Florida's New and Improved Residuals Rule

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For the last several years, Florida's wastewater treatment plant operators have been faced with meeting often-conflicting requirements between the current DEP residuals rule, Chapter 62-640 F.A.C., and EPA's corresponding residuals regulations contained in 40 CFR, Part 503. DEP has been in the process of revising the state rule to achieve better consistency with the Part 503 rule, including seven meetings of the Technical Advisory Committee and one public workshop. The proposed revisions will incorporate key concepts from the Part 503 rule, such as metals limits and pathogen and vector attraction reduction, and will provide improved guidance for areas which were not clearly addressed in the current rule, such as residuals management facilities, which includes large septage treatment facilities. The effective date of the proposed revisions is early December.

ADMINISTRATIVE ISSUES

Applicability

The applicability of the rule to various facilities is spelled out in the draft Rule 62-640.100, Florida Administrative Code (F.A.C.). From the perspective of most wastewater treatment facility (WWTF)permittees, the most significant aspect of the applicability language is probably the effective date. The effective date will be determined as the rule nears adoption, and will allow some lead time for permittees to become familiar with the rule before it becomes effective.

The revised rule, as drafted, will apply to importers of out-of-state residuals and to composting facilities on the effective date, to existing permitted WWTFs upon renewal or substantial revision of their permits, and to new facilities for which permit applications are received after the effective date. The applicability language explicitly states that the revised rule will address residuals and septage management facilities, which are not specifically addressed in the current rule. Specific guidance for those facilities is found in draft Rule 62-640.880, F.A.C. By interagency agreement with the Department of Health, DEP regulates septage management facilities that treat an average of more than 10,000 gallons per day of septage, or more than 20,000 gallons on a single day, if the septage is subsequently land applied. If a facility treats any amount of residuals, it is regulated by DEP.

Technical References

Technical guidance documents referenced in the draft rule have been updated to include revisions where appropriate, and new documents as well. New documents include EPA references addressing control of pathogens and vector attraction in residuals, and septage treatment and disposal.

Permitting

The most significant changes that are proposed for permitting have to do with the handling of new, expanded or modified land application sites in an AUP. Under the provisions of Chapter 62-620, F.A.C., such changes now require a minor permit revision, which must be obtained prior to applying residuals in new application areas. Guidance is provided for exceptions, which may arise in unusual circumstances, such as in the event of extended wet weather that precludes use of all land application sites that a permittee is approved to use. Under such circumstances, a new, expanded or modified application site may be used if the following conditions are met:

- Notification of DEP within 24 hours;
- Site complies with applicable rule criteria;
- A new or revised Agricultural Use Plan (AUP) is submitted for the site with a permit application within 30 days;
- No other approved application site, disposal method, or storage facility is available for use;
- Demonstration during permit application that additional residuals could not be applied to existing approved application sites without violating DEP rules, or could not be performed due to circumstances beyond the permittee's control.

The proposed rule language pertaining to new, expanded or modified sites will allow a permittee to submit more than one AUP for each minor permit revision. This should encourage permittees to plan ahead, and minimize the additional workload that will be required for DEP staff to process the permit revisions.

Prohibitions

In draft Rule 62-640.400, F.A.C., the proposed rule language will prohibit treatment of liquid residuals or septage in the tank of a hauling vehicle to meet pathogen reduction or vector attraction reduction requirements. This is consistent with the rules of the Department of Health for septage treatment.

The proposed rule language will also explicitly prohibit importation of residuals other than Class AA for land application or distribution and marketing, unless the residuals are shipped to a DEP-permitted wastewater treatment facility that accepts responsibility. The current rule does not explicitly prohibit importation of non-Class AA residuals, but DEP can not issue permits to out-of-state facilities, as would be required for land application of Class A or B residuals from such facilities.

Agricultural Use Plans

In the Agricultural Use Plan (AUP), application rates have historically been based solely on the ability of crops being grown to utilize the nitrogen provided by the applied residuals to prevent migration of nitrogen past the root zone and into the ground water. Under the proposed rule, all applied sources of nitrogen will need to be considered in establishing residuals application rates to avoid an over-application of nitrogen. Applied sources of nitrogen may include, for example, residuals, chemical fertilizers, reclaimed water, and animal manures.

The proposed rule will also require that, in certain instances, residuals-borne phosphorus be evaluated in the AUP. In geographical areas of the state that have been identified by statute or DEP rule as being subject to restrictions on phosphorus loadings, the plan will need to address the potential for phosphorus movement from the site. In such instances, the following considerations must be addressed in the AUP:

- Initial soil phosphorus testing and an ongoing testing program;
- Accounting for all sources of applied phosphorus;
- Agricultural phosphorus needs of the crops being grown;

- Measures used to minimize or prevent phosphorus impacts that could result from sediment transport from application areas to nearby surface waters;
- The soil phosphorus holding capacity.

It is worth noting that dedicated sites, which are regulated under the current state rule, will no longer be regulated under this rule. As a non-beneficial disposal option, dedicated sites will be regulated under Chapter 62-701, F.A.C., Solid Waste Management Facilities at the state level and by EPA under Part 503, Subpart C, Surface Disposal.

Monitoring, Recordkeeping, Reporting and Notification

The responsibilities of a WWTF permittee to perform monitoring, maintain records, submit reports and make notifications to DEP are found in different portions of the current rule. The proposed revisions to Chapter 62-640, F.A.C., have consolidated these requirements into one new section, draft Rule 62-640.650, F.A.C. Apart from the reorganization of the already-existing rule provisions, the major change proposed for this part of the rule is the incorporation of provisions from the Part 503 regulation. Most significantly, the required monitoring parameters are now identical to those that must be monitored under Part 503.

Two noteworthy changes are proposed for Class AA residuals. First, the minimum monitoring frequency for Class AA will be monthly rather than quarterly as in the current rule. The purpose of this change is to provide a higher degree of confidence in the quality of residuals being distributed and marketed in Florida. The second major change pertaining to Class AA residuals is that a report form is now provided in the rule for filing monthly shipping and sales reports. The new form is intended to facilitate data review by DEP staff.

A new form is also provided in the draft rule for residuals and septage management facilities, which currently report their data on a Discharge Monitoring Report (DMR) form. A Residuals Monitoring Report form has been developed that is tailored to the particular needs of residuals and septage management facilities.

Residuals and Septage Management Facilities

A new section, Rule 62-640.880, F.A.C., has been developed to provide guidance that is specific to residuals and septage management facilities. This section addresses permitting, responsibilities of the facility permittee, Type I, II and III facility classifications, design reports, facility staffing, agricultural use plans, hauling records and monitoring requirements.

Septage management facilities are included as a special category of residuals management facility, and are subject to the similar requirements. Two exceptions are that septage management facilities are not subject to 1) the interfacility agreement requirements entered into by source facilities and residuals management facilities, and 2) the requirement to maintain hauling records as must be done for source facilities and residuals management facilities.

An important distinction exists between septage management facilities as they will be regulated under the proposed Chapter 62-640, F.A.C., and the same facilities as viewed by Part 503. The state rule allows for treatment of food establishment sludges (grease trap wastes) at DEP-permitted septage management facilities, whereas the Part 503 rule does not. Part 503 septage guidance applies only to domestic septage as defined in the federal regulation. That definition does not include food establishment sludges.

TECHNICAL ISSUES

The proposed 62-640 rule is most similar to the EPA Part 503 rule with respect to metals limitations, pathogen reduction requirements, and vector attraction reduction requirements. The proposed rule also includes extensive requirements, not addressed by Part 503, in the areas of land application site management and Residuals Management Facilities (RMF). "Other solids" which are removed from the primary and secondary treatment processes during tank cleanout are also covered by the proposed rule to allow for the beneficial use of this material. The technical components of the proposed rule are outlined below.

Residuals Classifications

The proposed rule provides for three classifications of residuals; Class AA, Class A and Class B, based on the level of pathogen reduction provided. Both the pathogen reduction requirements for Class A and B and the vector attraction reduction requirements defined in Part 503 are included in the proposed rule by reference with a few exceptions as follows:

- *Vector attraction reduction Option 11 (503.33(b)(11)):* This option is not included as it relates to surface disposal which is not covered by the 62-640 rule;
- *Pathogen reduction requirements for septage (503.32(c)) and vector attraction reduction Option 12 (ref: 503.33(b)(12)):* These give reduced holding times for alkaline treatment of septage as compared to residuals which DEP has opted not to incorporate;
- *Site Restrictions for Class B residuals (503.32(b)(5)):* The Part 503 site restrictions are not included by reference but the proposed rule provides for very similar restrictions.

The Part 503 metals ceiling limits (Table 1-503.13(b)(1)) and pollutant concentrations (Table 3-503.13(b)(3)) are incorporated directly into the proposed rule. Class AA is a term unique to the DEP rule which is basically Class A residuals with low metals. The allowable use of the residuals is related to both the classification and to the metals content. Residuals which do not meet the metals ceiling concentrations are not suitable for land application, and only Class AA residuals can be distributed and marketed. This is more stringent than the Part 503 rule which allows distribution and marketing of Class A materials if specific labeling of recommended application rates is followed.

Land Application Criteria

The proposed rule establishes site use restrictions, cumulative application rates and agronomic rates for land application of residuals. The site use restrictions include similar restrictions to those in Part 503. Class A stabilization is required prior to beneficial use of residuals on unrestricted public access areas such as playgrounds, parks, golf courses and hospital grounds. The application of Class B residuals on roadway shoulders and medians is also limited to restricted public access roads. Additional site use restrictions that apply to Class B residuals are summarized in Table 1.

The cumulative application rates included in the proposed rule are identical to those given in Part 503 (Table 2-503.13(b)(2)) except that the units are given in pounds (lbs)/acre. These cumulative application rates establish a limited site life for

Table 1. Site Use Restrictions

Crop Type/Use	Location of Harvested Parts	Minimum Time between Application and Harvest/Sale
Nursery Plants		12 months
Food	Above Land Surface - Can Touch Residuals/Soil	14 months
Food	Below Land Surface	20 months(1)
Food	Below Land Surface	38 months(2)
Food, Feed or Fiber		30 days
Animal Grazing		30 days
Sod		12 months

(1) If residuals are not incorporated into the soil for 4 months or longer.
(2) If residuals are incorporated into the soil in less than four months.

sites receiving Class B or Class A residuals. This is more stringent than Part 503 which does not apply cumulative application rates to sites utilizing a Class B residual which meets the Table 3 metals limits (503.13(b)(3)).

Several general site requirements for land application of residuals are included in the proposed rule as follows:

- Florida water quality standards shall not be violated due to application;
- Monitoring of surface and groundwater may be required on a particular site;
- Appropriate equipment and techniques used to ensure uniform application;
- Formation of aerosols should be minimized when spraying liquid residuals;
- Appropriate advisory signs shall be posted at the site.

Temporary residuals storage at the land application site is allowed for up to 30 days during periods of inclement weather or to accommodate agricultural operations. Longer storage times may be allowed on a case-by-case basis as part of the AUP. The proposed rule establishes setback distances based on the level of pathogen reduction of applied residuals on the site as summarized in Table 2.

The proposed rule requires that a minimum pH of 5.0 be maintained in the residuals-soil mixture on all application sites at the time of residuals application. The residuals-soil mixture pH must be measured no less than once per year. The current DEP 62-640 rule requires a minimum pH of 6.5, which has been shown to be unnecessarily restrictive and which has reduced the number of potential application sites for residuals—farmers are reluctant to maintain such high pH's because of negative crop impacts and/or the need to lime fields to comply with the rule.

For groundwater protection, a minimum of 2 feet of unsaturated soil depth is required at the time of residuals application. The water table level must be determined prior to each application of residuals if the seasonal high water table for the site is within two feet of the surface or cannot be determined using soil survey maps. Residuals also cannot be applied during rains that cause site runoff or when surface soils are saturated. The site topographic grade must also be 8 percent or less and, if slopes exceed 2 percent, an approved conservation plan is required.

Application Rates

Annual application rates for residuals are determined based on agronomic nitrogen requirements. These agronomic rates must comply with values provided in section 62-640.750(2)(a) of the proposed rule or be justified by site specific rates in a DEP approved AUP as recommended by either the Natural Resources Conservation Service or the University of Florida Institute of Food and Agricultural Sciences (IFAS). The agronomic rates given in the proposed rule are based on the "pounds of nitrogen required per acre per crop or per active growing season" which is much more adaptable to agricultural practices than the current 62-640 rule which specifies annual application rates. If liquid residuals are surface applied, it is assumed that 50% of the total nitrogen in the residuals is volatilized and unavailable to the crop. Thus, the agronomic application rates given in the rule can be doubled when liquid residuals are applied to the ground surface.

Land reclamation sites are allowed a one-time maximum total application quantity of 50 dry tons of residuals per acre. If a blended material, such as compost, is utilized for the land reclamation project, only the residuals portion of the material is counted toward the 50 dry tons per acre of total application. Vegetation must be planted no later than three months after the residuals application and under no circumstances can Florida water quality criteria and standards be violated.

Table 2. Setback Distances

Type	Type of Residuals	Application Method	Minimum Setback Distance (Feet)
Building Occupied by General Public	Class B Injected	Surface 100	300
Class I Water Body, Outstanding National Resource Water or Outstanding Florida Water	Class A & B	All	1,000
Surface Water & Wetlands(1)	Class A & B Injected (2)	Surface 100	200
Private Potable Water Supply Well	Class A & B	All	300
Public Potable Water Supply Well	Class A & B	All	500
Visible Subsurface Fractures, Solution Cavities, Sinkholes, Excavation Core Holes, Abandoned Wells or Other Man-made Conduits which could allow Direct Contamination of Groundwater	Class A & B	All	200

(1)Exception for canals/water bodies used for irrigation located completely on-site with no off-site discharge. (2)Adherence to an approved conservation plan in accordance with proposed 62-640.700(4)(a) 2. is an alternative to injection.

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GRU Biosolids Management: Changing the Think Box for 503 Compliance

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Gainesville Regional Utilities (GRU) is a publicly owned utility providing electric, water, wastewater, natural gas, and communications services to the City of Gainesville and surrounding portions of Alachua County. In the wastewater service area, GRU currently has over 43,700 connections to its system for an annual average daily flow of 14.4 MGD. Two facilities provide treatment for this flow: the Kanapaha Water Reclamation Facility (WRF) and the Main Street Wastewater Treatment Plant (WWTP).

The Kanapaha WRF has a permitted capacity of 10 MGD. The liquids treatment scheme consists of preliminary treatment (screening and grit removal), single sludge predenitrification, secondary clarification, filtration, and chlorination. Three aerobic digesters, operated in a series configuration, receive waste activated sludge and scum from the secondary clarifiers. Digested sludge is pumped to gravity belt thickeners to reduce the water content prior to hauling.

The Main Street WWTP is permitted for 7.5 MGD and has a similar treatment scheme. Preliminary treatment, extended aeration for nitrification, secondary clarification, filtration, and chlorination comprise liquids treatment with two aerobic digesters in series and gravity belt thickeners employed for solids handling.

A transfer pump station allows GRU to distribute the flow between the two facilities as necessary. Being able to selectively load or offload a facility offers utilization of the combined system capacity as opposed to limited individual facility capacities.

GRU conducted a study to evaluate process changes that would provide Vector Attraction Reduction (VAR) compliance per the EPA Part 503 Biosolids Rule. The three lead alternatives included additional aerobic digestion capacity, composting, and lime stabilization, each with a multi-million dollar impact to the GRU budget. To find the most feasible solution, GRU had to leave the "think box" of changing the treatment strategy and instead focus on the disposal end of biosolids management. Specifically, GRU found that a "kitty litter" approach to land application held the key to providing an economical solution to compliance. A unique contractual partnership was formed with a local farmer to provide subsurface injection, or "burial," in a manner that would be both feasible and reliable for GRU.

Comparison of GRU Biosolids Performance Data with 503 Compliance Criteria

To apply GRU biosolids to restricted access agricultural land, metals criteria, Class B pathogen requirements, and Vector Attraction Reduction (VAR) Criteria as defined in the Part 503 standards must be met. GRU biosolids easily meet the exceptional quality metals criteria, primarily due to low industrial wastewater contribution and a strong pretreatment program.

Pathogen reduction data are presented in Tables 1 and 2. With the exception of the first quarter of 1994, the current aerobic digestion system reduced pathogens below the 2,000,000 MPN/gram TS limit. Both exceedances occurred in the same time period of January through March, 1994. We believe that the cold weather combined with operational experimentation in digester solids thickening was responsible for the exceedances. Previous and subsequent pathogen results were well below the 2,000,000 MPN/gram TS limit.

VAR compliance has also been achieved for each facility in all but one test period per facility. However, demonstrating compliance with VAR has proved to be somewhat more rigorous. It is our experience that cold weather and the resulting lower digester temperatures have a greater impact on volatile solids reduction (and thus VAR) than pathogen reduction. Also, no one method could be depended on to yield favorable results. In numerous cases, criteria would be met with one method during a test period but not be met using that same method in the following test period.

Interim GRU Compliance Measures

Prior to implementation of the 40 CFR Part 503 standards, GRU exclusively used surface land application of liquid sludge. Aerobically digested sludge was thickened from 2 to 4.5 percent solids utilizing gravity belt thickeners. This sludge would then be hauled to agricultural parcels, primarily utilized for livestock food production, in GRU "green trucks," which have a capacity of 3,000 gallons and utilize a pump to spray sludge from the back of the truck onto the application surface. Historically, GRU assumed the sludge application costs as well as hauling costs and serviced a large number of fields, ranging in size from 10 acres to 1,000 acres.

Table 1. Kanapaha WRF: Summary of Digester Performance

Compliance Period	Pathogen Reduction Compliance Methods				Vector Attraction Reduction Compliance Methods		
	Fecal Coliform Results (MPN/g TS)	Average Digester Temp (°C)	Detention Time Required (days)	Actual Detention Time (days)	Specific Oxygen Uptake Rate (1.5 max) (mg O2/hr-g TS)	% Volatile Reduction Achieved (38% min)	30 Day Bench Test % Volatile Solids Reduced (15% max)
1993							
Jul-Aug	4.10×10^3	26	40	44	2.4	29.2%	9.7%
Sep-Oct	5.20×10^3	22	40	46	0.9	36.0%	16.5%
Nov-Dec	6.66×10^4	15	62	38	1.0	35.0%	16.9%
1994							
Jan-Mar	2.17×10^6	14.5	64	39.8	2.3	34.17%	21.05%
Apr-Jun	2.48×10^5	23.7	40	42.2	1.9	19.69%	13.10%
Jul-Sep	3.57×10^4	26.0	40	74.7	0.9	45.75%	3.94%
Oct-Dec	4.62×10^4	20.3	40	62.6	0.5	31.82%	6.03%
1995							
Jan-Mar	8.10×10^4	14.0	64	46.3	0.9	24.63%	7.07%
Apr-Jun	4.85×10^4	23.1	40	32.3	0.8	29.61%	7.92%
Jul-Sep	8.52×10^4	27.1	40	19.0	1.1	23.35%	8.30%
Oct-Dec	9.50×10^4	20.0	40	51.0	1.24	31.51%	14.10%

Table 2. Main Street WWTP: Summary of Digester Performance

Compliance Period	Pathogen Reduction Compliance Methods				Vector Attraction Reduction Compliance Methods		
	Fecal Coliform Results (MPN/g TS)	Average Digester Temp (°C)	Detention Time Required (days)	Actual Detention Time (days)	Specific Oxygen Uptake Rate (1.5 max) (mg O2/hr-g TS)	% Volatile Reduction Achieved (38% min)	30 Day Bench Test % Volatile Solids Reduced (15% max)
1993							
Jul-Sep	4.40×10^2	27	40	111	1.4	44.8%	6.2%
Oct-Dec	6.70×10^3	19	48	83	0.4	30.9%	12.1%
1994							
Jan-Mar	6.90×10^6	17.2	52	58.2	6.1	24.40%	13.67%
Apr-Jun	4.49×10^5	24.3	40	41.8	2.9	25.42%	16.95%
Jul-Sep	2.24×10^5	26.9	40	76.6	2.4	45.19%	11.65%
Oct-Dec	1.66×10^5	21.8	40	68.7	2.6	50.92%	9.46%
1995							
Jan-Mar	6.54×10^5	15.9	56	47.2	5.4	30.65%	13.18%
Apr-Jun	1.36×10^5	24.0	40	56.1	5.0	28.91%	11.67%
Jul-Sep	1.52×10^5	27.5	40	39.2	3.6	33.13%	11.28%
Oct-Dec	4.26×10^5	20.5	40	22.3	3.7	38.73%	7.23%

Although test data indicated that VAR compliance could be achieved in the immediate future, GRU felt it was time to actively plan for future flow increases by evaluating capital improvements to the residuals treatment/land application program. VAR test results did not provide adequate assurance to GRU that the current surface land application process could continue unaffected in the interim prior to implementation of improvements. For this reason, GRU began taking measures to meet VAR compliance with the existing treatment process.

As reflected in the July, August, and September 1993 digester performance data (Tables 1 and 2), the Main Street WWTP had significantly longer detention times than the Kanapaha WRF. To equitably distribute the loading, the transfer pump station was utilized to divert more flow to the Main Street WWTP. The effect of this can be observed in the subsequent detention times of 1993 (last quarter), 1994, and 1995. Another measure taken to increase performance of the treatment process was to carry a higher solids content in the digesters. Manipulating waste activated sludge thickness, providing longer decant times, and minimizing sprayer use enabled staff to achieve a digester solids content of 2.25 to 2.5 % and thus higher detention times.

If these additional efforts failed to reliably achieve VAR compliance through the treatment process, GRU had a backup plan for land application. Rather than depend solely on surface application, GRU purchased a disk harrow attachment for a tractor. This enabled VAR compliance by incorporating a Class B sludge into the soil within six hours after application. An analogy drawn between soil incorporation and burial by a kitten in a litter box resulted in the process being nicknamed the “kitty litter” approach to VAR compliance. Farmers with agricultural operations compatible with disking were sought out for inclusion in the land application portfolio.

GRU Alternatives Evaluation

A thorough evaluation of all the Process to Further Reduce Pathogen (PFRP) and Process to Significantly Reduce Pathogen (PSRP) options was initiated to select a treatment process improvement for future 503 compliance. After researching each alternative, rankings were assigned to the lead alternatives based on the following categories: operating history, reliability, flexibility, simplicity, odor, energy requirement, chemical requirement, operation and maintenance requirement, compatibility with existing facilities, suitability for ex-

tended air waste activated sludge, consistent demand for sludge product, and treatment and disposal cost. From this ranking, composting, thermophilic aerobic digestion, anaerobic digestion, and aerobic digestion were selected for further evaluation. Ultimately, agitated bin composting was chosen.

As the treatment alternatives evaluation was being conducted, the contingency plan to disk for VAR compliance was being refined. Difficulty was encountered in finding farmers willing to allow their hay fields to be disked in cold weather. During the winter, hay and grass production are low, resulting in higher land requirements for livestock. Disking results in fields being taken out of service during this crucial period. The one farmer that was amenable to disking his hay fields in the winter months was located over 35 miles from the facilities, significantly increasing hauling expenses. Also, operational difficulties were encountered. GRU green trucks were utilized to spread the sludge in the fields, followed by a tractor with the disking attachment. Because of sludge spreading limitations, several passes with the green trucks were required. The disked soil often made subsequent passes impossible as the heavy trucks would get bogged down in the loose soil. GRU began searching for and found a better method of biosolids burial. This method, in combination with identification of a closer crop compatible agricultural field, ultimately resulted in a change in thought direction from modification of treatment strategy to changes in disposal methods for interim and future VAR compliance.

Refinement of the "Kitty Litter" Approach

Part 503 standards allow VAR compliance to be met by injecting a Class B sludge below the soil surface, provided no significant amount of sewage sludge be present above the soil surface within one hour after injection. GRU became interested in this option after identifying a piece of equipment to accomplish this with relative ease compared to the disking operation.

The subsurface injection attachment consists of a 4,800 gallon tank trailer equipped with both surface and subsurface injection equipment. Sludge is pumped out of a nozzle located at the top of the rear face of the cylindrical tank for surface spreading. Alternatively, the front of the tank has a series of plows with individual tubes passing behind the face of the blade. Sludge is pumped through the hose for burial at the depth of the plow setting. The attachment is not self propelled and must be pulled by a large four wheel drive tractor.

There are some siting considerations for optimal use of the subsurface injection attachment. Because of the plow action, soils with minimal amounts of rock and other small obstructions are desirable. However, the impact of obstructions is minimized by providing individual spring loaded shock absorbers for each plow arm.

Another consideration is storage. Providing onsite sludge storage enables the sludge hauling schedule to be compatible with plant operations as opposed to requiring coordination with the subsurface injection schedule . Also, onsite storage provides the opportunity to use larger tanker trucks for sludge hauling. This results in less trips to the site, decreasing hauling operation and maintenance costs as well as labor costs. Along these lines, it is more efficient to find larger tracts of land as opposed to numerous smaller tracts. As the attachment is not being utilized for hauling, this minimizes the number of times the unit must be moved from site to site.

GRU Subsurface Injection Program Description

GRU has entered into a contract to provide subsurface sludge injection on a parcel located approximately 12 miles southwest of the Kanapaha WRF. The owner, Roger Williams, is a farmer that GRU enjoys a good working relationship with and has been a key participant in the surface spreading program. At 1,100 acres, the parcel is of sufficient size to minimize movement of the subsurface injection attachment from site to site. The sandy soils at the site require substantial amendment for optimum productivity and are relatively devoid of large rocks and obstructions. Also, as row crops are the primary agricultural activity, sludge injection is a good fit for the cyclic planting/harvesting operation as opposed to livestock feed crop fields that remain planted for long periods of time. Another advantage is that harvesting of these crops occurs in the fall which is compatible with winter month subsurface injection.

The land will be leased from the farmer by GRU for the 5-year duration of the contract. While the farmer retains all harvesting rights, GRU's biosolids disposal requirements have precedence over agricultural operations on the leased fields. GRU is responsible for the purchase/lease and maintenance of the tanker truck and subsurface injection attachment. The farmer agreed to construct at his expense a gravity sludge unloading station, storage tank, and sludge pump station for filling the subsurface injection attachment. A 197,000 gallon Harvestore steel tank was purchased, disassembled and moved on site, and erected by the farmer. The tank is located at an elevation lower than that of the unloading station allowing sludge to be transferred from the tanker to the tank without pumping. A concrete block pit with a submersible pump was constructed by the farmer to move sludge from the tank into the subsurface injection attachment. To defray costs, GRU agreed to lease the tank and pumping system with the understanding that operation and maintenance of the system will be the sole responsibility of the farmer. The farmer will provide and maintain a tractor to pull the attachment. Additionally, redundancy must be provided by purchasing a second tractor, leasing a tractor, or borrowing a tractor in order to keep downtime for spreading biosolids within the 48 hours specified in the agreement.

GRU provides the labor for delivering sludge to the site and unloading into the tank. The farmer has agreed to be responsible for unloading the tank, operating the subsurface injection attachment, and maintaining the roads to the tank.

The capital cost of the subsurface injection equipment was $25,000. Annual operating costs for the existing aerobic digestion treatment with subsurface injection for biosolids disposal are estimated at $305,000. This includes digester operation and maintenance, gravity belt thickener operation and mainte-

nance, hauling costs utilizing the green trucks at a sludge percent solids of approximately 4.5%, lease costs for the on site storage tank and land, and subsurface injection equipment operation and maintenance costs.

Note that VAR compliance via subsurface injection in GRU's situation reduced aerobic digester detention time requirements. From a design perspective, GRU felt that a minimum of 60 days of digester detention time would be required to ensure reliable future compliance with VAR performance criteria. The subsurface injection program satisfied the VAR criteria, leaving only pathogen reduction criteria to be met by the aerobic digestion process. GRU believes the pathogen reduction performance criteria will be reliably met with 40 days detention time, which results in smaller tanks and a lower overall cost for biosolids management using aerobic digestion. For comparison, the present worth cost of aerobic digestion at the anticipated expanded plant capacity of 14 MGD was calculated for 60 days and 40 days detention time. At 60 days, assuming the present green truck method of surface spreading for disposal, an estimate of $11,100,000 was obtained. At 40 days, assuming use of the green trucks for hauling and subsurface injection for disposal, the estimate dropped to $7,600,000.

Efforts are underway to maximize the efficiency of the sludge hauling program. The sludge percent solids leaving the plant has been increased to 7%, which will reduce hauling costs. Water is added to the sludge onsite to facilitate unloading the green trucks, producing a lower percent solids for subsurface injection, which is the preference of the farmer. Previously, pumps on the green trucks used in surface spreading had limited the maximum percent solids to 4.5 to 5 %. In the future, GRU will be using a 6,000-gallon tanker truck to transport sludge to the site in lieu of the current green trucks.

The opportunities to operate at a higher percent solids and use a tanker for hauling are benefits realized by separating the agricultural component from the transportation component of the land application program.

Future Implications

Disposal reliability has been greatly enhanced by expanding VAR compliance to include land application practices as opposed to sole dependence on limited treatment facilities. Long range planning will also be influenced by subsurface injection. First, this program possibly has allowed GRU to extend the life of the existing treatment systems. Second, while agitated bin composting remains a viable future biosolids management option, the low cost of subsurface injection in combination with a reduced detention time criteria make expansion of aerobic digestion a more competitive option. Twenty-year present worth costs for agitated bin composting at the anticipated future plant capacity of 14 MGD are estimated to be $10,200,000 as compared to $7,600,000 for aerobic digestion with subsurface injection for disposal. Another consideration may be a more diversified approach that permits operation of the existing aerobic digestion/subsurface injection program simultaneously with a scaled back version of the composting facility for future capacity expansions. The present worth value of this option is estimated to be $8,800,000.

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Distribution and Marketing

The proposed rule requires monthly sampling for Class AA residuals which are distributed and marketed within the state. A Florida certified laboratory must be utilized for all analyses, including Class AA products which are imported into the state. Persons who intend to ship Class AA residuals into the state must notify the DEP at least 30 days prior to the first shipment.

The Class AA residuals sampling results are to be submitted to DEP on a monthly basis to include the following information:

- Quantity delivered or applied in each county;
- Name and address of the residuals generator;
- Brand name of the residuals product and DACS license number.

Labeling requirements are also included in the proposed rule for Class AA residuals. The label must indicate where the material was produced, state that the product complies with 62-640.850(3), recommend that the material be applied at agronomic rates and provide an analysis of the nutrient value of the product (total nitrogen, total phosphorus and total potassium).

Other Solids

Other solids are defined as solids removed from the primary or secondary treatment processes during maintenance activities, such as tank cleanout. The proposed rule establishes guidelines for the beneficial use of the material, a practice which is not established within current DEP rules. Materials generated within the preliminary treatment facilities, such as headworks, are not included in this category and must still be handled under the solid waste regulations.

The generator of the other solids must demonstrate that the material will be beneficial to the land, for example as a soil amendment, within the AUP and associated WWTF permitting process. An application rate must be established (not based exclusively on nitrogen content as this may not be applicable) for the beneficial use of the material. Once included in the facility's permit and AUP, the material must be monitored to ensure that the pathogen and vector attraction reduction requirements are met as well as for metals content and other criteria prior to land application. The site restrictions applicable to residuals of the same quality (Class A or B) would then apply to the land application site.

Lynn Green, P.E. is a project engineer at Black & Veatch, Tampa and a member of the Technical Advisory Committee for the Chapter 62-640 rule. Lee Smith, P.E. is a residuals coordinator with the Florida Department of Environmental Protection, Tallahassee.