Grease Receiving and Cogeneration Project Update

International Symposium on Near-Term Solutions for Climate Change Mitigation in California

March 6, 2007

Kennedy/Jenks Consultants

Engineers & Scientists

Video Presentation

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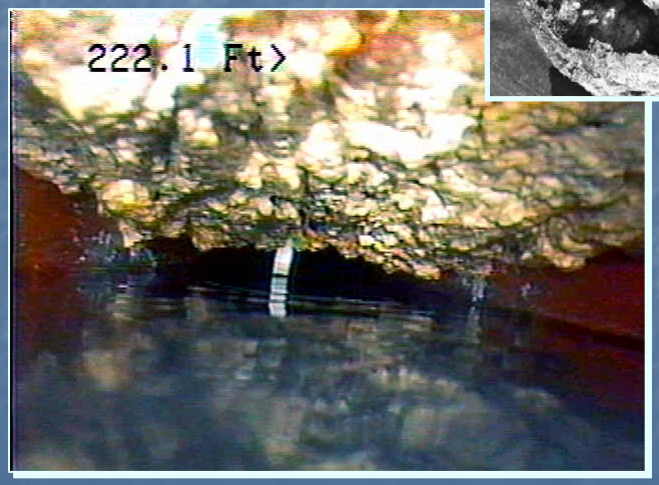
Why is Sewer Grease an Issue?

- Generated wherever there are restaurants
- Deposits in sewer system
- Requires grease traps and maintenance
- Private haulers pump out grease traps
- Many landfills won't accept grease trap waste
- Unsuitable disposal of grease loads:
  - Sanitary sewer
  - Storm drain
  - Local watercourse



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Grease Can Cost You $$$

U.S. ANNOUNCES $2 BILLION SEWAGE SPILL AGREEMENT FOR CITY OF LOS ANGELES

LOS ANGELES - In one of the largest sewage cases in U.S. history, the Department of Justice, U.S. Environmental Protection Agency, the Los Angeles Regional Water Quality Control Board, Santa Monica Baykeeper, and a coalition of Los Angeles community groups have reached a **$2 billion settlement** with the city of Los Angeles over years of sewage spills. Under the terms of the historic agreement, the city of Los Angeles will rebuild at least 488 miles of sewer lines, clean 2,800 miles of sewers annually, **enhance its program to control restaurant grease discharges**, increase the sewage system's capacity, and plan for future expansion.

http://www.usdoj.gov/opa/pr/2004/August/04_enrd_542.htm

Why Consider Grease Receiving?

- Economics
  - Additional digester gas produced
  - Additional revenue from tipping fees
    - Between $0.10 to $0.18 per gallon
- Provide Environmentally Sound Disposal Option for Haulers
- Receive Other Waste Streams

Millbrae WPCP

Millbrae is a Good Candidate

- Close proximity of plant to Freeway
- Anaerobic digesters good for co-digestion of grease (WITH PROPER MIXING)
- Millbrae has ample digester capacity (approx 1 million gallons)

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Project Assumptions

- Will receive ~3000 gallons per day
- Volatile solids content in grease = 18%
- Volatile solids destruction = 65%
- Gas production = 15 CF/lb VS destroyed
- Methane Content = 60%
- Cost of electricity = $0.138/kWh
- Tipping Fees:
  - $0.14 per gallon
  - $25 dump fee

Project Facts

- Gas Quality
  - H2S level < 1 ppm
  - Siloxane level < 70 ppb
- Digester Capacity = ~1 MG
- Existing loading 2800 lbs VSS/day
  - 0.022 lbs VSS/cu. ft digester volume

Anticipated VS Load

- VS from sludge = 2800 lbs/day
- VS from grease trap waste = 4500 lbs/day
- Digester loading = 0.057 lbs VS/cu. ft./day
- Other Digester Loadings
  - Textbook = 0.10 – 0.30 lbs/cu. ft./day (pump mixed)
  - SBSA = 0.10 - 0.13 lbs/cu. ft./day (pump mixed)
  - North San Mateo = 0.15 lbs/cu. ft./day (pump mixed)
  - San Leandro WPCP = 0.18 lbs/cu. ft./day (pump mixed)

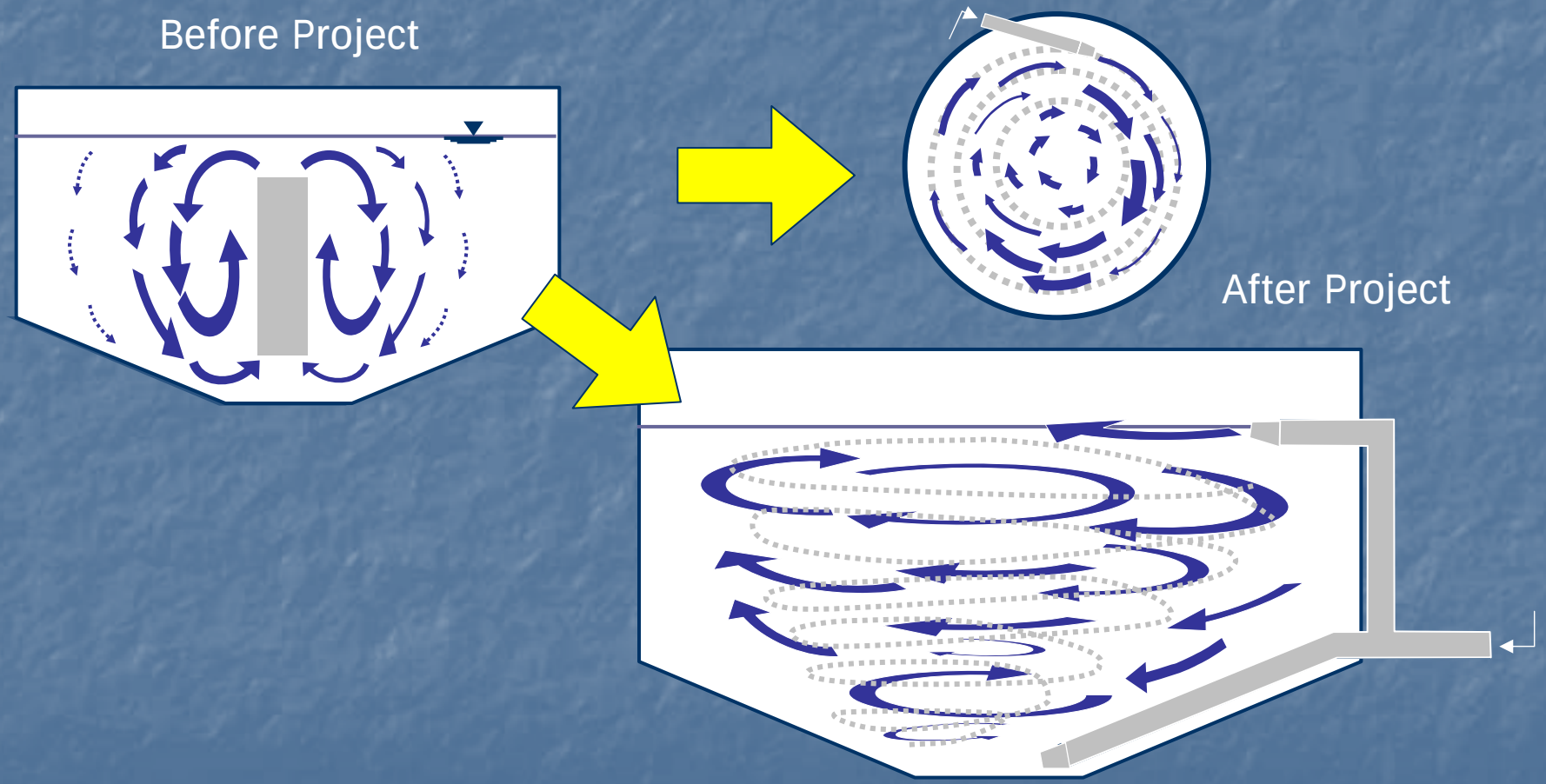
Anaerobic Breakdown of Fats and Oils

- Final reaction:

$$CH_3COOH \rightarrow CO_2 + CH_4$$

- Many intermediate steps to breakdown
- Specialized bacteria at each step
- Must culture bacteria in anaerobic digester

The Key is Good Mixing



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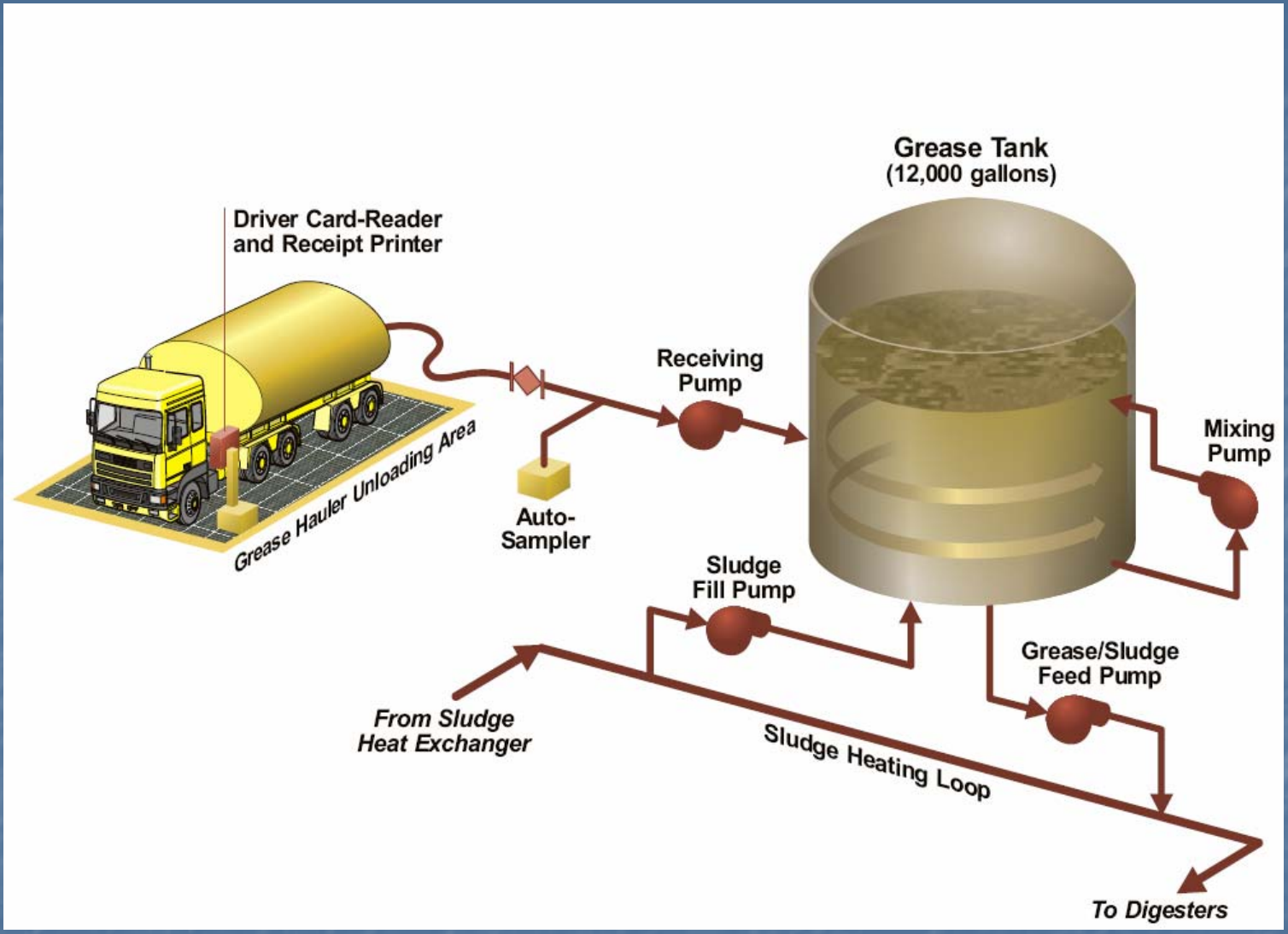

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Preliminary Gas Usage

- Before project:
  - 29,000 cfd digester gas
- Projected:
  - 80,000 cfd natural gas
  - 40,000 cfd digester gas
- Actual:
  - 32,000 cfd natural gas
  - 66,000 cfd digester gas

How much did it cost?

- Total project cost ~$5.5 M
  - Base cogen facility ~$1.9 M
  - Switchgear upgrade ~$0.7 M
  - Grease receiving station ~$0.7 M
  - CNG storage facility ~$0.7 M
  - Digester mixing ~$1.5 M

Emissions Reduction

- Project will reduce CO2 emissions by over 1.1 million pounds annually
- $7,500 per ton of CO2 emissions reduced

Thank You

16,000 WWTPs in the United States
3,500 of these have anaerobic digestion

ONLY 2% of these plants produce electricity from digester gas

http://www1.eere.energy.gov/femp/news/printable_versions/news_detail.html?news_id=8961

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