CHAPTER 7: SLUDGE HANDLING AND DISPOSAL

7.1 APPLICABILITY AND SCOPE

This chapter is applicable to the construction, installation, or modification of any disposal system required to obtain a construction permit from the department under Iowa Code section 455B.183 and rule 567—60.2(455B). Specifically, this chapter details the design criteria for sludge handling and disposal, including sewage sludge thickening, stabilization, storage, pumping, dewatering and final disposal.

7.2 DESIGN CONSIDERATIONS

Facilities for processing sludge shall be provided at all mechanical wastewater treatment plants. Complete calculations including design basis, unit sizing and process reliability shall be presented in the facility plan. The selection of sludge treatment, handling, and disposal methods shall address all of the following:

- Volume of sludge to be treated. Whenever possible, obtain the design information from chemical analysis and measurement;
- Energy requirements;
- Efficacy of sludge thickening and dewatering;
- Complexity of equipment;
- Staffing requirements;
- Toxic effects of heavy metals and other substances on sludge stabilization and disposal including the effects of any co-digestion waste streams;
- Sludge digestion or stabilization requirements, including appropriate pathogen and vector attraction reduction;
- Prior treatment process; e.g., poor quality supernatant results from anaerobic digestion of activated sludge;
- Treatment of side-stream or return flows, such as digester, sludge storage, dewatering, or thickener supernatant;
- Biological phosphorus removal in the activated sludge process and its impact to the digester;
- A backup method of sludge handling and disposal; and
- Ultimate methods of sludge disposal.

7.3 SLUDGE THICKENING AND CONDITIONING

7.3.1 Sludge Thickening

As the first step of sludge handling, the need for sludge thickeners to reduce the sludge volume shall be addressed in the preliminary report or facilities plan. If it is determined that sludge thickening is needed, the thickener design shall consider the type and concentration of sludge, the sludge stabilization processes, the ultimate sludge disposal method, chemical needs, and operation costs. The use of gravity thickening tanks for unstabilized sludge is not recommended because of problems due to septicity unless provisions are made for adequate control of process operational problems and odors at the gravity thickener and any downstream unit processes. Particular attention shall be given to the pumping and piping of the concentrated sludge and possible onset of anaerobic conditions.

7.3.2 Sludge Conditioning

Conditioning is the treatment of sludge to facilitate water removal by a thickening or dewatering process. Conditioning normally has a significant effect on both the efficiency of the thickening and/or dewatering process and the liquid treatment portion of the treatment plant. The facility plan shall include a thorough discussion addressing the effects of conditioning on all processes.

7.4 SLUDGE STABILIZATION AND HOLDING

7.4.1 Anaerobic Sludge Digestion

7.4.1.1 General

1. Multiple Units - Multiple tanks are recommended. Where a single tank is used, an alternate method of sludge processing or emergency storage to maintain continuity of service shall be provided.
2. Depth - For those units proposed to serve as supernatant separation tanks, the depth shall be sufficient to allow for the formation of a reasonable depth of supernatant liquor. A minimum side water depth of 20 feet is recommended.

3. Maintenance Provisions - To facilitate draining, cleaning, and maintenance, the following features shall be provided:
   a. Slope - The tank bottom shall slope to drain toward the withdrawal pipe. For tanks equipped with a suction mechanism for withdrawal of sludge, a bottom slope not less than 1:12 is recommended. Where the sludge is to be removed by gravity alone, a slope not less than 1:4 is recommended.
   b. Access Manholes - At least two access manholes, not less than 36-inches in diameter, shall be provided in the top of the tank. A gas dome, if provided, shall not be considered an access manhole. Consider providing stairways or attached ladders to reach the access manholes. A separate sidewall manhole shall be provided, with openings large enough to allow the use of mechanical equipment to remove grit and sand. All access manholes shall be provided with gas tight and watertight covers.
   c. Safety - It is the facility owner's responsibility to ensure that OSHA, NFPA 70, NFPA 820, and other applicable building and construction codes and requirements are met during construction and subsequent operation. During construction, this requirement may be met by including references to OSHA, NEC, and other applicable building and construction codes in the contract documents.

7.4.1.2 Sludge Inlets, Outlets, Recirculation, and High-Level Overflow

1. Multiple sludge inlets and drawoffs and, where used, multiple recirculation suction and discharge points to facilitate flexible operation and effective mixing of the digester contents shall be provided, unless mixing facilities are incorporated within the digester.
2. One (1) inlet shall discharge above the liquid level and be located at approximately the center of the tank to assist in scum breakup. Typically, the second inlet is located opposite to the suction line at approximately the two-thirds (2/3) diameter point across the digester.
3. Inlet discharge points for feedstock shall be located to minimize short-circuiting to the digested sludge or supernatant drawoffs.
4. Locate sludge withdrawal from the bottom of the tank where feasible. The bottom withdrawal pipe shall be interconnected with the recirculation piping, including necessary valving, to increase operational flexibility when mixing the tank contents.
5. An unvalved, vented overflow shall be provided to prevent damage to the digestion tank and cover in case of accidental overfilling. This overflow shall be adequately sized and piped to an appropriate point in the mainstream wastewater treatment process or a sidestream treatment process with sufficient capacity to minimize the impact on the treatment process units.

7.4.1.3 Tank Capacity

1. Calculate the total digestion tank capacity taking into consideration the sludge volume to be treated, total and volatile solids concentrations, percent solids and character, temperature to be maintained in the digesters, degree or extent of mixing to be obtained, degree of volatile solids reduction required, and further treatment and/or disposal of digested sludge and supernatant liquors. Sufficient sludge storage capacity shall be provided for periods of inclement weather and equipment failure. Provide adequate detention to avoid sludge application on frozen or snow-covered ground where feasible. Calculations shall be submitted to justify the basis of design. Consider the allowable temperature and sludge retention time ranges for the digestion process to be classified as a Process to Significantly Reduce Pathogens (PSRP) as defined in 40 CFR Part 503 in designs where pathogen reduction is intended.
2. If calculations are not based on the above factors, the minimum combined digestion tank capacity outlined below will be required. The requirements assume that raw sludge is derived from ordinary domestic wastewater, that a digestion temperature will be maintained in the range of 85-100°F (29°C to 38°C), that 40-50% volatile matter will be maintained in the digested sludge, and that the digested sludge will be removed frequently from the system.
3. Mixing is required as part of the digestion process, and each tank requiring mixing shall have sufficient mixing equipment or design flexibility to ensure that the total mixing capability is not lost with the failure of any one piece of mixing equipment. It is permissible for the backup equipment to be uninstalled.
   a. Completely-Mixed Systems - Completely-mixed systems shall provide for intimate and effective mixing to prevent stratification and to assure homogeneity of digester contents, with a typical corresponding power input of 0.2 to 0.3 horsepower per 1,000 cubic feet of volume. The system

may be loaded at a rate up to 130 lbs/1,000 ft^3 of volume/day of volatile solids in the active digestion units at 30-day maximum design loadings. The minimum sludge retention time shall be 15 days.

b. Moderately-Mixed Systems - For digestion systems where mixing is accomplished only by circulating sludge through an external heat exchanger, it is recommended that the system be loaded at a rate of no more than 50 lbs/1,000 ft^3 of volume/day of volatile solids in the active digestion units at 30-day maximum design loadings. Subject to departmental concurrence, this loading may be modified upward or downward depending upon the degree of mixing provided. Minimum sludge retention time shall be 30 days.

c. Two-Stage Systems - For digestion systems utilizing two stages in series (i.e., primary and secondary units), the first stage (primary) may be either completely mixed or moderately mixed. The second stage (secondary) shall be designed for sludge storage, thickening, and gas collection, and shall not be credited in the calculations of design volumes required for sludge digestion.

7.4.1.4 Gas Collection, Piping and Appurtenances

1. General - All portions of the gas system, including the space above the tank liquor, the storage facilities, and the piping, shall be designed so that under all normal operating conditions, including sludge withdrawal, the gas will be maintained under positive pressure. All enclosed areas where gas leakage might occur shall be adequately ventilated. Explosion-proof gas detectors shall be provided in accordance with IWFDS Section 4.8.
2. Safety Equipment - Safety facilities shall be included where gas is produced. Pressure and vacuum relief valves and flame traps, together with automatic safety shutoff valves, shall be provided. Water seal equipment shall not be installed. Gas safety equipment and gas compressors shall be housed in a separate room with an exterior entrance.
3. Gas Piping and Condensate - Gas piping shall be of adequate diameter and shall slope to condensate traps at low points. Float-controlled condensate traps shall not be used. Condensation traps shall be protected from freezing.
4. Gas Utilization Equipment - Gas-fired boilers for heating digesters shall be located in a separate room not connected to the digester gallery. Such a separated room would not ordinarily be classified as a hazardous location. Gas lines to these units shall be provided with suitable flame traps.
5. Electrical Fixtures - In places enclosing anaerobic digestion appurtenances where hazardous gasses are normally contained in the tanks and piping, the electrical fixtures and controls shall comply with the location specified in the NEC for Class I, Division 1, Group D. Isolate digester galleries from normal operating areas, in accordance with paragraph 7. of this section, to avoid an extension of the hazardous location.
6. Waste Gas - Waste gas burners shall be readily accessible. Burners shall be located at least 25 feet away from any plant structure if placed at ground level, or may be located on the roof of the control building if sufficiently removed from the tank and all flammable materials. All waste gas burners shall be equipped with automatic ignition, such as pilot light or a device using a photoelectric cell sensor. Consider the use of natural or propane gas to ensure reliability of the pilot light.
7. Ventilation - Any underground enclosures connecting with digestion tanks or containing sludge or gas piping or equipment shall be provided with forced ventilation for dry wells in accordance with IWFDS Sections 3.7.1 and 3.73. Isolate the piping gallery for digesters from other passages using tightly fitting, self-closing doors at connecting passages and tunnels to minimize the spread of gas.
8. Meter - A gas meter with bypass shall be provided to meter total gas production.

7.4.1.5 Digester Heating

1. Insulation – Whenever possible digestion tanks shall be constructed above groundwater level. Digestion tanks shall be suitably insulated to minimize heat loss.
2. Heating Facilities - Sludge may be heated by circulating the sludge through external heaters or by heating units located inside the digestion tank.

   a. External Heating - Design piping to provide for the preheating of feed sludge be-fore introduction to the digesters where appropriate. Provisions shall be made in the layout of the piping and valving to facilitate cleaning of these lines. Heat exchang-er sludge piping shall be sized for heat transfer requirements.

   b. Other Heating Methods - Other types of heating facilities will be considered on their own merits. Hot water heating coils affixed to the walls of the digester or other types of internal heating equipment that require emptying the digester contents for repair shall not be used.
3. Heating Capacity - Heating capacity sufficient to consistently maintain the design sludge temperature shall be provided. Where digester tank gas is used for sludge heating, an auxiliary fuel supply is required.
4. Hot Water Internal Heating Controls
   a. Mixing Valves - A suitable automatic valve shall be provided to temper the boiler water with return water so that the inlet-water to the heat jacket can be held below a temperature at which caking will be accentuated. Manual control shall be provided by suitable bypass valves.
   b. Boiler Controls - The boiler shall be provided with suitable automatic controls to maintain the boiler temperature at approximately 180°F (82°C) to minimize corrosion and to shut off the main gas supply in the event of pilot burner or electrical failure, low boiler water level, or excessive temperature.
   c. Thermometers - Thermometers shall be provided to show temperatures of the sludge, hot water feed, hot water return, and boiler water.

7.4.1.6 Supernatant Withdrawal

1. Piping Size - Supernatant piping shall not be less than six inches in diameter.
2. Withdrawal Arrangements
   a. Withdrawal Levels - Piping shall be arranged so that withdrawal can be made from three or more levels in the digester. An unvalved vented overflow shall be provided. See Subsection 7.4.1.2.
   b. Supernatant Selector - If a supernatant selector is provided, provisions shall be made for at least one other drawoff level located in the supernatant zone of the tank in addition to the unvalved emergency supernatant drawoff pipe. High pressure backwash facilities shall be provided.
3. Sampling - Provisions shall be made for sampling each supernatant drawoff level. Sampling pipes shall be at least 1 ½ inches in diameter, and shall terminate at a suitably-sized sampling sink or basin.
4. Supernatant Disposal - The supernatant shall be returned to the treatment process at an appropriate point. Consider the effect of supernatant on plant performance and effluent quality and whether supernatant conditioning is appropriate.

7.4.2 Aerobic Sludge Digestion

7.4.2.1 General - Aerobic sludge digestion systems shall include provisions for digestion, supernatant separation, and any necessary sludge storage. These provisions may be accomplished by separate tanks or processes or in the digestion tanks.

7.4.2.2 Freeboard - Digestion tanks shall provide a minimum freeboard of 1.5 feet to allow for foaming that can occur in aerobic digesters.

7.4.2.3 Tank Duplication - Multiple tanks are recommended. A single sludge digestion tank may be used where adequate provisions are made for sludge handling and where a single unit will not adversely affect normal plant operations.

7.4.2.4 Mixing and Air Requirements - Aerobic sludge digestion tanks shall be designed for effective mixing. Sufficient aeration shall be provided to maintain DO of at least 1.0 mg/L.

1. Diffused Air Systems - To meet minimum mixing and oxygen requirements, an aeration rate of 30 cfm/1,000 ft^3 of tank volume shall be provided with the largest blower out of service.
   a. Bottom Diffusers - Nonclog diffusers designed to permit continuity of service are required.
   b. Jet Aeration - If jet aerators are utilized, a complete spare aeration system (pumps and aerator) shall be provided on site and shall be capable of being installed without dewatering the tank, unless at least 75% of the oxygen transfer capability of the system can be maintained with the largest aeration unit inoperable.
2. Mechanical Aeration Systems - Mechanical aerators shall not be used unless adequate performance data is submitted for existing comparable installation(s) to satisfactorily demonstrate that the proposed aerators are capable of continuous operation during periods of severe climatic conditions. If mechanical aerators are used, a minimum of 1.0 horsepower/1,000 ft^3 shall be provided. At least two aerators shall be installed. A complete spare mechanical aerator shall be provided on site unless at least 75% of the oxygen transfer capability of the system can be maintained with the largest aeration unit inoperable. Replacement of mechanical aerators shall be provided for such that replacement can be accomplished

without dewatering the tank. Where mechanical aerators are used, if the solids concentration is greater than 8,000 mg/L, bottom mixers shall be provided.

3. Combined Systems - Combinations of diffused air, mechanical aeration, mechanical mixers or compressed gas mixing that provide equivalent effectiveness to the criteria in this section may be considered on a case-by-case basis.

7.4.2.5 Tank Capacity - Tank capacities shall be determined using calculations which consider the quantity of sludge produced, sludge characteristics, time of aeration, and sludge temperature. Sufficient sludge storage capacity shall be provided for periods of inclement weather and equipment failure. If possible, provide adequate detention to avoid sludge application on frozen or snow covered ground. Calculations shall be submitted to justify the basis of design. Additional volume or supplemental heat may be required if the land application disposal method is used in order to meet applicable EPA requirements. Consider the allowable temperature and sludge retention time ranges for the digestion process to be classified as a Process to Significantly Reduce Pathogens (PSRP) as defined in 40 CFR Part 503 where pathogen reduction is intended.

1. Volatile Solids Loading – The typical design volatile suspended solids loading should not exceed 100 lbs/1,000 ft^3 of volume/day in the digestion units. Lower loading rates may be necessary depending on temperature, type of sludge, and other factors.
2. Solids Retention Time - Required minimum solids retention time for stabilization of biological sludges vary depending on type of sludge. A minimum of 15 days retention shall be provided for waste activated sludge and 20 days for combination of primary and waste activated sludge, or primary sludge alone. Where sludge temperature is lower than 59°F (15°C), additional detention time shall be provided so that digestion will occur at the lower biological reaction rates.

7.4.2.6 Supernatant Separation - Provisions shall be made for effective supernatant separation and withdrawal. The supernatant shall be returned to the treatment process at an appropriate point. Design the supernatant drawoff unit to prevent the recycling of scum and grease back to plant process units.

7.4.2.7 Emergency High-Level Overflow - An unvalved, high-level overflow and any necessary piping shall be provided to recycle digester overflow back to the head of the wastewater treatment plant or to the aeration process in case of accidental overfilling. Design considerations related to the digester overflow shall include waste sludge rate, duration of unattended plant operation, potential effects on plant process units, discharge location of the emergency overflow, and potential discharge of suspended solids in the plant effluent.

7.4.3 Autothermal Thermophilic Aerobic Digestion

Maintain thermophilic digestion temperature between 122 and 158°F (50 and 70°C). Systems may be either single-stage or multiple-stage. The total solids retention time shall be at least 10 days. Sludge thickening prior to treatment in the digestion tanks is recommended. Design the digester structure to allow for operation in the thermophilic temperature range with the digestion tanks suitably insulated to minimize heat loss. To satisfy minimum process oxygen requirements an air supply of 70 cfm/1,000 ft^3 of active tank volume shall be provided with the largest blower out of service. Foam and odor control shall be considered. Consider providing a freeboard of at least 3 feet and provisions for draining and cleaning the tanks.

7.4.4 High pH Stabilization

7.4.4.1 General - Alkaline material may be added to liquid primary or secondary sludges for sludge stabilization in lieu of digestion facilities; to supplement existing digestion facilities; or for interim sludge handling. There is no direct reduction of organic matter or sludge solids with the high pH stabilization process. There is an increase in the mass of dry sludge solids. Without supplemental dewatering, additional volumes of sludge will be generated. The design shall account for the increased sludge quantities for storage, handling, transportation, ultimate use/disposal methods, and associated costs.

7.4.4.2 Operational Criteria - Sufficient alkaline material shall be added to liquid sludge in order to produce a homogeneous mixture with a minimum pH of 12 after two (2) hours of vigorous mixing. Facilities for adding supplemental alkaline material shall be provided to maintain the pH of the sludge during interim sludge storage periods.

7.4.4.3 Odor Control and Ventilation - Odor control facilities shall be provided for sludge mixing and treated sludge storage tanks when located within one-half (½) mile of residential or commercial areas. Continuous or intermittent ventilation shall be provided for indoor sludge mixing, storage, or processing facilities in accordance with IWFDS Section 3.7.2.

7.4.5 Other Methods of Sludge Stabilization

If other sludge stabilization methods, such as heat treatment or composting are considered, a detailed description of the process and design data shall accompany the engineering report or facility plan. Additional design information may be required if the land application disposal method is used in order to meet applicable EPA requirements.

7.4.6 Sludge Storage Tanks

Sludge storage facilities shall be provided at all mechanical treatment plants. Sludge storage may be provided as additional storage volume to sludge digestion in the sludge digestion units or provided as separate storage tanks or facilities, such as drying beds.

7.4.6.1 Tank Reliability - A single sludge storage tank may be used when adequate provisions are made for sludge handling and when a single unit will not adversely affect normal plant operation.

7.4.6.2 Tank Capacity - The determination of capacity shall be based on rational calculations, including such factors as quantity of sludge, sludge characteristics, and climatic conditions. Sufficient sludge storage capacity shall be provided for periods of inclement weather and equipment failure. If possible, provide adequate detention to avoid sludge application on frozen or snow covered ground considering area seasonal rainfall patterns and crop growth on land application sites. Calculations shall be submitted to justify the basis of design.

7.4.6.3 Mixing and Odor Control - The design shall consider mixing, aeration, covering or other appropriate means to assist in sludge withdrawal, monitoring and odor control in sludge storage tanks.

7.4.6.4 Supernatant Separation - Same requirements as Subsection 7.4.2.6.

7.4.7 Sludge Storage Lagoons

Sludge storage lagoons shall not be used for final disposal of sludges. Unless adequate justification is provided, sludge storage lagoons should not be used as storage where the sludge has been stabilized through the treatment process. Where sludge lagoons are allowed, adequate provisions shall be made for other acceptable sludge handling methods in the event of upset or failure of the sludge digestion process. Sludge storage lagoons shall be designed in accordance with this Section.

7.4.7.1 Lagoon Reliability - A single lagoon may be used where adequate provisions are made for sludge handling and where a single lagoon will not adversely affect normal plant operation.

7.4.7.2 Lagoon Capacity - Same requirements as Subsection 7.4.6.2.

7.4.7.3 Mixing and Odor Control - See Subsection 7.4.6.3.

7.4.7.4 Cleaning - The lagoon(s) shall be designed to facilitate cleaning.

7.4.7.5 Lagoon Construction Details - The lagoon shall, in general, be constructed in accordance with IWFDS Section 8C.7.

7.4.7.6 Supernatant Separation - Facilities may be provided for effective separation and withdrawal of supernatant. Supernatant shall be returned to the treatment process at an appropriate point.

7.5 SLUDGE PUMPS AND PIPING

7.5.1 Sludge Pumps

7.5.1.1 Capacity - Provisions for varying pump capacity are recommended.

7.5.1.2 Duplicate Units - Duplicate units shall be provided such that with any one pump out of service, the remaining pumps will have capacity to handle the peak flow.

7.5.1.3 Type - Plunger pumps, screw feed pumps, recessed impeller type centrifugal pumps, progressive cavity pumps, or other types of pumps with demonstrated solids handling capability shall be provided for handling raw sludge.

7.5.1.4 Minimum Head - A minimum positive head of 24 inches shall be provided at the suction side of centrifugal-type pumps and is desirable for all types of sludge pumps. Maximum suction lifts shall not exceed 10 feet for plunger pumps.

7.5.1.5 Sampling Facilities - Unless sludge sampling facilities are provided, quick-closing sampling valves shall be installed at the sludge pumps. The size of the valve and piping shall be at least 1½ inches.

7.5.2 Sludge Piping

7.5.2.1 Size and Head - The recommended minimum diameter for sludge withdrawal piping is eight inches for gravity withdrawal and six inches for pump suction and discharge lines. Where withdrawal is by gravity, the recommended available head on the discharge pipe is at least 4 feet, preferably more.

7.5.2.2 Slope - Gravity piping shall be laid on uniform grade and alignment. The hydraulic slope of gravity discharge piping shall not be less than 3%. Provisions shall be made for cleaning, draining, and flushing discharge lines.

7.5.2.3 Supports - Special consideration shall be given to the corrosion resistance and continuing stability of supporting systems located inside the digestion tank.

7.6 SLUDGE DEWATERING

7.6.1 Sludge Drying Beds

7.6.1.1 Area - In determining the area of sludge drying beds, consideration shall be given to climatic conditions, the character and volume of the sludge to be dewatered, the method and schedule of sludge removal, and other methods of sludge disposal. In general, the sizing of the drying bed may be estimated on the basis of 2.0 ft^2/capita when the drying bed is the primary method of dewatering, and 1.0 ft^2/capita if it is to be used as a backup dewatering unit.

7.6.1.2 Percolation Type - The lower course of gravel around the underdrains shall be properly graded and shall be 12 inches in depth, extending at least six inches above the top of the underdrains. Place the gravel in two or more layers as appropriate for the depth and layout. The top three inches of the gravel shall consist of gravel ⅛-¼ inch in size.

1. Sand - The top course shall consist of six to nine inches of clean coarse sand. The finished sand surface shall be level.
2. Underdrains - Underdrains shall be plastic or concrete drain tile or clay pipe at least four inches in diameter laid with open joints. Underdrains shall be spaced not more than 20 feet apart. The underdrain filtrate shall be returned to the treatment process at an appropriate point.

7.6.1.3 Partially Paved Type - The design of the partially paved drying bed shall consider the space required to operate mechanical equipment for removing the dried sludge.

7.6.1.4 Walls - Walls shall be watertight and extend 15-18 inches above and at least six inches below the bed surface. Outer walls shall be curbed to prevent soil from washing onto the beds.

7.6.1.5 Sludge Removal - Not less than two beds shall be provided and they shall be arranged to facilitate sludge removal. Concrete truck tracks shall be provided for all percolation-type sludge beds. Pairs of tracks for the percolation-type beds shall be on 20-foot centers.

7.6.1.6 Sludge Influent - The sludge pipe to the drying beds shall terminate at least 12 inches above the bed surface and be so arranged that it will drain. Splash plates for percolation-type beds shall be provided at sludge discharge points.

7.6.2 Sludge Lagoons

Sludge lagoons shall not be substituted for adequate sludge digestion and shall not be approved for use as a sludge volume reduction process, except as provided for in Subsection 7.4.7.6.

7.6.3 Mechanical Dewatering Facilities

7.6.3.1 General - Provision shall be made to maintain sufficient continuity of service so that sludge may be dewatered without accumulation beyond storage capacity. Provide the number of vacuum filters, centrifuges, filter presses, belt filters, or other mechanical dewatering facilities for sufficient dewatering of the sludge produced. Unless other standby facilities are available, adequate storage facilities shall be provided. The storage capacity is recommended to be sufficient to handle at least a three-month sludge production.

7.6.3.2 Spare Parts for Mechanical Dewatering Facilities

1. Spare parts shall be available for all mechanical dewatering facilities to replace parts which are subject to wear and breakage.
2. A backup vacuum pump and filtrate pump shall be installed for each vacuum filter. It is permissible to have an uninstalled backup vacuum pump or filtrate pump for every three or less vacuum filters, provided that the installed unit can easily be removed and replaced.

7.6.3.3 Ventilation - Adequate facilities shall be provided for ventilation of the dewatering area in accordance with IWFDS Section 3.7.1. Provide adequate conditioning of the exhaust air to avoid odor nuisance.

7.6.3.4 Chemical Handling Enclosures – Completely enclosing lime mixing facilities is recommended to prevent the escape of lime dust. Automate chemical handling equipment to eliminate manual lifting where feasible.

7.6.4 Drainage and Filtrate Disposal

Drainage from beds or filtrate from dewatering units shall be returned to the sewage treatment process at appropriate points.

7.6.5 Other Dewatering Facilities

If an alternative method of sludge dewatering or disposal is proposed, a detailed description of the process and design data shall accompany the preliminary report or facility plan.

7.7 FINAL DISPOSAL OF SLUDGE

7.7.1 Sludge Disposal on Land

A sludge land application program must be evaluated as an integral system, including stabilization, storage, transportation, application, soil, crop, and groundwater. The requirements for municipal sludge land application are in 567—Chapter 67.

7.7.2 Other Sludge Disposal Methods

When other sludge disposal methods, such as incineration or landfill, are considered, a detailed description of the process and design data shall accompany the preliminary report or facility plan.