Neenah-Menasha Sewerage Commission

Biosolids Storage Facility, Greenville, WI

Rapid Health Impact Assessment

October 2011

Conducted by

Outagamie County Public Health Division

Public Health
Prevent. Promote. Protect.

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INTRODUCTION

Outagamie County Public Health Division

The Outagamie County Public Health Division provides public health services to residents of all towns, villages and cities in Outagamie County outside the City of Appleton. Duties and required services for local public health agencies are specified in Wisconsin statutes 251.05, and incorporated in our mission:

> *In partnership with the community, the mission of the Outagamie County Public Health Division is to promote health and prevent disease, injury and disability for the residents of our service area. The role of local public health agencies is expressed as: "Prevent. Promote. Protect."*

Some examples of public health services that we provide for Greenville, and around the county include:

- Children's Immunization Clinics
- Car seat checks
- Women, Infant, and Children's (WIC) Nutrition Program
- Helping high-risk pregnant women access health care and health education services
- New mom and new baby home visits
- Communicable Disease follow-up
- Restaurant, grocery and lodging inspections
- Private Well-water testing
- Radon education and kit distribution
- Promoting healthy lifestyles

The Community: Greenville, WI

The Town of Greenville is a rapidly growing community located west of the City of Appleton with a population of 10,467 and growing. There are three main highways running through the Town: Highway 15, Highway 96 and Highway 76.

Greenville contains both rural lands, farming and more urbanized subdivisions – some of which are served by Town sewer and water. [1]

Health Impact Assessment Process

A Health Impact Assessment (HIA) is a tool that can be used to incorporate health issues in the planning process of a project or policy. The World Health Organization defines HIA as:

"A combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population."[2]

The five steps of a Health Impact Assessment:

1. Screening: Determines the need and value of a HIA
2. Scoping: Determines which health impacts to evaluate, the methods for analysis, and the work plan for completing the assessment.
3. Assessment: Provides: a profile of existing health conditions; evaluation of potential health impacts; strategies to manage identified adverse health impacts.
4. Reporting : Includes development of the HIA report and communication of findings and recommendations.
5. Monitoring: Tracks impacts on decision-making processes and the decision as well as impacts of the decision on health determinants. [2]

Purpose and Limitations

The purpose of this Health Impact Assessment (HIA) is to discuss the negative and positive health impacts of a biosolids storage facility being proposed in the Town of Greenville, and to identify ways to decrease any adverse health impacts of the proposed biosolids storage facility.

An HIA can take months to complete. This HIA has been conducted on a very short timeline. Outagamie County Public Health first learned of the proposed biosolids storage facility and the concerns of the community on September 29, 2011. The impact assessment was completed and presented to the community in less than one month.

The assessment is narrow in scope, and should not be considered a definitive review of all issues related to biosolids management. It is intended to be an objective review of scientific literature related to the specific health risks identified in community forums.

Outagamie County Public Health Division has no regulatory authority for biosolids production, transport, storage or use. Outagamie County Public Health Division's sole interest in this project is to review potential health concerns and propose methods to reduce those risks.

STEP 1: SCREENING

The Proposed Biosolids Storage Facility in Greenville

In August of 2011, the Neenah-Menasha Sewerage Commission (NMSC) submitted a request to the Wisconsin Department of Natural Resources (DNR) for the construction of a Biosolids Storage Facility. The approximately 180-foot by 230-foot pre-engineered enclosed metal building with 10-ft tall concrete side walls and an 8-inch concrete floor would be constructed in the Northwest Quarter of the Town of Greenville, on the east side of Manley Road about 800 feet south of School Road. [3,4]

The proposed facility would be located on agricultural land, which is currently being farmed. The biosolids would be transported by truck from the Neenah-Menasha wastewater treatment plant to the storage facility twice a day, 5 days per week. The biosolids would be applied to agricultural lands. The biosolids produced by the NMSC are classified as Class B biosolids.

This new facility is being proposed because the NMSC contract with the current hauler and off-site storage facility will expire on October 31, 2011.

The submitted request was taken under review by the Wisconsin DNR. The Department reviewed the project and evaluated the environmental impacts and made a preliminary determination that the project could be approved. On September 19, 2011 a news release was issued and the public was given an open comment period until September 29, 2011, at which time the DNR would then review the comments received before taking final action on the proposal.

On September 29th the Town of Greenville held a public meeting with presentations from the Neenah-Menasha Sewerage Commission as well as the Wisconsin DNR regarding the proposed project (see Appendix A: Minutes from Greenville Informational Meeting, September 29, 2011). Due to the concerns of the town of Greenville and its residents, the DNR agreed to extend the comment period, but did state that they saw no reason that the Department should not approve the proposed storage facility.

On October 5, 2011 a second town meeting related to the proposed project was held, at which time the Town Chairman read a statement from the town to the Neenah-Menasha Sewerage Commission and the Wisconsin (see Appendix B: Town of Greenville Statement, October 5, 2011).

Outagamie County Public Health staff attended both meetings to learn more about the health concerns being raised. The community's concerns included:

- Health risks such as pathogens, toxic chemicals, vectors
- Environmental risk of groundwater contamination
- Unfavorable aesthetics and decreased property values
- Odor
- Truck traffic

It was determined that an HIA would add value by identifying the potential negative health impacts and by providing mitigation strategies. It was also concluded that the HIA would provide a background that could serve as a base to address citizen inquiries and complaints that local agencies may encounter if the storage facility is built.

STEP 2: SCOPING

Determining Health Issues for Assessment

In order to narrow the focus on the most significant potential health impacts for the proposed Greenville Biosolids Storage Facility the following activities were completed:

- Review of comments and concerns from public meetings.
- Examination of local media coverage of the proposed project.
- Review of the proposed design and operational strategies.
- Review of literature specific to health impacts of biosolids storage facilities and land spreading.
- Review of documentation of stakeholders and agencies involved in the approval process.
- Interviews with existing biosolids storage facilities in Outagamie County (See Appendix C: Biosolids Facility Survey).

In light of the short timeline for completion of the rapid HIA, the scope will be limited to the health issues most frequently cited in citizen forums:

Area Evaluated	Health Concern
Pathogens	Infectious disease through direct contact with pathogens in biosolids, aerosolized, injection of contaminated crops
Chemicals	Contamination of groundwater or crop
Odor	Physical and emotional distress due to noxious odors
Groundwater contamination	Movement of pathogens or chemicals into groundwater

STEP 3: ASSESSMENT

Definition of Biosolids and Regulation

Biosolids are the nutrient-rich organic materials resulting from the treatment of sewage sludge (the name for the solid, semisolid or liquid untreated residue generated during the treatment of domestic sewage in a treatment facility).[4] When treated and processed, sewage sludge becomes biosolids which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils and stimulate plant growth. [5]

Biosolids storage can occur at the treatment plant, the site of application, or a temporary facility. Off-site storage requires proper site selection and management to minimize the potential for odor problems. [5]

In 1993, federal standards for the use or disposal of biosolids (40 CFR Part 503) were enacted. The Part 503 rule addresses land application and beneficial use of biosolids. [6]

The Part 503 rule did not specifically address management standards and practices for storage of biosolids. Storage is necessary during inclement weather when land application sites are not accessible and during winter months when land application to snow covered and frozen soil is prohibited or restricted. Storage may also be needed to accommodate seasonal restrictions on land availability due to crop rotations or equipment availability.

Biosolids are categorized as:

Class A: Treated by "processes to further reduce pathogens" (PFRP). Concentrations of pathogens in Class A biosolids are reduced to levels low enough that no additional or special handling precautions are required by Federal regulations. [7]

Class B: Treated by "processes to significantly reduce pathogens" (PSRP). Class B biosolids may still contain pathogens and Federal regulations require additional measures to restrict public access and to limit livestock grazing for specified time periods after land application. [7]

Since the enactment of Part 503, numerous stakeholders, land appliers and biosolids operators have identified critical issues associated with successful off-site (meaning not at the wastewater treatment facility) storage of biosolids. A guidance document was published by the EPA in 2000, to provide a set of consistent Recommended Management Practices for the field storage of biosolids. [8]

In Wisconsin, Chapter NR204 establishes standards, monitoring, recordkeeping and reporting requirements for the use and disposal of biosolids. [9] (see Appendix D: Summary of Biosolids Monitoring and Reporting Requirements)

Current Biosolids Storage in Outagamie County

To obtain a better understanding of the current practices in the production, storage and use of biosolids in Outagamie County, a telephone survey was performed with municipal wastewater treatment plant operators within the County (see Appendix C: Biosolids Storage Facility Survey). Grand Chute-Menasha West and Neenah Menasha Sewage District were also included in this survey. Eight operators participated in the study; results are summarized below.

Table 1

Wastewater Treatment Plant	Biosolids		Land Application	Onsite Storage
	Class	Form		
Appleton	B	Solid	100%	Yes
Hortonville	B	Liquid	100%	Yes
HOTV Metropolitan	A	Liquid	100%	Yes
Nichols	B	Liquid	100%	Yes
Freedom	B	Liquid	100%	Yes
Seymour	B	Liquid	100%	Yes
Grand Chute-Menasha West	A	Solid	100%	Yes
Neenah Menasha	B	Solid	100%	No

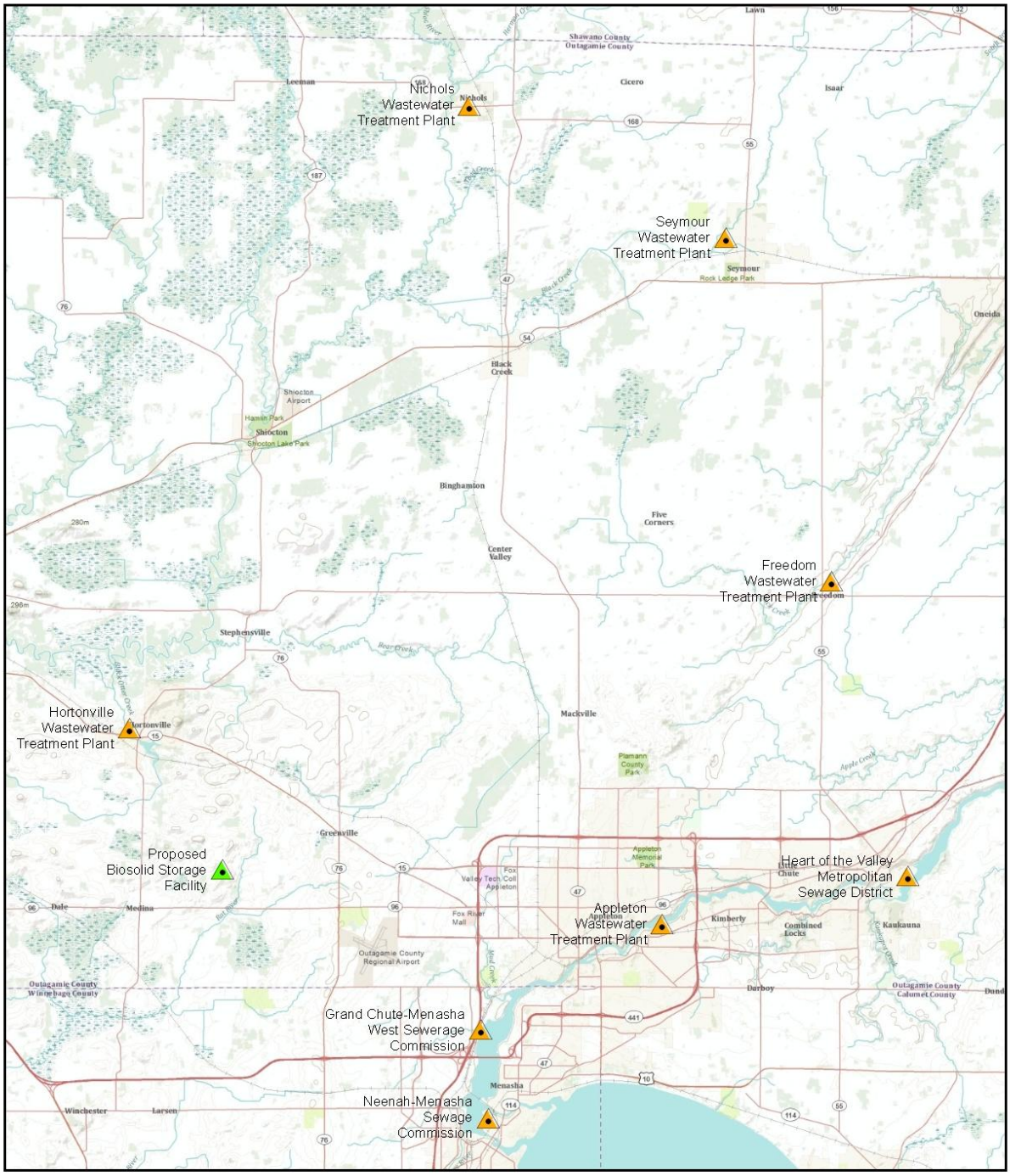
Most of the biosolids produced in Outagamie County are in a liquid form. In a liquid state, biosolids can be transported by a truck to a land application site where they are applied directly to the land using tractors, tank wagons, irrigation systems or special application vehicles. The solid forms of biosolids are usually transported and applied to land using front-end loaders, trucks, tractors, or biosolid spreading equipment.

All facilities indicated that they have a protocol to investigate and follow-up on complaints. When asked if they receive odor complaints, all responded “no”.

An aerial photo was also obtained for each facility and the approximate distance from the treatment and/or storage facility to the nearest residential property. For practical purposes, all distances were taken from the main building of the facility. The average distance from a wastewater treatment plant/storage facility to a residential home is approximately 600 ft (range 185 ft to 1245 ft). WI DNR regulations require storage facilities to be 1000 ft from a public supply well and 250 ft from a private water well. [9]

Per the 2010 “Local Climatological Data for Green Bay”, the average wind speed during 2010 was 8 mph. The prevailing wind direction was wind coming from the northeast. (Personal communication with Edward J. Hopkins, PhD, Assistant Wisconsin State Climatologist)

Wastewater Treatment and Biosolid Storage Facilities



Wastewater Treatment and Biosolid Storage Locations

Proposed Biosolid Storage Facility

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Date: 10/24/2011

Appleton Wastewater Treatment Plant

2006 E Newberry St Appleton, WI 54915

Type: Class B solid

Use/Disposal: Land Application

Closest Home: 600 ft

Freedom Wastewater Treatment Plant

N4229 Garvey Av. Freedom, WI 54913

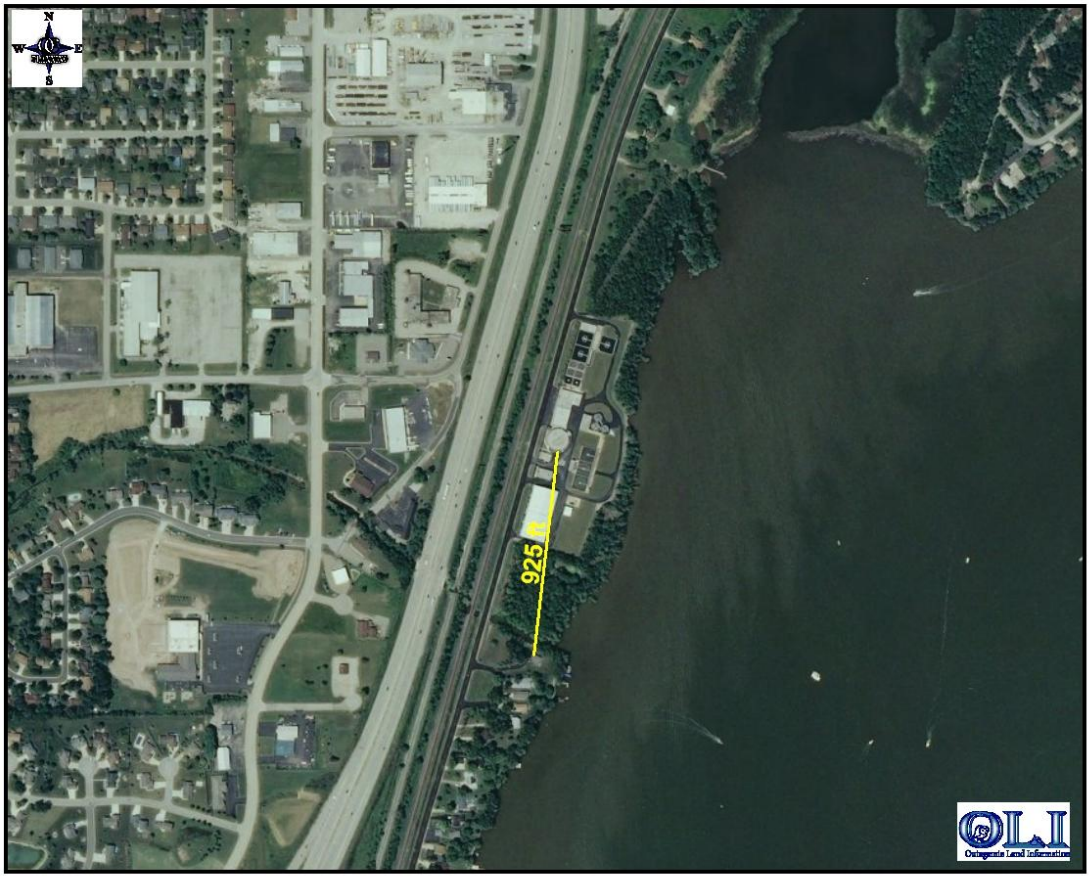
Type: Class B liquid

Use/Disposal: Land Application

Closest Home: 295 ft

Grand Chute-Menasha West Sewerage Commission

1965 Butte des Mortes Beach Rd. Neenah, WI 54956



Type: Class A solid

Use/Disposal: Land Application

Closest Home: 925 ft

Heart of the Valley Metropolitan Sewage District

801 Thilmany Rd. Kaukauna, WI

Type: Class A liquid

Use/Disposal: Land Application

Closest Home: 1245 ft

Hortonville Wastewater Treatment Plant

521 W. Cedar St. Hortonville, WI

Type: Class B liquid

Use/Disposal: Land Application

Closest Home: 255 ft

Nichols Wastewater Treatment Plant

W5750 County Road F (Main St) Nichols, WI

Type: Class B liquid

Use/Disposal: Land Application

Closest Home: 800 ft

Seymour Wastewater Treatment Plant

445 Municipal Dr. Seymour, WI

Type: Class B liquid

Use/Disposal: Land Application

Closest Home: 530 ft

Neenah-Menasha Sewage Commission

101 Garfield Av. Menasha, WI 54952

Type: Class B solid

Use/Disposal: Land Application

Closest Home: 185 ft

Gizmo Farms Storage Facility

1931 Knott Rd. Oshkosh, WI 54906

Type: Class B solid

Use/Disposal: Land Application

Closest Home: 1125 ft

Proposed Biosolid Storage Facility

SE Corner of Manley and School Road, Greenville WI

Type: Class B solid

Use/Disposal: Land Application

Closest Home: 445 ft and 2,225 ft

Use and Disposal Options for Biosolids

Land Application

Incineration

Landfill

In the United States, approximately 60% of the 5.6 million dry tons of biosolids disposed of annually are land applied. [10] While this is the predominant mechanism for biosolids disposal, two other options exist – incineration and placement in a landfill. The advantages and disadvantages of these two alternatives are listed below. For the purposes of this assessment, the focus from this point forward will be on land application.

Other Disposal Methods	Advantages	Disadvantages
Landfill [11]	• Suitable for biosolids with high concentrations of metals or other toxics • May require smaller land area than land application • Improves packing of solid waste and increases biogas production • May be most economical management solution, especially for malodorous biosolids	• Eliminates their reuse potential and is contrary to EPA national reuse policy • Requires extensive planning, including selection of proposed landfill site, and operation, closure and post closure care of site • Operation, maintenance and post closure care of landfills are labor intensive • Landfill sites have a potential for groundwater contamination from leachate • Decomposition of biosolids in a landfill produce methane gas which must be collected and reused or disposed of by flaring or venting
Incineration [12]	• Volume reduction • Generation of stable material • Ash is a stable, sterilized material • Potential energy recovery • Minimal land area required	• High capital investment • Annual operating costs depend on fuel costs • Potential for air pollution: Particulates including trace metals, and emission of problematic gases • Consumption of non-renewable resources • Limited feasibility in nonattainment areas • Potential operating problems – significant down time for routine maintenance • High technology instrumentation required to comply with air pollution control permits • Public opposition

Benefits of Land Application of Biosolids

Land-spreading of biosolids represents a transition from treating them as waste products to realizing the potential from beneficial use alternatives.

The benefits of recycling biosolids onto agricultural land include: [7,13,14]

- Providing essential nutrients for crop needs
- Providing organic matter for improving soil tilth, water-holding capacity, soil aeration, and an energy source for earthworms and beneficial microorganisms
- Crop yields on land amended with biosolids can be as great or greater than land fertilized with only commercial synthetic fertilizer
- The high organic matter content and low nitrogen content common in biosolids provides a product that mimics wetland soils, prevents overloading of nitrogen, and absorbs ammonium to prevent transport to adjacent surface waters
- Reuse leads towards a sustainable system [15]

Potential Health Risks of Storage and Land Application of Class B Biosolids

The management of biosolids is perceived and experienced by different people in different ways. The recycling of biosolids onto agricultural soils for reclamation of depleted soils brings biosolids closer to more people, with the result that more people are becoming aware of biosolids and assessing whether or not they represent a risk to their health or the environment.

Are biosolids safe? That's an impossible question to answer. Safe is a relative term. We accept certain risks on a daily basis, so the question more realistically is "Is the risk acceptable?"

An individual's perception of risks develops from his or her values, beliefs and experiences. Social scientists have identified factors that affect perceptions of risk, such as: [16]

- Is the risk known?
- Is the risk voluntary, can the individual control the exposure?
- Is the risk equitable, how fairly is it distributed?

There are measurable differences in how technical experts and citizen stakeholders define and assess risk. [16]

Social science research has identified many factors that affect how risk is perceived. Sandman called these "*outrage factors*", because they influence the level of concern or *outrage* that people feel regarding a real or potential hazard. [17] When the list of outrage factors developed by social scientists [18] are used to evaluate a land application scenario in North America, it is easy to see why biosolids recycling has seen greater conflict than other forms of organic residuals recycling – such as animal manure or yard waste. Many of the following outrage factors are involved, as neighbors and communities perceive a biosolids land application program to be:

- Involuntary – out of their control
- Artificial and industrial
- Exotic and or unfamiliar: manure is familiar, biosolids are not

- Hard to understand
- Memorable – because of odors or other nuisances
- Dreaded – “yuck” factor of biosolids origins creates dread
- Uncertainty
- Personal stake – neighbors
- Being controlled by “the system” or others
- Advocated by those with a financial interest
- Operating by a closed process
- Having limited or no visible benefits

Public perceptions of biosolids recycling were measured in a telephone survey of 1069 residents across the United States in 2002. [19] This survey found that support for the concept of wastewater treatment is high (93%), at the same time, knowledge of the word biosolids is limited (14%). When explained to survey respondents, the concept of biosolids recycling is supported, although respondents expressed uncertainty around particular issues such as “heavy metals”.

Responses from this 2002 telephone survey closely reflected those predicted by risk perception theory:

- Respondents favored biosolids recycling programs that display clear benefits, such as providing renewable energy or recycling of nutrients
- Their level of concern increases if biosolids include industrial waste or are from a large city
- Their level of concern decreases if they are contacted about the biosolids recycling program in advance and /or if it is supervised locally (reducing uncertainly)
- Respondents expressed trust in those who appear most knowledgeable and objective and strongly distrust those who have a profit motive

Researchers concluded that discussions of risk may also be debates about values, accountability and control. [16]

Although there are many benefits to land spreading of biosolids, the practice also involves some disadvantages and risks. Reusing biosolids is not a universally accepted practice. [20]

The Potential health risks reviewed are:

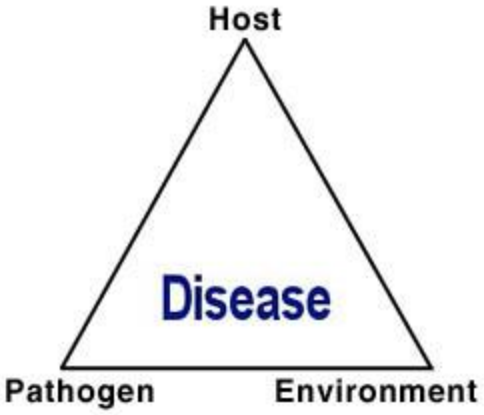
- Pathogens
- Chemicals
- Odor
- Groundwater Contamination

Pathogens

The survival of pathogens during the production of biosolids and the ability of these organisms to be infectious is a fundamental public health concern. Exposure to pathogens was also a frequently cited concern by Greenville residents at the two public meetings.

The presence of pathogens is not sufficient to cause disease. The ability of a pathogen to cause illness is dependent of the three factors shown in the diagram below:

Figure 1:



- The pathogen must be present in sufficient concentrations to be infectious
- Susceptible individuals must come in contact with the pathogen in a manner that causes infection (i.e. injection, inhalation)
- The pathogen must be able to overcome the physical and immune barriers of the individual (host).

Disease prevention efforts focus on breaking the chain of disease transmission either by keeping susceptible individuals or animals from direct contact with stored materials and/or by preventing the movement of any residual pathogens in stored materials into the environment in a way that would be harmful. [21]

The EPA regulations for land application of Class B biosolids limit human exposure to pathogens by delaying harvesting post application and minimizing public encroachment on lands with applied biosolids through site restrictions. [13]

Potential routes of exposures to pathogens in biosolids include: [13,8]

- Direct exposure through physical contact with either stored biosolids, or after mixing with soils.
- Exposure can also be indirect through transport of pathogens through the air in the form of bioaerosols.
- Consumption of groundwater or food contaminated with pathogens following land application may also result in infection.

The risks associated with these exposure pathways are shown in Table 2.

Table 2: Community Risk of infection associated with indirect pathogen contact from 3 indirect contact exposure scenarios [a,b,c] from animal manure and biosolids that are transported off site following land application of the residual. [13]

	Risks from single indirect exposure to manures or biosolids (per 10,000 people)	
Pathogen	**Cattle or cow manure**	**Class B Biosolids[d]**
Campylobacter jejuni	≤ 0.0002	≤ 0.00001
E. coli O157:H7	≤ 0.00001	NA
Listeria monocytogenes	≤ 0.00001	≤ 0.00001
Salmonella	≤ 0.00001	≤ 0.00001
Cryptosporidium	≤ 0.00001	≤ 0.00001
Adenovirus	NA	≤ 0.002
Coxsackievirus	NA	≤ 0.00009

a. Assumes 292 g food-crop consumed on a one-time exposure from plots amended with residuals and food-crop harvested four months after residual land application
b. Assumes runoff transport of residual-borne pathogens to an adjacent food-crop field and subsequent crop ingestion
c. Assumes aerosol risks during land application of the residual to a population located 100 m downwind of the site and 10% ingestion of inhaled aerosols
d. Class A biosolids are assumed to be pathogen free and hence risks are below those presented above for Class B biosolids

The National Academy of Sciences, Committee on Toxicants and Pathogens in Biosolids Applied to Land, evaluated 23 studies relevant to the assessment of human health effects associated with biosolids. They concluded that the epidemiologic literature provides no evidence for or against the potential for biosolids to cause bacterial, viral or protozoan infection. [21]

The members of the Maine Biosolids White Paper Project concluded that "The combination of biosolids processing standards and site use restrictions appear to be effective at protecting public health". [15]

According to the Environmental Protection Agency, "The potential exposure to pathogens during proper biosolids storage is no greater than that associated with direct land application". [8]

Chemicals

There are 2 main routes of exposures to chemicals that might be present in biosolids: groundwater contamination and crop uptake. This section will review the risk of exposure and health impact of different chemicals.

Metal concentrations have been a point of concern in biosolids land application. In a study conducted for the Water Environmental Research Foundation (WERF), it was found that average metal concentrations in biosolids fall far below the U.S. EPA standards, as outlined in the 40 CFR 503 biosolids regulations. [22] Table 3 shows the metal content in biosolids compared to other products used in land application.

Concerns of groundwater contamination with metals and other synthetic organic chemicals comes from the potential of these products leaching into local wells or discharge into surface waters. [8,13] Best management practices to isolate these contaminants from reaching surface and groundwater resources is important to minimize the potential risk of health effects. [8]

Table 3: Metal Contents in Biosolids, Manures, Chemical Fertilizers (ppm) [23]

Metal	Biosolids	Beef Cattle Manure	Poultry Manure	Phosphate Fertilizer*	40 CFR 503 limits
Arsenic	5.0	NA	13	11.3	75
Cadmium	4.4	NA	2.4	65	85
Copper	425	36	465	56.5	4300
Lead	76	NA	46	12.2	840
Molybdenum	12	4.94	19	NA	75
Nickel	33	NA	16	27.5	420
Zinc	735	129	602	240	7500

* When calculating the amount of metals introduced into the soil, it is important to take into consideration that chemical fertilizers require much less material to be applied.

The scientific basis of the Part 503 rule was studied by the National Research Council in 2002. They found that there was no documented scientific evidence that the Part 503 rule had failed to protect the public health. However they indicated that additional research was needed, the risk assessment methods needed to be updated, and a new national survey of chemicals in sewage sludge needed to be conducted. [21]

Since that time, new concerns about the distribution and effects of endocrine disruptors such as pharmaceuticals, personal care products and flame retardants as well as hormones, have been raised. In a recent study, scientists from the United States Geologic Survey purchased or obtained nine different commercially or publicly available biosolids and analyzed them for 87 organic chemicals found in cleaners, personal care products, pharmaceuticals and other products. They found that 55 of the 87 organic chemicals measured were detected in at least one of the nine biosolids collected, with as many as 45 in a single sample. Twenty-five of the chemicals were present in every biosolid sample including compounds that are pharmaceutically and hormonally active. The types of contaminants and their relation to each other did not vary greatly between the biosolids tested. [24]

It is not known how these endocrine disruptors within land applied residuals affect human health, however the risks are thought to be low. [13] Risks from polybrominated diphenyl ethers (a flame retardant) and estrogenic compounds in biosolids were recently evaluated and found to be low. [24] Research suggests the primary risks to human health associated with these compounds are related to direct household exposure from dust. [13]

In 2009, the EPA conducted a Targeted National Sewage Sludge Survey. They found that 12 of 72 pharmaceuticals and 9 of the 25 steroids and hormones tested were present in almost all the samples. All flame retardants tested were found in essentially all the samples and very few samples contained hormones. [25] This is an area that has been identified as needing further research.

Odor

According to the EPA, malodors are the greatest reason for public concern about storage sites. Experience and practice have demonstrated that biosolids can be handled and processed without release of excessive malodorous compounds. However, if they are poorly managed, then objectionable odors may develop during storage. [26]

The malodorous compounds (odorants) associated with biosolids are the volatile emissions generated from the chemical and microbial decomposition of organic nutrients. When inhaled, these odorants interact with the body's odor sensing system and the person perceives odor. Individual sensitivity to the quality and intensity of an odorant can vary significantly, and this accounts for the difference in responses experienced by individuals who inhale the same amounts and types of compounds [26]. With biosolids, three conditions are necessary to create malodorous conditions:

1. Presence of an odorous volatile chemical (odorant)
2. Geographic and weather conditions conducive to transport of the odorant with minimal dilution
3. People are present and they perceive odor

The types of odorous compounds generated are ammonia, amines, and reduced sulfur-containing compounds. Amines and reduced-sulfur compounds may be detectable and perceived at greater distances from a storage facility than ammonia because they are more persistent, intense, and have very low odor detection thresholds. [8]

The EPA has identified methods to prevent and manage odor with stabilization and processing methods at the wastewater treatment plant. The other control points where odor can be managed are during transport and storage.

One way to reduce public exposure to odors during transport is to choose a hauling route that avoids densely populated residential areas. The fewer residences located along the hauling route, the less likely the general public will be annoyed by odor. Making sure that the trucks are clean and well maintained are another way to keep road surfaces clean and control odors during biosolids transport. Trucks should be cleaned before leaving the generating facility and after the biosolids have been deposited on the field storage site. [8]

In most cases, biosolids produced at wastewater treatment plants with well-operated stabilization processes can be stored off-site without creating odor nuisances. However, if certain conditions occur while material is in storage, the potential for odorous emissions will increase:

- Weather: Warm temperatures and high humidity increase the potential for odor nuisances, while cold, dry conditions reduce the potential for nuisance complaints.

- Length of storage and changes in characteristics: Preventing the resumption of microbial activity in biosolids is a primary means of controlling odors at storage sites. Ensuring that the materials brought to the facility are thoroughly stabilized and minimizing the length of time materials are kept in storage are two major tools to achieve this goal.

- Accumulated water and site management: Establishing good housekeeping procedures and keeping the storage area, equipment and trucks clean and free of standing water is another component of avoiding odor generation. In addition, conducting handling operations in a clean and efficient manner that minimizes the time materials are disturbed will help limit odor. [8]

Wastewater treatment plants should have policies and procedures for tracking and responding to odor complaints.

Water Quality

Levels of nutrients, organic matter, pathogens and metals are measured in biosolids in order to assess their potential impact on water quality. Some of the concerns on groundwater contamination were mentioned in previous sections; the limited timeframe did not allow for additional research in this area. Good storage design and use of appropriate management practices effectively block potential pathways into surface or ground water

STEP 4: REPORTING

The HIA Report will be posted on the Outagamie County Public Health website and the Town of Greenville website. The findings of the report will be presented to the public on October 26, 2011

STEP 5: MONITORING AND RECOMMENDATIONS

Communicable Disease Concerns: By state statute, health care providers and laboratories are required to report communicable diseases to the local public health agency. Public Health staff investigates the potential source of illness and identifies control measures. With the exception of adenovirus and enterovirus, all pathogens that might be present in biosolids would fall under this reporting requirement. Outagamie County Public Health would recognize increased cases or geographic patterns.

Adverse health effects: The University of North Carolina School of Public Health received funding from the EPA to develop a tool for investigating health incidents associated with biosolids applied to land. Outagamie County Public Health has been in contact with the researchers and have received the investigation protocol. Public Health staff will monitor health complaints using this standardized tool. [27]

It is recommended that the Neenah-Menasha Sewerage Commission track and respond to resident complaints. Complaint monitoring related to date, time and weather conditions could provide useful information for mitigation.

The EPA has published the “Guide to Field Storage of Biosolids”. The guide targets the critical control points of transportation and storage, and provides management practices to address three critical issues: Odors, water quality, and pathogens, which have potential environmental, public health and community relations impacts. An overview is provided below:

Overview of Management Control Points for Field Stored Materials [8]

ISSUES	SELF-MONITORING CHECKLIST	CONTROL OPTIONS
Transportation		
Odors and aesthetics Traffic and safety	Proper equipment in compliance with state and federal transportation regulations Regular inspection of vehicles and equipment Suitable haul routes Vehicles and equipment kept clean	Training for drivers Plan/inspect haul routes, minimize time in transport Emergency spill plan and supplies in place Maintain and clean trucks and equipment regularly
Field Storage Site		
Odors and aesthetics Water quality and environmental protection Safety and health protection	Proper site location and suitability Proper design of field storage or constructed facility Run-on and run-off controls Accumulated water control buffers Biosolids quality vs. length and amount in storage Operations and maintenance plan Odor prevention and mitigation plan Spill control and response plan Safety plan	Regular self inspections of site and operations Consistent implementation of management plans Self monitoring of biosolids quality and condition Revision of management plans when necessary Change amount or length of storage Implement odor control and mitigation measures Implement additional structural or site management practices Remove stored biosolids when atmospheric conditions are conducive to low odor impacts on neighbors

CONCLUSION

Over the past several decades, a significant amount of laboratory and field research has contributed to the knowledge base on the benefits and hazards of land application of biosolids, however significant knowledge gaps remain. It must be remembered that as long as sewage is produced, it is not possible to have a totally risk-free environment. Every method of sewage disposal contains health and environmental risks. The goal is to reduce the risk as much as possible.

This rapid Health Impact Assessment is meant to be an objective assessment of the positive and negative health impacts associated with a proposed biosolids storage facility in Greenville. The assessment is narrow in scope and should not be considered a definitive review of all issues related to biosolids management.

The public dialog in response to the proposed biosolids storage facility and land application of Class B biosolids in Greenville reaffirms that people want information about their environment and potential health risks associated with wastewater treatment and disposal. People want to be involved in decisions that affect them, and want their concerns to be heard.

If the proposed project goes forward, the Neenah-Menasha Sewerage Commission should monitor and respond to resident complaints. Biosolids-related health complaints should be monitored so that trends or other indicators of adverse health effects can be recognized and investigated in a timely manner. Outagamie County Public Health will coordinate that effort.

As a local public health agency, we look to state and national public health leadership for guidance before drawing conclusions about adverse health effects. The Centers for Disease Control and Prevention (CDC) is the leading source for public health guidance in the nation. The CDC has provided guidance for workers exposed to Class B biosolids, however they specifically state that the guidance is not intended to address non-occupational exposure. The CDC has not developed guidance for non-occupational settings. The American Public Health Association does not have a policy statement on biosolids. The National Institutes of Health has sponsored research on biosolids, however, does not have a policy statement. The Wisconsin Division of Public Health does not have a fact sheet or policy statement about the health effects related to land spreading of biosolids. However, through consultation and technical assistance with the Wisconsin Division of Public Health, Bureau of Environmental Health, we can state that land application of biosolids is a common practice in Wisconsin. The majority of biosolids produced in the state are land-applied. Wisconsin has not experienced any infectious disease outbreaks related to biosolids exposure. If biosolids are handled in an appropriate manner and according to regulations, they should not result in a human health hazard.

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GLOSSARY

Endocrine disruptors	Disrupting compounds comprise a diverse group of pharmaceuticals, plant products, pesticides, chemicals used in plastics and numerous consumer and industrial products. Endocrine disrupting compounds can cause a wide range of health effects in humans and wildlife by interfering with hormone receptors in the endocrine system. Endocrine disrupting compounds can be introduced to biosolids through sewage treatment systems; personal care products and other consumer chemicals represent significant sources of endocrine disrupting compounds.
Eutrophication	Results from the introduction of excess nutrients (typically nitrogen or phosphorus) into aquatic ecosystems (lakes, rivers, coastal waters) leading to “blooms” of algae or other plants, usually with adverse effects.
Helminthes	Parasitic worms and ova (eggs) of these worms. Helminth ova are quite resistant to chlorination, and can be passed out in the feces of infected humans and organisms and ingested with food or water.
Land Application	The spreading or spraying of biosolids onto the surface of land, the direct injection of biosolids below the soil surface, or the incorporation into the surface layer of soil; also applies to manure and other organic residuals.
Leachate	Liquid which has come into contact with or percolated through materials being stockpiled or stored; contains dissolved or suspended particles and nutrients.
Liquid Biosolids	Biosolids or manure containing sufficient water (ordinarily more than 88%) to permit flow by gravity or pumping.
Pathogen	Disease-causing organism, including bacteria, fungi, helminthes, protozoan, or viruses
Risk, Potential	Refers to a description of the pathways and considerations involved in the occurrence of an event that may result in an adverse health or environmental effect.
Risk Assessment	A quantitative measure of the probability of the occurrence of an adverse health or environmental effect. Involves a multi-step process that includes hazard identification, exposure assessment, dose-response evaluation, and risk characterization. The latter combines this information so that risk is calculated: Risk = Hazard x Exposure.
Soil Tilth	Refers to the soil’s general suitability to support plant growth – or more specifically, root growth.
Soil Colloids	Very small organic and inorganic particles found in soil. They hold large quantities of elements and compounds which are used by plants for nutrition.

APPENDIX A: Minutes from Greenville Informational Town Meeting, September 29, 2011

September 29, 2011

Informational meeting – for a Bio-solid facility on the Steinacker property.

The meeting began at 6:04 p.m.

Over 200 residents were in attendance.

Randy Leiker stated this is not a Town issue. The Town has no process in this for approval or denial. The Town only issues the building permit on agricultural property. The Fire Chief has no problem with the storage from a fire point. Chad Olson from McMahon, the engineer who designed the project and stormwater spoke. Randy from the Neenah-Menasha Sewage District and Jerry from the DNR were also present.

Chad stated that bio-solids are now applied in the Town of Utica and have been since 1991 from the treatment plant. They do not want to renew their contract. They are moving in a new direction. Neenah-Menasha needs to find a new site. They do have a 20 year history with the Town of Utica. Steinacker farms would site the building and oversee it. It is 210' x 240' in size and they would be entering into a 20 year contract with an option for another 20 years. This includes application. It is a water tight structure. Bio-solids are nutrient rich domestic sewage. They are highly regulated as to when you can use it and how you can use it. Much of the liquid is removed. It is a Class B bio-solid. The solids are tested every other month and results sent to the DNR. Only so much metal can be applied during the year and during a lifetime. It will be applied on Steinacker land. Steinacker has been handling Grand Chute-Menasha West bio-solids since 1991. Neighbors are notified when it is being spread. No one in the audience has even been notified when it was spread.

Jerry from the DNR –

Question -What regulations are there for testing? It is governed by the fact that Neenah-Menasha has a permit from the DNR

The bio-solids will only be going on the Steinacker farm – by their contract (owned, managed or leased) for application on their fields. If it goes on any other property, they would be considered a commercial use and they would be shut down by the Town. DNR says a contract hauler (Steinacker) – takes it from one facility and applies it to any sites that are approved by the DNR. There are additional requirements. John Kiel, Attorney for Neenah-Menasha Sewage District stated it is for the property owned, leased or rented. It is for what they currently have agreed to and nothing else.

Notification comes from the DNR. They are responsible. This application is controlled to the maximum. A farmer can put as much fertilizer as he wants and no one regulates it. Neenah-Menasha is building the building. Steinacker will be under contract with them.

Dave Tebo, if they meet the Town ordinances, we cannot stop them.

Comments were not positive.

Randy Leiker stated we will contact our Town Attorney to see if he has any other direction we can take. We will then set up another meeting and post it on the web site to see what options there may or may not be.

The meeting was adjourned at 7:53 p.m.

Deborah Wagner, Town Clerk

APPENDIX B: Town of Greenville Statement, October 5, 2011

As Town Chairman I would like to read the following statement which will be presented to the Neenah-Menasha Sewage District and Wisconsin DNR on behalf of Town residents and for protection of the health, safety and public welfare of Greenville.

The recent comment request period by the DNR about the proposed biosolid facility on the Steinacker property may have educated many of us about issues we knew little about, like Class A and Class B biosolids and the inner workings of a sewer plant.
Many questions have emerged from residents and the Town about this project we initially viewed as a large agricultural building being approved for storage of fertilizer to be used on fields farmed by the Steinacker's.

Out of respect for the many questions and legitimate health concerns raised by Greenvill residents about this proposed facility and the biosolids that will be stored there we are asking that the Neenah-Menasha Sewage District, as a possible new neighbor in Greenville, supply to the Town and its residents the following before moving ahead with construction of this facility:

1. Well tests from the four homes closest to your 20-year Omro facility to show no impact on area wells;
2. Letters from the four homes closest to the Omro facility stating that they have not experienced odors from the facility;
3. A written statement from the DNR and EPA explaining to our residents the difference between Class A and Class B biosolids and addressing any safety concerns that we should have as a community with the storage or application of Class B biosolids;
4. We also ask for time. Time for our residents to better understand what is being proposed. We would like to work with the Outagamie County Health Department to perform a Rapid Health Risk Assessment of Class 2 Biosolids that can be presented to the community from a neutral and objective source interested only in the long-term health of the area.

Neenah-Menasha Sewage District and the Steinacker's have represented that this building will hold Clas B biosolids and will only be used on the Steinacker's property either owned or leased for farming. For this reason the Town could view this as an Agricultural building and not needing a rezoning to Commercial use. Subsequent discussion has raised a concern that the amount of biosolids going to the facility may exceed the ability of Steinacker's to spread this material, on his farmed or leased land only, in a safe manner. In order to satisfy Town concerns that these biosolids will only be used by Steinacker in the present and the future on his properties, in an environmentally safe manner, we would like to ask the NM Sewage District to provide the following:

1. Contractual agreements between NM Sewage District with Steinacker stating their arrangement regarding storage and application of biosolids will only go on lands farmed or leased by Steinacker, with no exception;
2. Documentation of expected loads of biosolids coming from the plant to storage facility and showing the correlation of that volume with the volume applied to Steinacker's fields, including a map of all fields that will be applied to;
3. A written statement from NM Sewage District stating it is their understanding that should these biosolids be found applied to lands other than those farmed or leased by Steinacker that the Town will issue NMSD a cease and desist order opening the need to find another storage facility or seek rezoning to a commercial district;

As a possible new neighbor we would ask that you go the extra mile to help alleviate the concerns of residences in rural Greenville and make some minor, fairly inexpensive changes to your building up front including:

1. A simple filtering process to help alleviate any odors that might exist;
2. A washing system for trucks to make sure the biosolids are not dragged on to the road.

Many of us through our research have come upon supposed experts in the sewer treatment field who are concerned about application of Class B biosolids on our farm fields.

We understand that your treatment process is now very close to a Class A and expect you to present us a cost analysis for what it would take to produce a Class A product that we would gladly accept in Greenville. We feel this is the best solution to the problem.

Despite having thousands of acres of farmland in Greenville many of our residents know very little about modern day farming. This lack of knowledge just makes it harder for us to understand the Steinacker's proposal.

Please work with us as we seek to better educate ourselves about your process and its impact on the residents of Greenville.

APPENDIX C: Biosolids Facility Survey

Biosolids Facility Survey

Wastewater Treatment Plant: _____

Contact Person: _____ Phone: _____

Address: _____

What kind of biosolids is produced at your facility? (A, B, liquid, dewatered)

_____

Do you have a storage facility? Y N Approximate size: _____

Where? (address if offsite) _____

Are your biosolids used on a land application? Y N If yes, how many farms? __

Do you know the direction and the approximate distance to the closest residential home from the storage facility?

_____

Have you ever received complaints about the storage facility? (odor, health effects, etc.)

Y N

How do you handle the complaints? _____

_____

Do you have a complaint log? Y N May I have a copy of the complaints received in the last 5 years?

Do you have any health, safety and/or nuisance prevention practices above and beyond DNR requirements? (ex. truck wash)

Monitoring:

APPENDIX D: Summary of Biosolids Monitoring and Reporting Requirements[9]

The following reports must be submitted to DNR by the permit holder annually when applicable:

1. General Information Report
    a. Sources, processes and treatment systems
    b. Sludge processing technique prior to disposal
    c. Mode of sludge transportation
    d. Quantity of sludge generated and quantity disposed
    e. Available capacity of sludge storage
    f. Whether the sludge is sold or given away, in bulk, bags or other containers
2. Characteristics Report
    a. Physical, chemical and biological aspects of the sludge
    b. Analysis of some or all of the following parameters depending on facility size, processes used, method of disposal, and characteristics of the industrial discharges coming into the facility
        i. Total solids, volatile solids, pH and Specific Oxygen Uptake Rate
        ii. Nitrogen, Phosphorus and Potassium
        iii. Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, nickel, selenium and zinc
        iv. Fecal coliform, Salmonella, enteric viruses and viable helminth ova
        v. Selected phenolics, pesticides, toxic substances and persisten organics
        vi. Priority pollutant scan
        vii. Toxicity characteristics leaching procedure test if landfilling
        viii. Paint filter if landfilling
    c. Frequency of monitoring for parameter
    d. Amount of sludge per year that is landfilled or applied
3. Landfilling Reports
4. Bagged Sludge and Exceptional Quality Sludge Reports
5. Incineration Reports
6. Land Application Site Evaluation Information Report
    a. Location
    b. Soil testing results
    c. Nitrogen rate provided by sludge
    d. Total acreage available for application
    e. Crops to be grown
    f. Preset use of the site
    g. Separation distances
7. Bulk Sludge Land Application Records Report
8. Notification Reports
9. Certification of Sludge Quality Records