

## **THE YOLO COUNTY CENTRAL LANDFILL: CUTTING EDGE TECHNOLOGY**

### **SUMMARY**

The 2014-15 Yolo County Grand Jury (YCGJ) completed an investigation of the Yolo County Central Landfill (YCCL) and concluded that the landfill operates waste management effectively. Plans to operate the landfill at or above current capacity extend into the next century. A tour showed a well maintained and clean facility, with recyclables sorted.

YCCL has been innovative in being one of the first landfills in the United States and the first in California to have a full scale bioreactor operating to break down waste efficiently and effectively.

The YCGJ identified matters that need attention, including expansion of the re-purpose program.

### **GLOSSARY**

**Aerobic (dry)** - In an aerobic bioreactor landfill, leachate (the liquid that drains or 'leaches' from a landfill) is removed from the bottom layer, piped to liquid storage tanks, and re-circulated into the landfill in a controlled manner. Air and moisture are injected into the waste mass, using vertical or horizontal wells, to promote aerobic activity and accelerate waste stabilization.

**Anaerobic (wet)** - In an anaerobic bioreactor landfill, only moisture is added to the waste mass in the form of re-circulated leachate and other sources to obtain optimal moisture levels. Biodegradation occurs in the absence of oxygen (anaerobically) and produces landfill gas. Landfill gas, primarily methane, can be captured to minimize greenhouse gas emissions and for energy projects.

**Bioreactor** - A bioreactor landfill operates to rapidly transform and degrade organic waste. The increase in waste degradation and stabilization is accomplished through the addition of liquid and/or air to enhance microbial processes. This bioreactor concept differs from the traditional municipal landfill approach.

**Closed Landfill Cells** - The portions of the landfill that have been properly prepared to no longer accept waste materials.

### **BACKGROUND**

California Penal Code Section 925 authorizes the grand jury to investigate and report upon the operations, accounts and departments of Yolo County. Pursuant to that statute, the YCGJ investigated Yolo County Central Landfill. The last YCGJ tour of the YCCL was in 2007. There has not been an investigation since 1998. It was decided a more current assessment of the YCCL was appropriate.

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### **METHODOLOGY**

YCGJ followed four primary methods for this investigation: initial research, interviews, detailed research, and site visits. The investigation included six interviews of county staff involved with the landfill. The YCGJ toured the facility in October 2014 and February 2015. The focus of the investigation was on the current and short term future operations of the landfill.

### **DISCUSSION**

#### **Administration and Operations**

Yolo County Central Landfill is part of the Department of Planning, Public Works, and Environmental Services. YCCL is managed by the Deputy Director for Integrated Waste Management with 26 full-time and two part-time staff. YCCL is a Class III municipal landfill (which is a non-hazardous solid waste facility) operating through usage fees and grants. It operates under many permits and restrictions conforming to Federal, State, and local mandates such as those regarding air and groundwater quality.

The landfill opened in 1975 and operates on 722 acres on County Road 28H outside of Woodland, California. The landfill is open Monday through Saturday from 6:30 am to 4:00 pm and Sundays from 9:00 am to 5:00 pm. The landfill is closed six days a year: New Year's Day, Easter Sunday, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. The YCCL holds several special clean-up programs throughout the year including free tire, appliance, and Christmas tree disposal.

#### **Waste Disposal and Recycling**

In 2013, 167,000 tons of waste were deposited at the landfill. Eighty-two percent of the waste was from within the county. During the investigation, the grand jury discovered that there are still residents who are unaware of many of the restrictions on items they might be placing in their garbage intended for the landfill. Current education includes messages in various mailings and newsletters, calendars, websites, school visits, landfill informational packets, and the location of battery recycling containers in local communities.

The landfill offers recycling of used oil, e-waste, tires, metals, cleaned agricultural chemical plastic containers, wood and yard waste, and concrete. E-waste includes discarded electrical or electronic devices. YCCL does not take e-waste larger than televisions or computer monitors. Approximately 789,000 pounds of e-waste is received yearly and generates up to \$90,000 from contract sales.

Household Hazardous Waste Drop-Off Days are Friday and Saturday from 7:30 am to 3:30 pm. Household hazardous waste is any type of potentially dangerous substance used around the home. County staff sorts the materials and makes suitable materials available to

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the public for reuse. County residents and businesses may obtain free, reusable materials such as paints, insecticides, and soil amendments surrendered at the household hazardous waste reuse center on drop-off days. Reusable, nonhazardous household items such as toys, furniture, tools and other discards are excluded from the program.

### Innovation and Technology

The grand jury learned that YCCL began using bioreactor technology in a 1992 pilot study to determine the efficiency and cost effectiveness of the program. Landfill staff has determined that the “bioreactor cells” that are enhanced with liquid (wet cells) are more efficient in breaking down, accelerating the decomposition, and decreasing the volume of garbage. Use of wet cells adds to the lifespan of the landfill. The cells without added liquid (dry cells) break down the volume of garbage more slowly. All future cells are planned to be wet cells. Construction of the first full scale bioreactor was completed in 2002 on a 12 acre area that consists of a 2.5 acre aerobic (dry) cell, and 3.5 and 6 acre anaerobic (wet) cells (Figure 1). Four million shredded tires were used for the base and instrumentation layers of the cells. A new pilot project using anaerobic bio-digester technology is now underway on a 0.25 acre cell area. This involves the process of utilizing clean organic wastes -- naturally biodegradable materials derived from plants, animals, or carbon compounds. Decomposition is enhanced through the injection of liquid to accelerate the breaking down of biodegradable materials like green wastes, manure and food wastes in the absence of oxygen. This produces methane gas used to generate electricity which reduces air emissions. The enhanced decomposition produces high quality compost for agricultural and horticultural use.

The closed landfill cells are monitored for up to 30 years or longer before they are returned to approved land uses. The amount of space available on top of closed cells makes it feasible to consider putting in a solar power system for energy production. Solar power would be able to supply the estimated \$80,000 yearly electrical expenses. These cells can reach a height of 120 feet at their peak before they begin to decompose and reduce their volume over time resulting in lower height and uneven surface. Due to the unstable nature of the topography and the ability to anchor the solar array without disturbing the changing base or puncturing the landfill cover, more study needs to be done.

At the beginning of the investigation the grand jury found that under the category of “Innovative Projects,” the YCCL website contained information on projects which were no longer current (such as Rubberized Asphalt Concrete) and was missing information on current projects (such as the Bio-Digester). A recent Yolo County website redesign noted many of the web page addresses have changed and search results may not be accurate for a time.

### Power Generation

Minnesota Methane, a subsidiary of Fortistar, is a private company operating methane gas recovery for electricity production at the landfill (Figure 2). YCCL receives royalties from

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Minnesota Methane for the processing of methane gas generated from the use of the wet, anaerobic cells. Annual royalties have generally been increasing since 1998 and averaged \$130,000 per year for the last five years including 2014. Royalties paid the county are percentage based and determined by the gross revenue earned from the sales of refuse gas and energy derived therefrom. It is estimated that the use of wet cells will increase the lifespan of the landfill by 50 years or more.

Under the Yolo County Landfill Commercial Gas Production Agreement, executed in 1985, all specified opt-out dates have passed making it difficult for the county to amend or cancel the contract. The grand jury discovered the county is currently researching potential options and has implemented safeguards to prevent open-ended contracts. Current contracting policies state that multiple year contracts must include provisions for early termination and must be contingent upon available funding. The county developed, and now uses, two standard forms as a basis for most vendor contracts: a short form for smaller contracts and a longer form for complex contracts and contracts over \$75,000.

### FINDINGS

- F1. YCCL works to reduce waste and re-purpose household hazardous waste products.
- F2. YCCL does not make nonhazardous household items, such as toys, furniture, tools and other discards available for reuse.
- F3. Informing residents and other users of the facility about the importance of recycling and proper disposal of household and agricultural wastes is an on-going need.
- F4. Generating solar energy at the landfill has been considered; however, there are special challenges to proper installation on “closed” landfill cells.
- F5. The YCCL website is not current, making it difficult to be aware of all landfill projects.
- F6. Under the Yolo County Landfill Commercial Gas Production Agreement, all specified opt out dates have passed making it difficult for the county to amend or cancel the contract.
- F7. The hours of operation offer broad opportunities to use the facility.

### RECOMMENDATIONS

- R1. Director, Department of Planning, Public Works and Environmental Services (PPWES), in consultation with the County Counsel, shall implement a non-hazardous waste reuse program for the public by June 1, 2016.
- R2. Director, PPWES, shall increase education and outreach efforts on proper sorting and disposal of waste for all residents of Yolo County by January 1, 2016, including non-English language speakers, and recent residents.

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- R3. Director, PPWES, shall complete an assessment plan on the possibility of utilizing solar panels on the landfill property to produce electricity by July 1, 2016.
- R4. Beginning September 1, 2015, the Director of PPWES shall review and update website content at least quarterly to reflect current information.
- R5. Immediately, County Counsel and the Chief Administrative Officer shall follow Yolo County adopted policies when entering into any contract to provide goods or services to, or for the utilization of resources generated by, the Yolo County Central Landfill.

#### INVITED RESPONSES

- f* Director, Department of Planning, Public Works and Environmental Services – R1 through R4
- f* Deputy Director for Integrated Waste Management, Department of Planning, Public Works and Environmental Services – R1 through R4
- f* County Counsel – R1 and R5
- f* County Administrator – R5

#### BIBLIOGRAPHY

##### Websites:

- f* Yolo County website: [www.yolocounty.org](http://www.yolocounty.org)
- f* CalRecycle website: [www.calrecycle.ca.gov](http://www.calrecycle.ca.gov)
- f* United States Environmental Protection Agency website: [www.epa.gov](http://www.epa.gov)
- f* Stoel Rives Renewable + Law Blog website: [www.lawofrenewableenergy.com](http://www.lawofrenewableenergy.com)
- f* The Biogas Supply & Demand Center website: [www.directedbiogas.com](http://www.directedbiogas.com)
- f* California Environmental Protection Agency Air Resources Board website: [www.arb.gov](http://www.arb.gov)
- f* California Legislative Information website: <https://leginfo.legislature.ca.gov>

##### Documents:

- f* "One Person`s trash..."Your guide to reducing, reusing and recycling. A quarterly newsletter of Yolo County, fall 2014
- f* YCCL Overview document, 17 pages
- f* Yolo County A to Z Recyclopeda 2015 Calendar

## **The Yolo County Central Landfill: Cutting Edge Technology**

*f* “How a small county in California went grid positive,” Rocky Mountain Institute, Laurie Guevara-Stone, April 10, 2014

*f* Landfill Gas to Energy Facility Agreements Summary, Landfill Gas Revenues, and Detail Summary of Revenue from Minnesota Methane from the Department of Planning, Public Works and Environmental Services

*f* Full Scale Landfill Bioreactor Project at the Yolo County Central Landfill: Final Report, Yazdani, Keiffer, Akau, April 2002

*f* County of Yolo Administrative Policies and Procedures Manual, Contracting & Purchasing Policies, September 9, 2008

### **Contracts:**

*f* The Yolo County Landfill Commercial Gas Production Agreement, various amendments to the agreement, and actions taken by the Yolo County Board of Supervisors between the years 1985 and 1999

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### PHOTOGRAPHS

Figure 1: Yolo County Central Landfill anaerobic bioreactors showing use of tires to secure vinyl covering.



Figure 2: Yolo County Central Landfill methane gas-to-energy plant.