



**SYNAGRO**

*A Residuals Management Company*



**UTILIZING AERATED STATIC PILE (ASP) AND  
BIOFILTRATION COMPOSTING TECHNOLOGY FOR  
BIOSOLIDS COMPOSTING TO MEET AIR QUALITY  
REGULATIONS IN THE  
SAN JOAQUIN VALLEY AIR POLLUTION CONTROL  
DISTRICT**

# *South Kern Compost Manufacturing Facility*



## *Presentation Overview*

- **Project Development & Design-Build**
- **Permitting Authorities**
- **Material Balance**
- **Major Equipment/Processes**
- **Air Quality Regulation Background**
- **SKCMF Air Permitting**
- **SKCMF Source Testing**
- **Summary**

# *Project Development & Design-Build*

## **Acquisition & Permitting**

- ◆ Conditional Use Permit issued October 2002, allowing for a 100 acre biosolids composting facility within a 744 acre industrial park.
- ◆ Synagro acquired SKIC in April 2003.
- ◆ Synagro regulatory permitting for Air, Water & Solid Waste approvals issued in June 2004.

## **Design-Build**

- ◆ CH2M Hill & Tilden-Coil Constructors Joint Venture to provide Synagro Design-Build services for the composting facility.
- ◆ Synagro and the Joint Venture worked diligently in 2003 and 2004 on several design iterations and cost estimations with the goal of a cost competitive project while maintaining Synagro's operational and performance requirements.
- ◆ Commencement of onsite construction activities in April 2005.
- ◆ Construction completed in December 2006, with Synagro commencing the receipt and processing of biosolids on December 27, 2006.

# *Permitting Authorities*

San Joaquin Valley Air Pollution Control District

- ◆ Permits to Operate

Regional Water Quality Control Board

- ◆ Waste Discharge Requirement

State of California - CalRecycle

- ◆ Solid Waste Facility Permit

County of Kern

- ◆ Conditional Use Permit

EPA

- ◆ Registration

# *Material Balance*

## Design

- ◆ Biosolids
  - 500 wet tons per day
  - 23% total solids content
- ◆ Amendments
  - 350 wet tons per day
  - 65% total solids content
- ◆ Product Compost
  - 384 wet tons per day
  - 70% total solids content

## Current

- ◆ Biosolids
  - ≈700 wet tons per day
  - ≈ 23% total solids content
- ◆ Amendments
  - 400 - 750 wet tons per day
  - 60 - 80% total solids content
- ◆ Product Compost
  - 350 – 500 wet tons per day
  - 60 - 70% total solids content

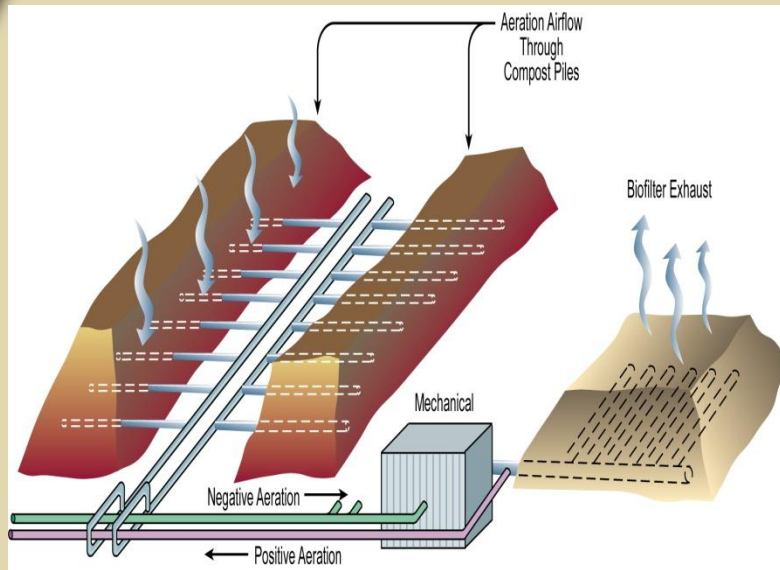
# *Major Equipment/Processes*

## **Enclosed Biosolids Receiving & Feedstock Mixing Operation**



# Major Equipment/Processes

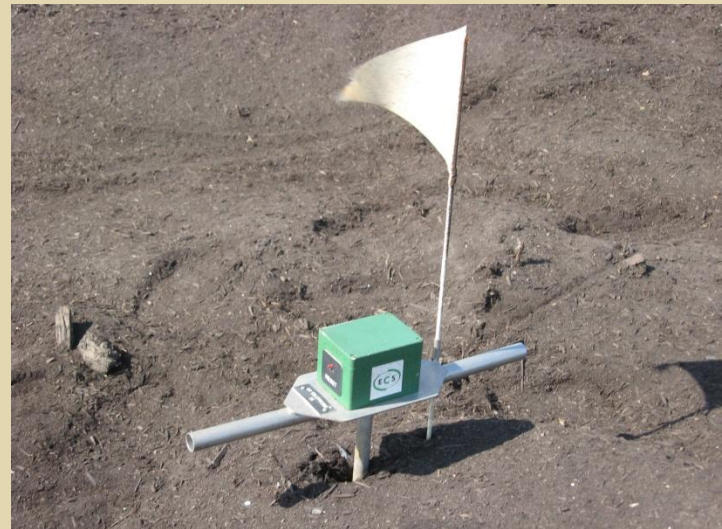
## Engineered Negative Aerated Static Pile Composting





# *Major Equipment/Processes*

## **Engineered Negative Aerated Static Pile Composting**



# *Major Equipment/Processes*

## **Screening Operation**



# *Major Equipment/Processes*

## **Process & Contact Stormwater Impoundment**



# *Air Quality Regulation Background*

## ◆ **Pre-2003**

- ◆ Biosolids composting facilities were regulated primarily for nuisance odor and dust.
- ◆ No biosolids composting sites had been permitted with specific reduction requirements for Volatile Organic Compound (VOC) or Ammonia (NH<sub>3</sub>).
- ◆ Biofilters were utilized at biosolids compost facilities if required due to regional location, weather impacts or sensitive receptors.

## ◆ **SCAQMD Rule 1133**

- ◆ Targeted emissions reductions of VOC & NH<sub>3</sub>.
- ◆ Effectively shut down biosolids composting in the SCAQMD due to the requirement to enclose and treat everything (\$\$\$).

## ◆ **SJVAPCD Co-Compost Regulation**

- ◆ None – at time of SKCMF permit application/issuance.
- ◆ BACT for VOC and NH<sub>3</sub> at biosolids composting in the SJVAPCD was set via the SKCMF project.
- ◆ SJVAPCD Rule 4565 adopted on March 15, 2007 with requirement to reduce VOC emissions by 80%.

## *SKCMF Air Permitting*

- ◆ **Authorities to Construct**
  - ◆ Issued June 2004.
  - ◆ Active & Curing Phase Composting via Engineered Negative Aerated Static Pile with Biofilters.
  - ◆ 80% reduction of VOC & NH<sub>3</sub> across biofilters.
  - ◆ Source testing via SCAQMD Rule 1133.2, Attachment A
  - ◆ Modifications to Air Permits issued in 2010

# Source Testing



# *SKCMF Source Testing - 2007*

## **2007 Final Test Results**

- ◆ Completed Final Source Testing Program in December 2007.
- ◆ Utilized SCAQMD and SJVAPCD approved final source test protocol
  - VOCs or TNMNEOC by SCAQMD Method 25.3
  - Ammonia by SCAQMD Method 207.1
  - Fixed gases and helium by SCAQMD Method 25.3
- ◆ Confirmed that the Active Phase Biofilters reduced VOC emissions by 97% and NH<sub>3</sub> by 84%, exceeding the SJVAPCD ATC requirements.
- ◆ Confirmed that the Curing Phase Biofilters reduced VOC emissions by 88% and NH<sub>3</sub> by 97%, exceeding the SJVAPCD ATC requirements.
- ◆ Confirmed that the SKCMF Engineered Negative Aerated Static Pile system reduced VOC and NH<sub>3</sub> emissions from the SCAQMD baseline uncontrolled values of 1.78 lb/ton throughput of VOC and 2.93 lb/ton throughput of NH<sub>3</sub>, by 85% and 94%, respectively.

# *Biofilter Replacement*

- ◆ Biofilter replacement occurred prior to the 2009 Source Test
- ◆ Improvements made to the original biofilter design
  - ◆ A full open rockfill plenum was placed around the air distribution laterals;
  - ◆ An additional drainage system was installed with perforated drainage pipe and filter cloth below the air distribution laterals;
  - ◆ Inspection locations were installed for inspection of lateral pipes for water levels.



# *SKCMF Source Testing - 2009*

## **2009 Final Test Results**

- Completed Final Source Testing Program in December 2007
- Utilized SCAQMD and SJVAPCD approved final source test protocol
  - VOCs or TNMNEOC by SCAQMD Method 25.3
  - Ammonia by SCAQMD Method 207.1
  - Fixed gases and helium by SCAQMD Method 25.3
  - VOC species by EPA TO-15 and TO-14
  - Siloxanes by EPA TO-15
- Confirmed that the Active Phase Biofilters reduced VOC emissions by 86% and NH<sub>3</sub> by 99.75%, exceeding the SJVAPCD PTO requirements.
- Confirmed that the Curing Phase Biofilters reduced VOC emissions by 86% and NH<sub>3</sub> by 98.75%, exceeding the SJVAPCD PTO requirements.
- Confirmed that the SKCMF Engineered Negative Aerated Static Pile system reduced VOC and NH<sub>3</sub> emissions.

## *Why Siloxanes? (HC-Si-O)*

- ◆ Non photo-reactive and can be considered ‘exempt’ compounds from the VOC total.
- ◆ Eight dominant siloxane compounds summed for a total siloxane contribution to total VOCs.
- ◆ USEPA TO-15 used with modifications by Environmental Analytical Services.

# Summary

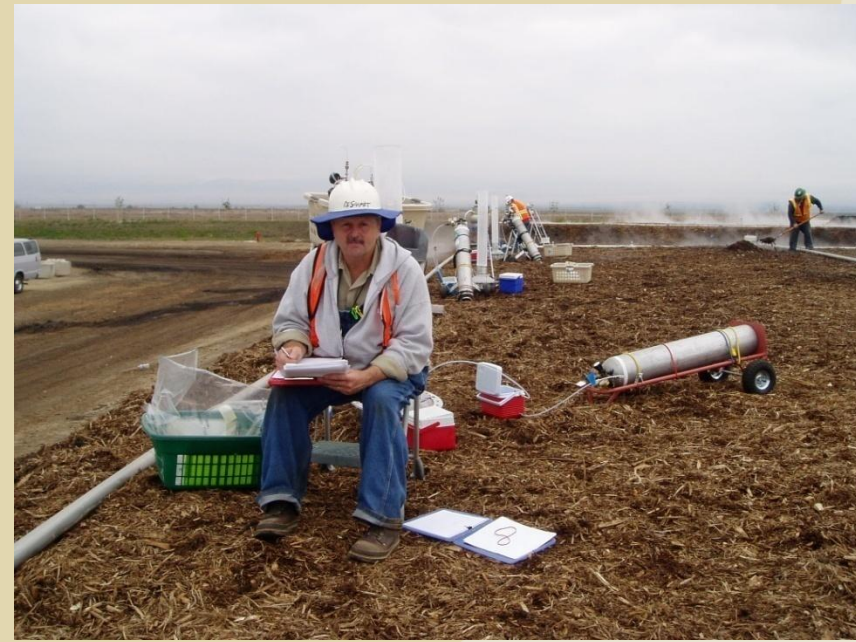
- ◆ **Success!!!**
  - ◆ Met SJVAPCD Permit and Regulatory VOC & NH<sub>3</sub> reduction goals.
  - ◆ Met SCAQMD 1133 VOC & NH<sub>3</sub> reduction goals, without enclosing and treating all composting operations!
- ◆ SCAQMD modified USEPA flux chamber technology for high advective flow sources as found on compost sites is an effective assessment technology.
- ◆ Removal efficiencies of 80% or higher can be achieved with proper biofilter design, operation, and maintenance for total hydrocarbons and ammonia.
- ◆ Siloxane compounds, although found at around 2% of total VOC emissions, can be assessed and considered exempt compounds from the VOC total.

## *Special Thank You To....*

Dr. Chuck E. Schmidt  
(Independent Environmental Consultant)

&

Tom Card  
(Environmental Management Consulting)





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***Thank You!!!***