

# Biosolids Land Application

## *Biosolids Storage Procedures:*

The City of Sioux City wastewater treatment facility has 8 Seventy Five (75) -foot diameter anaerobic digesters with up to 0.9-MG capacity each. Four are dedicated to primary sludge (fixed covers) and four are for secondary sludge storage with floating lids. The four storage lagoons have a combined maximum capacity of 45.3 million gallons with an IDNR directive to utilize only 41.8 MG of that capacity to maintain 12" of levee freeboard. The recommended freeboard is ensured by use of 12" crossover tubes between each of the four cells.

Over 70 million gallons of digested sludge are pumped annually to the lagoons at average total solids of 2.8 percent. Cell loading is conducted in series to improve settleability. As cell number one is filled the heavier solids are settling and the supernatant provides a cap to reduce odors. When cell level reaches the crossover tube the supernatant starts filling the next cell and so on. Lagoon decanting commences when any cell contains a sufficient amount of supernatant. During the course of the year over 25 million gallons of supernatant is returned to the plant for reprocessing. The supernatant averages less than 1/3 of 1 percent total solids.

This practice yielded average biosolids land application total solids to just over 4 percent for 2006. Restarting this recharging process as soon as the lagoons have been emptied can increase this concentration by at least 1 percent. Additional concentration increases will come from increasing the amount of supernatant returned to the treatment plant.

## *Biosolids Sampling Schedule and Sampling Procedures:*

Biosolids personnel obtain from daily loads, representative composite samples. Individual samples are collected from biosolids flow as tanker trailers are being loaded. These individual samples are equal in volume and represent each load. Individual samples are combined and stored in a covered plastic container to be composited at the end of the day.

In accordance with IAC 567.67.8 (1) b. (1) there will also be sets of seven representative sludge samples sent to a State Certified contract laboratory for determination of fecal coliform bacteria. The tests are conducted under analytical method described in the 20th edition of Standard Methods; 9222D as allowed under IAC 567.67.10(3); and under EPA/832/R-93/003, Page 147 TABLE 6-7.

In conjunction with and in accordance to IAC 567.67.8 (1) b. (3), the contract laboratory includes a pollutant (metals) analytical report to assure that the parameters are meeting Class II Sludge requirements. The metals analysis will be conducted to comply with IAC 567-67.10(5), which designates the SW-846 "Inorganic pollutants" methods be utilized for analytic methods. Also, nutrient information is included for calculating agronomic application rates.

### Determination of Land Required

American Water estimates an annual need of between 2,500 and 3,000 acres to accommodate the Class II biosolids application. The facility currently has in excess of 12,000 acres of ground permitted and under agreement for application with over 32 landowners. This provides options of appropriate sites based on several criteria including previous applications, weather and road conditions, and proposed cover crop. Most sites are conducive to fall and winter application.

On site calculations include a safety factor and are based on application of sludge containing 15 to 40 pounds of Plant Available Nitrogen (PAN) per Dry Ton (DT) (PAN #/DT) when surface applied with an average agronomic application rate between 70 and 180 PAN #/acre. In past years the target application for disposal was approximately 5,000 to 7,000 dry tons per year with actual application totals of between 9,000 and 11,000 dry tons.

### Types and Capacities of Equipment Used for the Land Application of Biosolids

The City of Sioux City supplies the following equipment to American Water under Exhibit Y of the O&M Contract.

A 1997 Model 8930 Case tractor as power for 1998 and 2005 model stick pumps capable of pumping an average of 5 percent solids at ~1000 gallons/minute. The tractor/ pump combination is used to load trailers and to stir biosolids.

The Biosolids are loaded into 6,000 gallon tankers and applied directly from the truck/trailers via splash plate. The American Water lease hauler has used this practice successfully. The results have continued to show increased production with less manpower.

Land application restrictions such as not exceeding the agronomic rate for the particular crop, crop rotation, frozen ground, and restriction periods for harvesting and grazing all affect and restrict the land application schedule and procedures. If biosolids are applied on frozen ground, proven farm management practices to prevent runoff and utilize land areas of less than 5 percent slope are required, unless approved by IDNR. Therefore, during long periods of time in the winter, almost all of the biosolids produced by the plant are stored in the sludge lagoons.



## **Biosolids Authoritative Links:**

Water Environment Federation

<http://www.wef.org>

National Biosolids Partnership

<http://www.biosolids.org>

U.S. Environmental Protection Agency (EPA)

<http://www.epa.gov>

Iowa Water Pollution Control Association

<http://www.iawpca.org>

Great Lakes By-products Management Association

<http://www.glbma.org>

Mid-Atlantic Biosolids Association

<http://www.mabiosolids.org>

New England Biosolids Association

<http://www.nebiosolids.org/intro.html>

Northwest Biosolids Management Association

<http://www.nwbiosolids.org>

## Biosolids Monthly Land Application Data

MONTH	TONS PRODUCED	# DAYS HAULED	LOADS APPLIED	TONS APPLIED	AVERAGE TS %	AVERAGE T/L
January	584	12	754	1466.33	7.82	1.96
February	551.3	15	926	2195.79	9.84	2.46
March	615.9	11	531	673.76	5.13	1.28
April	476.3	12	693	727.44	4.20	1.06
May	563.9					
June	498.1					
July	429.9	NO LAND APPLICATION FROM MAY 1 THROUGH SEPTEMBER 30				
August	547					
September	519.7					
October	544.5	11	673	693.17	4.10	1.02
November	559.1	16	1319	1429.95	4.29	1.08
December	527.9	13	812	876.71	4.32	1.08
<b>TOTALS</b>	<b>6417.6</b>	<b>90</b>	<b>5708</b>	<b>8063.15</b>	<b>5.67</b>	<b>1.42</b>

Land application for 2006 showed a 25% increase over 2005.

AWE has an exclusive contract with Godfredson Trucking - Sgt. Bluff, IA. for the hauling and land application of biosolids.