

Sludge Treatment

CE 326 Principles of Environmental Engineering
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Iowa State University
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Processes

- Thickening
- Stabilization
- Conditioning
- Dewatering
- Volume Reduction
- Disposal

Thickening

- c_____ sludge using gravity or f_____ methods. Primary sludge can be thickened to a maximum of about 10% solids and secondary sludge to a maximum of about 6% solids.

Stabilization

- Converting the o_____ in the sludge to more stable (inert) forms so they can be handled more easily (more d_____, less potential for odors) and used as soil conditioners.
- Typically stabilization involves **anaerobic** or **aerobic digestion**.
- During digestion considerable v_____ s_____ destruction occurs

Conditioning

- Addition of c_____ to allow better separation of the water and the solids. Ferric c_____ and organic and inorganic p_____ are frequently used for sludge conditioning.

Dewatering

- V_____, pressure, or drying methods for removing w_____ from the solids.
- Typically about 25 to 35% solids can be achieved.

Volume Reduction

- Drying and p_____ for sale as a fertilizer
- C_____
- I_____ of sludge with ash residual for ultimate disposal.

Biosolids

- **Biosolids** are t_____ s_____;
- there are two different classes:
 - Class A: no detectable levels of p_____ and meets m_____ regulations, requires controlled treatment process involving high pH, temperature, or both; no permit required for land application
 - Class B: have been t_____ but may contain some pathogens and metals, requires permit for land application

Processes for Class A

- Processes for generating Class A biosolids:
 - sludge p_____
 - T_____ treatment (55°C for 24 h)
 - temperature p_____ anaerobic digestion (55°C digester followed by 35°C digester) developed at ISU

Gravity thickener



Dissolved Air Flotation (DAF) Thickener



Dissolved Air Flotation (DAF) Thickener



Anaerobic Digestion



Steps in Anaerobic Digestion

Hydrolysis

Acidogenesis

Acetogenesis

Methanogenesis



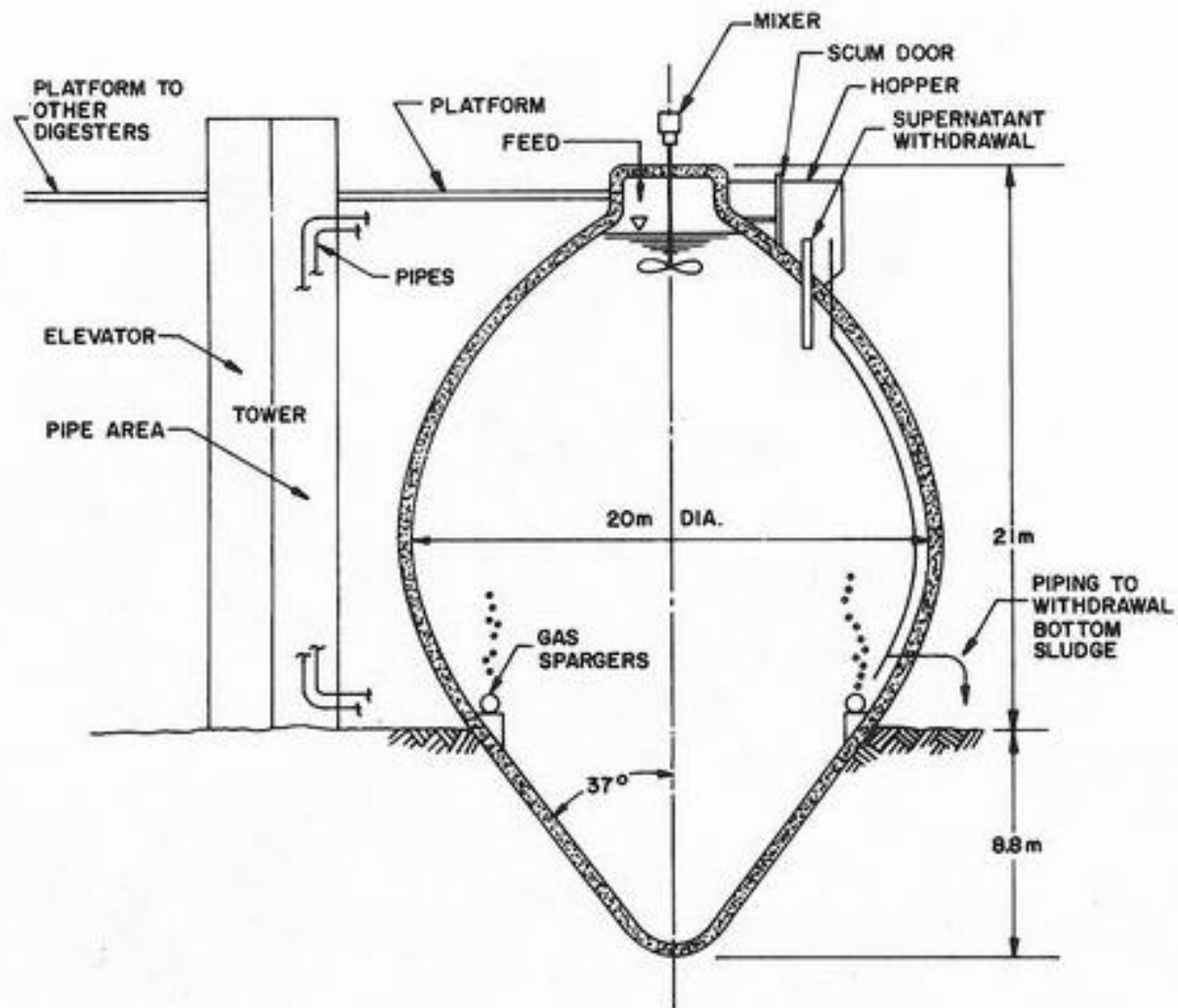
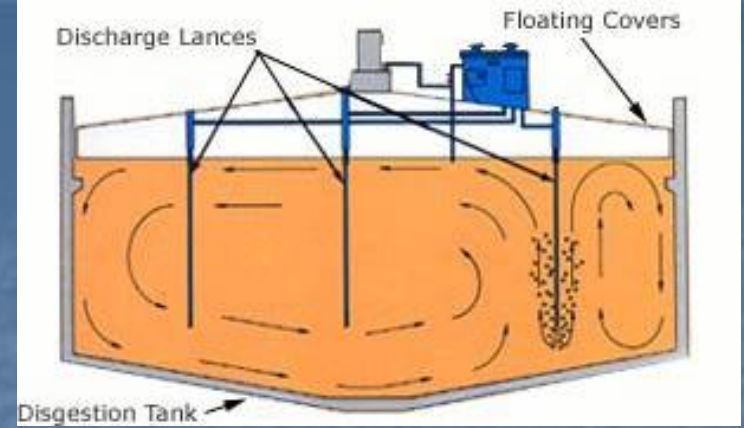


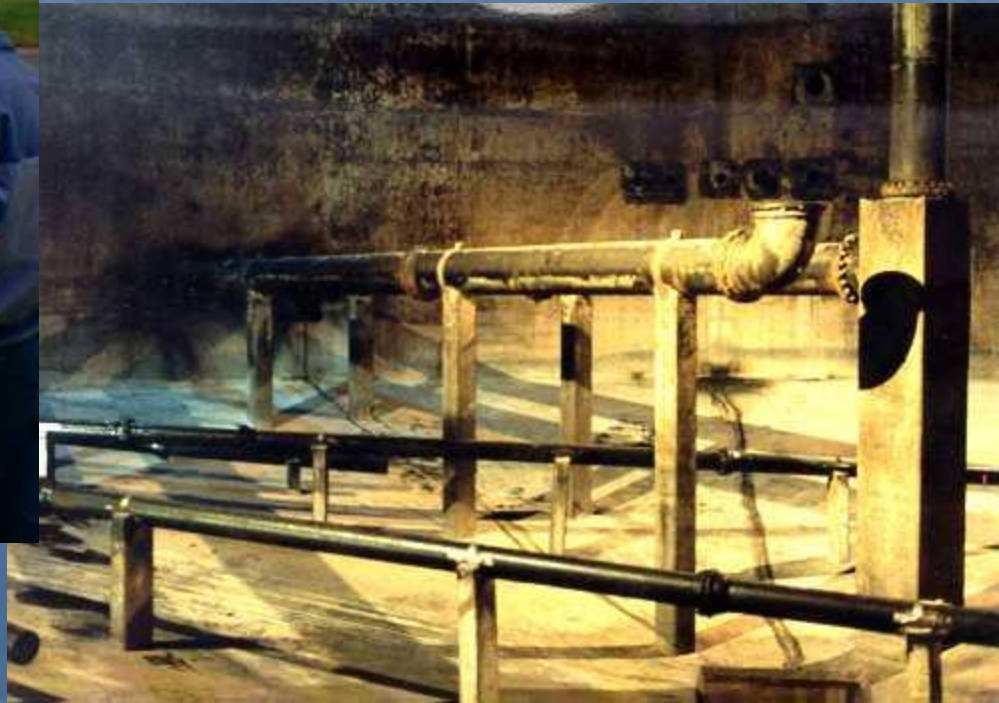
Figure 15.9 Egg-shaped anaerobic digester.



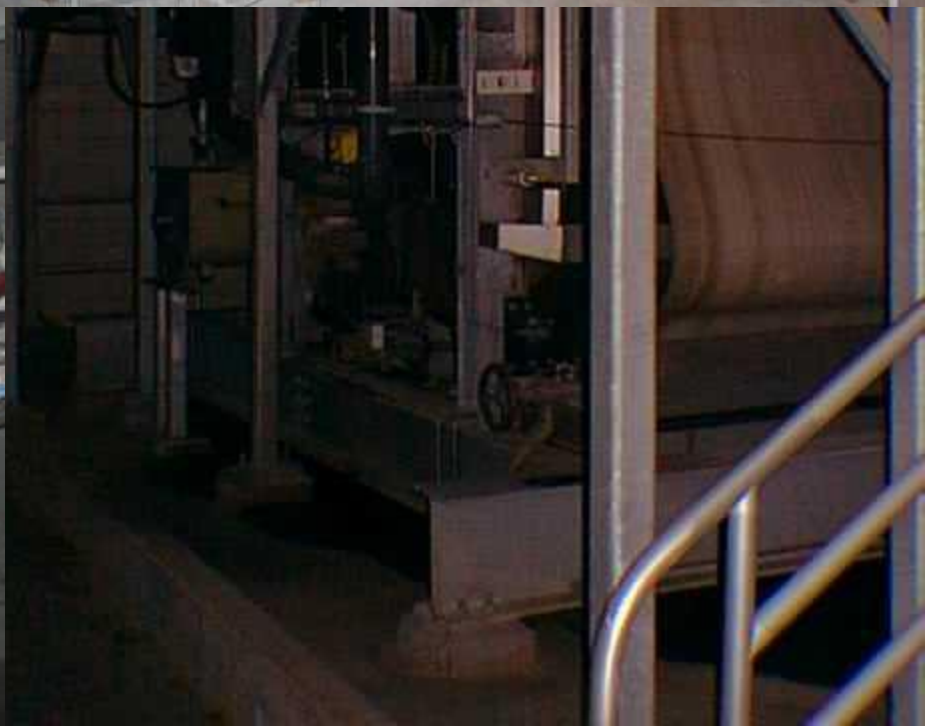


Fixed vs.
floating cover





Belt Filter Press



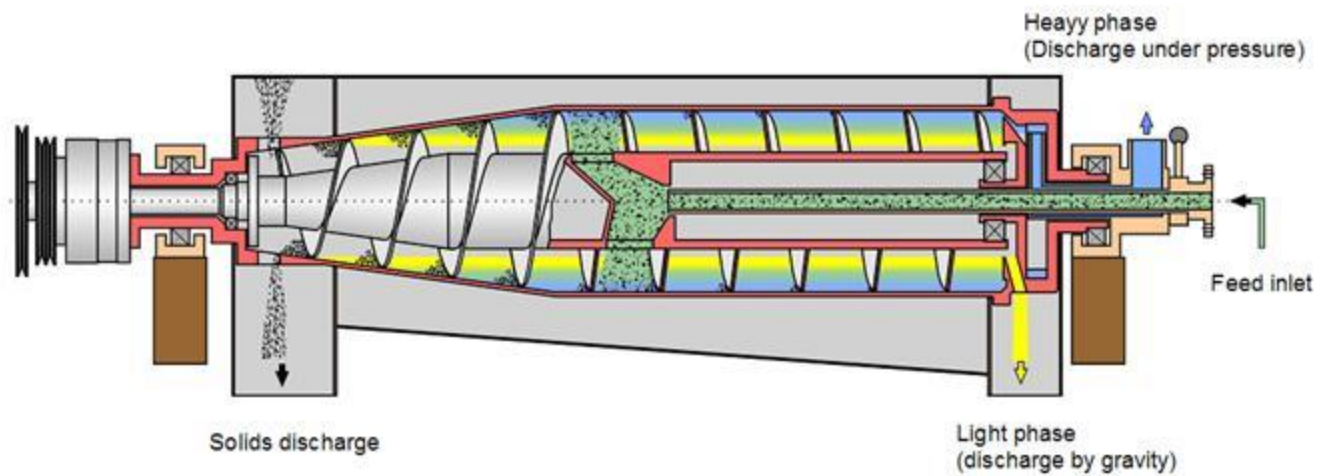


Centrifuge









Cross-section of a Flottweg TRICANTER[®] - Separation of two liquids and one solid phase

Land Application



Composting

L NEWS

B2 AUGUST 24, 2003

SUNDAY NEWS, LANCASTER, PA.

Compost company will rebuild its sludge plant

A&M asks state for permission to restart in Penn Township after snow damage.

BY JON RUTTER
Sunday News Staff Writer
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A&M Composting Inc. plans to rebuild a five-acre sludge processing plant collapsed by snow last February in Penn Township.

The company, operated by J.P. Mascaro & Sons of Harleysville, recently filed notice of its intent to apply for a modified permit from the state Department of Environmental Protection.

A&M will pursue an improved building design, said Mascaro attorney William F. Fox Jr.; however, "the terms of the permit won't change."

The plant schedule will remain the same, as will the amount of sludge composted, he said.

Currently, according to Fox, the state allows the plant at 2022 Mountain Road, Manheim, to compost 5,000 tons a month.

The composted sludge is used

as a fertilizer or soil supplement.

Fox said he expected A&M to begin construction in the spring of 2004 and reopen by late summer or early fall.

DEP spokeswoman Sandra Roderick said the application process typically takes a year but could be shorter for A&M because the facility already had a permit.

"The only thing we would look at is what they're proposing to build and if they plan to change any operational procedures."

Anti-sludge activists worried by the possibility of heavy metals and other contaminants protested A&M's request for a 10-year license renewal in 2001.

But neighbors' complaints about smell have dwindled since the company improved its odor control system several years ago.

"We haven't had any public interest at all since they were able to do that," Roderick said.

State Rep. Tom Creighton, R-

37th, confirmed A&M has notified Penn Township of its intent.

A Feb. 16 blizzard destroyed the sprawling A&M facility, causing a loss of \$12.5 million.

Fox said the company must rebuild even if its contract with New York City is not reinstated.

The city terminated a \$95 million contract with Mascaro last year. According to newspaper records, the city claimed Mascaro had failed to provide adequate composting capacity. The company denied the claim.

"We have other long-term contracts," including one with Nassau County, N.Y., Fox said.

According to Fox, the company maintains two dozen municipal contracts at any given time.

Since the blizzard, he added, Mascaro has diverted A&M sludge to other facilities it owns in Pennsylvania and West Virginia.

The new structure will be much better quality than the one Mascaro bought in 1994, Fox said.

It will also be strong enough to withstand heavy snow.

"Obviously we'll try to ... prevent this from happening again."

NYC dumps \$95M pact with local sludge firm

■ Trucks stop delivering Big Apple sewage here.

By AD CRABBE
New Era Staff Writer

New York City's sewage sludge is no longer being trucked to Lancaster County.

Three years into a 15-year, \$95 million contract, New York City has terminated its deal with J.P. Mascaro & Sons to bring up to 60,000 tons a year of the Big Apple's sludge to the A&M Composting plant near Manheim.

The trucks stopped rolling last November, when the cancellation went into effect.

Adding to Mascaro's woes, heavy snow demolished the Penn Township A&M facility on Feb. 16, causing an estimated \$10 million damage.

However, Mascaro's corporate attorney said today the contract termination is being reviewed by the New York comptroller's office.

"I'm almost certain it will be reinstated," said William Fox.

Fox called the contract cancellation by New York City's Department of Environmental Protection a political move.

Frank Schiano, New York DEP deputy counsel, confirmed

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LANCASTER, PA., NEW ERA

Sludge

Continued from A1

this morning that the contract termination was under review by the comptroller's office. But he added, "I don't think it's going to be reinstated."

New York DEP had sent a four-page certified letter to Mascaro last Oct. 29, serving notice of the contract termination for repeatedly failing to provide promised capacity to handle sludge and turn it into "beneficial re-use."

Mascaro got into a bind when one of its West Virginia composting plants that also handled New York sludge was closed by the state because of persistent odor problems.

Also, a West Virginia landfill owned by Mascaro, where a new, indoor composting plant was being built under orders from the state, was shut down.

The last straw, as outlined in a four-page letter to Mascaro by New York DEP deputy director David Tweedy, occurred when officials learned that Mascaro planned to use the new composting plant partly for Nassau County, N.Y., sludge.

"Mascaro was well aware that it could not even meet the city's (contract) and as such should not have been promising city capacity for other customers," Tweedy wrote Mascaro in a certified letter.

"DEP has been more than generous with Mascaro. Despite the ability to terminate the contract for almost two years, DEP time and again gave Mascaro latitude with regard to its failure to meet its

contractual obligations. At this time, DEP can extend no further generosity," Tweedy said.

But Mascaro's Fox says the reasons cited for terminating the contract were "way, way out of hand."

"We found interim homes for New York City material. We never missed an ounce of their sludge," he said. He said the contract was canceled just as Mascaro was about to finish a \$6 million composting plant in West Virginia.

After the New York City deal fell through, the A&M composting operation slipped to about half its permitted intake, which is up to 225 tons a day.

Much of the sludge being composted was from Nassau County, N.Y., outside New York City. Contracts call for sludge to be composted and turned into a usable fertilizer or soil supplement.

Mark Nolt, who lives near the A&M plant and is an officer of the Lancaster Citizens for Quality Air group that once protested A&M, said the plant had been performing well, and he had heard of no complaints from residents other than an occasional gripe about truck traffic.

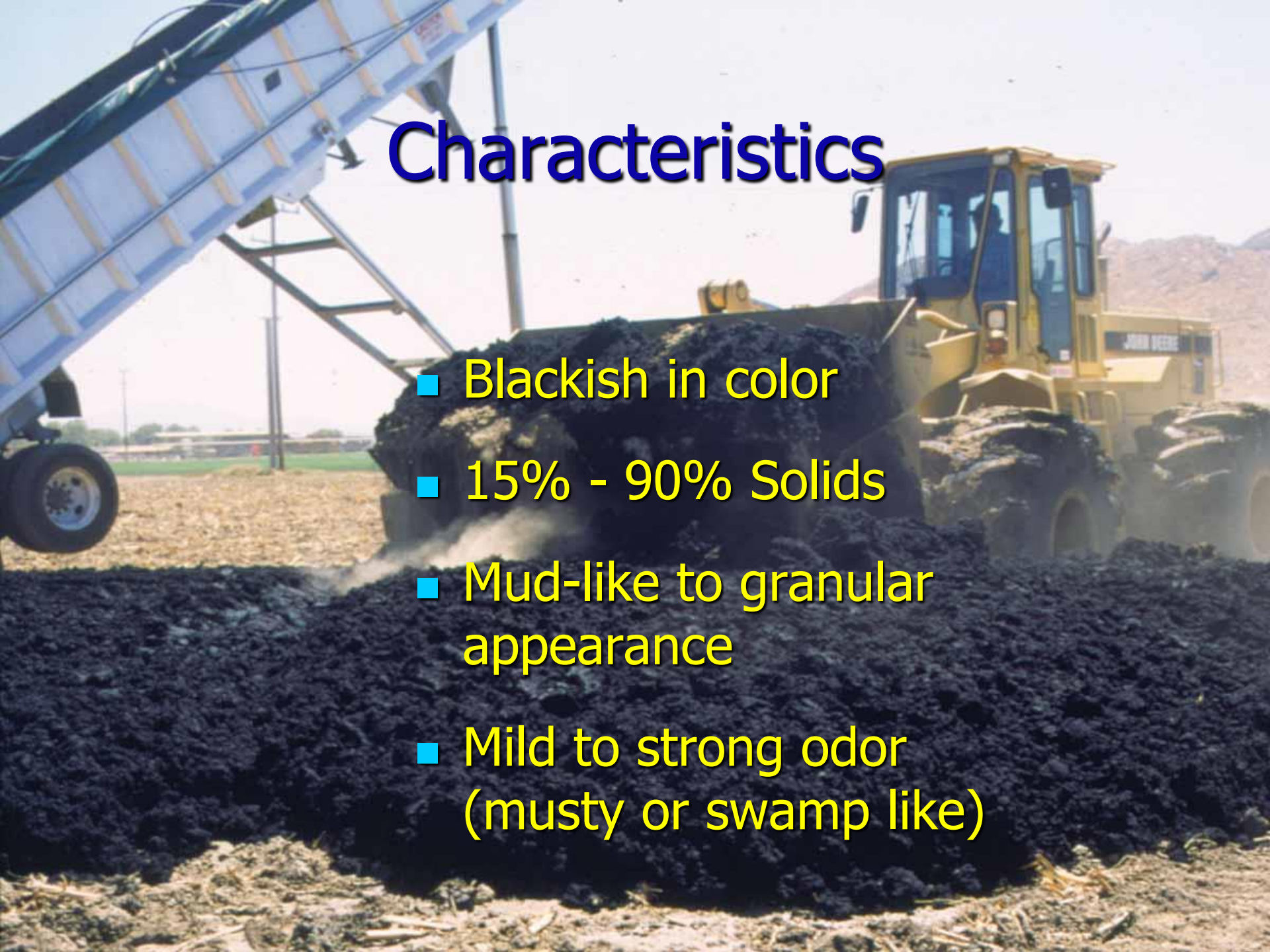
Asked about the end, at least temporarily, of the incoming New York City sludge, he said, "It's not been a problem so it really doesn't matter to us."

"Our whole position has been, as long as they don't make a problem, we're not out to ruin somebody's business."

Fox said the new composting facility to be built at A&M would be on the same location but with the addition of new technological improvements.

Characteristics

- Blackish in color
- 15% - 90% Solids
- Mud-like to granular appearance
- Mild to strong odor (musty or swamp like)



Plants Grow Better with Compost





Tree Rings Before and After Organic Matter Applied

Typical organic matter inputs from organic manures (250kg/ha total N)

Manure type	Organic matter (t/ha)
Farm manures:	
- FYM	6
- slurry	3
- poultry manure	3
Biosolids:	
- cake	7
- liquid	4

Increase in arable topsoil organic matter content of 3-7% above 'typical' background level of c.4%
(many decades to increase soil organic matter level by 1%)



Can you put on too much?



‘This is a huge natural disaster’



Marty Heisey/NEW ERA

Sewage sludge is loaded into a dump truck this morning at the A&M Composting plant near Manheim. The building collapsed during the recent snowstorm.

\$10M damage from roof collapse

