waste Landfills, 40 CFR 60 Subpart WWW (the Landfill NSPS). Because the West Expansion Unit would be located at a landfill that is subject to this NSPS, the West Expansion Unit would also be subject to relevant requirements of this NSPS. The Landfill NSPS requires control of the emissions of LFG at new,<sup>11</sup> larger MSW landfills, such as the Winnebago Landfill, if the calculated annual NMOC emissions from the landfill in the absence of any control would be 50 Megagrams (about 55 tons) or more. At an MSW landfill that must be controlled pursuant to the Landfill NSPS, LFG must be collected by a properly designed and operated gas collection system.<sup>12</sup> The collected LFG must then be combusted in an appropriate control device or otherwise must be appropriately processed in preparation for use as fuel.<sup>13</sup> Open flares are commonly used as control

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landfills should not be used for the Winnebago Landfill. A significantly higher threshold is appropriate to address the effect of higher natural moisture on the rate at which biological degradation of MSW occurs.

<sup>11</sup> For purposes of the Landfill NSPS, 40 CFR 60 Subpart WWW, a new NSW landfill is a MSW landfill that has been constructed or expanded after May 30, 1991. A "larger landfill" is a landfill with a design capacity of 2.5 million megagrams or 2.5 million cubic yards.

<sup>12</sup> Under the Landfill NSPS, the effectiveness of the LFG collection system is addressed by an "instantaneous" operational standard for the concentration of methane at the surface of the landfill. These concentrations must be measured on a regular basis by a traverse of the surface of the landfill. If the measured levels of methane are excessive (i.e., more than 500 ppm) corrective actions must be taken. If three consecutive measurements are high, the LFG collection system must be expanded or enhanced to eliminate the exceedance.

<sup>13</sup> Another option under the NSPS for control of collected LFG is to appropriately process the LFG for its subsequent use as fuel. This option is commonly used when collected LFG is being used as fuel in engine-generators to recover the energy value of the LFG as electricity. USEPA has developed criteria that must be met by such systems and approves the use of systems on a source-specific basis.

devices to comply with the Landfill NSPS. The USEPA has adopted certain design and operating requirements that open flares must meet to assure effective destruction of organic compounds, including NMOC.

The Winnebago Landfill is also subject to the federal National Emission Standards for Hazardous Air Pollutants (NESHAP) for MSW landfills, 40 CFR 63 Subpart AAAA, the Landfill NESHAP. The Landfill NESHAP requires control of the same landfills and has the same requirements for control of NMOC emissions as the Landfill NSPS. The Landfill NESHAP also requires the operator of a subject landfill to maintain and implement a Startup, Shutdown, and Malfunction Plan to facilitate proper operation of the LFG control systems at all times to the extent practical.

The West Expansion Unit will have to be equipped and operated so as to comply with the applicable requirements of the Landfill NSPS and NESHAP, as well as with applicable state emission standards.<sup>14</sup>

## **V. EMISSIONS**

The potential or permitted emissions from flaring of LFG collected from the West Expansion Unit, as would be allowed by the draft construction permit, are summarized in Table 1. The potential emissions represent the maximum emissions from flaring LFG as would be allowed by the draft permit. This determination of potential emissions considered the maximum amount of LFG that would be generated by the West Expansion Unit based on the results, as provided in the application, of a computerized model for the generation of LFG developed by USEPA. The determination of potential emissions also considered other relevant data, as discussed in the application, including data for the actual composition of LFG currently generated by the Winnebago Landfill, the effectiveness of the enhanced gas collection program and emission factors provided by the manufacturers of the flare and from USEPA's *Compilation of Air Pollutant Emission Factors* (AP-42).

The actual emissions of the West Expansion Unit are expected to be less than its potential emissions. This is because the West Expansion Unit would not be generating LFG at peak rates. In addition, the levels of NMOC, sulfur and other constituents in LFG that contribute to emissions would be less than the maximum concentrations used for the determination of potential emissions.

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<sup>14</sup> The diesel engine to supply emergency electrical power to the West Expansion Unit is also subject to NSPS and NESHAP standards. It must comply with applicable requirements of the NSPS for Stationary Compression Ignition Internal Combustion Engines, 40 CFR 60 Subpart IIII, and the NESHAP for Stationary Reciprocating Internal Combustion Engines, 40 CFR 63 Subpart ZZZZ. Winnebago Reclamation Services will comply with these standards by purchasing an engine that is certified by the manufacturer to comply with the applicable limitations for emissions of NO<sub>x</sub>, CO, particulate matter and hydrocarbons in the NSPS for emergency engines, as is provided for by the NSPS. (Refer to 40 CFR 60.4202(a)(2), 89.112 and 89.113). Winnebago Reclamation Services must also implement certain work practices pursuant to these NSPS and NESHAP standards.

## VI. APPLICABILITY OF PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The proposed West Expansion Unit is not subject to the substantive requirements of the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21. This is because the potential emissions of different pollutants from this project would be less than the significant emission rates for those pollutants established in the PSD rules. Accordingly, this project is not considered a major modification or major project for any pollutants under the PSD rules.

The PSD rules would apply to this project if it were a major project under the PSD rules.<sup>15</sup> When determining whether the proposed West Expansion Unit would be a major project, the existing Winnebago Landfill is considered to be a major source under the PSD rules.<sup>16</sup> Accordingly, for a pollutant addressed by the PSD rules,<sup>17</sup> the West Expansion Unit would be a major project if its potential, non-fugitive emissions of that pollutant would be significant.<sup>18, 19</sup> However, with the measures to collect and control LFG that would be required by the draft permit, the non-fugitive emissions of all pollutant addressed by the PSD rules from the West Expansion Unit would be below the levels at which they would be considered significant. In this regard, the enhanced LFG collection program serves to require collection of all LFG that can reasonably be collected. This effectively eliminates quantifiable emissions from LFG from the West Expansion Unit that would not be collected but could reasonably have been collected so would not

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<sup>15</sup> The PSD rules are potentially applicable to the proposed project for all pollutants that are addressed by the PSD rules because Winnebago County is not a nonattainment area for any pollutants for which there are National Ambient Quality Standards.

<sup>16</sup> The existing Winnebago Landfill became a major source for purposes of PSD with the construction of the Northern Expansion. The construction permit for that project, Permit 09080052, provided for SO<sub>2</sub> emissions of 490 tons/year from the landfill making it a major source with permitted emissions of at least 250 tons/year of SO<sub>2</sub>. (That permit provided for SO<sub>2</sub> emissions of 245 tons/year from both the Northern Expansion and the existing landfill prior to the Northern Expansion.) While the Annual Emission Reports submitted for the Winnebago Landfill indicate actual SO<sub>2</sub> emissions less than 250 tons (182 tons in 2012 and 66 tons in 2013), the existing landfill is a major source for PSD based on its permitted SO<sub>2</sub> emissions.

The situation is the same for both CO and NO<sub>x</sub>, for which the landfill is currently permitted to emit 477 and 301 tons/year, respectively. The landfill is a major source based on permitted emissions even though actual emissions are less than 250 tons (for 2012 and 2013, 182 and 195 tons of CO and 44.4 and 41.9 tons of NO<sub>x</sub>, respectively).

<sup>17</sup> The determination of the applicability of PSD for the proposed West Expansion did not need to consider emissions of greenhouse gases. This is because this proposed project would not be a major project for PSD based on its emissions of pollutants other than greenhouse gases. Applicability of PSD for emissions of greenhouse gases would only needed to have been considered if the project were major and subject to the PSD rules for emissions of a pollutant other than greenhouse gases.

<sup>18</sup> For the purpose of the PSD rules, "fugitive emissions" are emissions that could not reasonably pass through a stack, chimney vent or other functionally equivalent opening. (See 40 CFR 52.21(b) (20).)

Fugitive emissions are not considered when determining whether a project at an MSW landfill is a major project for purposes of PSD.

<sup>19</sup> The significant rates for annual emission of various pollutants set by 40 CFR 52.21(b) (23) (i) include: PM<sub>2.5</sub>, hydrogen sulfide, total reduced sulfur and reduced sulfur compounds - each 10 tons; PM<sub>10</sub> - 15 tons; PM - 25 tons; SO<sub>2</sub>, NO<sub>x</sub> and VOM - each 40 tons; and municipal solid waste landfill emissions, as NMOC - 50 tons.

be considered fugitive emissions. As a result, the proposed West Expansion Unit is not a major project for purposes of the PSD rules.

## **VII. PERMIT CONDITIONS**

The conditions of the draft permit would set forth the air pollution control requirements that Winnebago Reclamation Services must meet for the West Expansion Unit. In addition to regulatory requirements, these requirements would include limits on the emissions of the West Expansion Unit. These emission limits would be accompanied by additional provisions as needed to make these limits enforceable as a practical matter. For example, the draft permit would require Winnebago Reclamation Services to conduct monitoring for the sulfur content of the LFG that is flared to address the operation of the sulfur removal system. It would also have to keep records for the amount of LFG that is collected and flared and the emissions for flaring.

The draft permit would also require implementation of an enhanced collection program for LFG, as proposed by Winnebago Reclamation Services in its application. For this purpose, the permit would require use of thresholds for the levels of methane measured at the surface of the landfill that are more stringent than the thresholds that would apply under applicable rules, i.e., a value of 300 ppm for the instantaneous threshold at any point of the landfill and a value of 50 ppm for the integrated threshold for each grid of the landfill. In response to exceedances of these thresholds Winnebago Reclamation Services would have to undertake tiered corrective actions in the manner set forth under the NSPS, 40 CFR 60.755(c). Initial corrective action and re-measurement would be required within 10 days. If the initial action was not adequate, a second level of corrective action and re-measurement would be required with 10 days. If the corrective action is still not sufficient, a new or replacement well would need to be installed within 120 days to correct the exceedance unless an alternative remedy is approved by the Illinois EPA on a case-specific basis. Relevant records would be required, including records for the routine measurements of surface methane levels and records for corrective actions and "repeat" measurements following any exceedance of a threshold.

## **VIII. REQUEST FOR COMMENTS**

It is the Illinois EPA's preliminary determination that the construction permit application submitted by Winnebago Reclamation Services for the West Expansion Unit meets applicable state and federal air pollution control requirements. The Illinois EPA is therefore proposing to issue a constructions permit for this project.

Comments are requested on this proposed action by Illinois EPA and the conditions of the draft of the permit.

Table 1: Summary of the Permitted Emissions of the West Expansion Unit from Flaring LFG and the Emergency Engine-Generator (tons/year) \*

Pollutant	Emissions
Nitrogen Oxides (NO <sub>x</sub> )	24.9
Carbon Monoxide (CO)	29.7
Sulfur Dioxide (SO <sub>2</sub> )	36.0
Volatile Organic Material (VOM)	10.0
Municipal Solid Waste Emissions, as NMOC	10.0
Particulate Matter (PM)	12.46
Particulate Matter <sub>10</sub> (PM <sub>10</sub> )	12.46
Particulate Matter <sub>2.5</sub> (PM <sub>2.5</sub> )	9.66
Hydrogen Sulfide (H <sub>2</sub> S)	0.40
Reduced Sulfur Compounds (RSC)	0.40
Total Reduced Sulfur (TRS)	0.44

\* This summary does not address fugitive emissions, as defined by 40 CFR 52.21(b) (20), associated with the West Expansion Unit.