

Document: Addendum No. 1 to Final MND No. 191

Project Name: **Addendum No. 1 to Final Mitigated Negative Declaration No. 191 for Final Closure and Post-Closure Maintenance Plan at Santiago Canyon Landfill for the U.C. Irvine/Ener-Core Landfill Gas Renewable Energy Project**

**OC Waste & Recycling
Log #:** 632

Purpose and Content of Addendum

The closed Santiago Canyon Landfill is a 113-acre landfill site that operated from 1968 to 1996. The landfill site is owned by the County of Orange and operated by OC Waste & Recycling. The site accepted mixed municipal and residential solid wastes. The total volume of refuse within the landfill is approximately 23.7 million cubic yards. Final closure construction at the landfill began in August 2002 and was completed in November 2004. The site is located off Santiago Canyon Road, east of the intersection of SR 261 and SR 241, adjacent and westerly of Irvine Lake. Direct access to the landfill from Santiago Canyon Road is provided by a paved access road. The address of the site is 3099 Santiago Canyon Road.

U.C. Irvine (UCI) and Ener-Core are proposing to construct and operate a landfill gas renewable energy facility adjacent to the existing flare station at the closed Santiago Canyon Landfill. A minor addition to Final Mitigated Negative Declaration (MND) No. 191 for the Final Closure and Post-Closure Maintenance Plan is required to incorporate the proposed project, with the following project description and analysis added to the MND under Section 2.6.2.1 Existing Landfill Gas Control/Collection System, beginning on page 2-13.

Summary

OC Waste & Recycling is pursuing participation in a CEC grant award that demonstrates advanced pollution control equipment for energy production at the Santiago Canyon Landfill. UC Irvine is the lead applicant with OC Waste & Recycling, Ener-Core (a technology vendor) and Environ Strategy (an engineering consulting firm) as members of the project team. The proposed project involves the installation of a 250 kW Ener-Core power generating unit using the low emissions Power Oxidizer technology with a commercial small gas turbine. The Power Oxidizer replaces the turbine's standard combustor so that the unit can operate on a gaseous fuel that is much lower in quality, and with fewer emissions than in a conventional turbine. The system would be located adjacent to the existing flare station at the Santiago Canyon Landfill and serve the site electrical load using a net metering or, potentially, bill credit tariffs. The County will benefit from reduced utility costs of up to \$240,000 per year for 3 years (term of the agreement).

Project description

This project will demonstrate use of a novel low emissions thermochemical technology to convert low quality renewable fuel streams into electricity. Many potential renewable fuel streams cannot be used to generate electricity using current technology without considerable

upgrading (i.e., increasing the heating value) and substantial clean up (e.g., cleaning contaminants such as H₂S or siloxanes from the fuel which are introduced by the feedstock). Prime examples include landfills which are approaching end of life that still produce gases that have some heating value, but values that are generally too low for use in commonly used combustion devices (e.g., reciprocating engines, gas turbines, etc.). Landfill generated biogases are also notoriously challenging due to the variability in level of contaminants caused by the wide range of materials contained within them.

The proposed project will utilize a 250 kW gas turbine system that converts these relatively dirty low heating value fuels into heat using gradual oxidation. This oxidation technology has been developed by Ener-Core, an Irvine, CA company and has been demonstrated in operating systems for well over 1000 hours, but has not yet been commercially deployed in California. The intended site for the demonstration is Santiago Canyon, a closed landfill producing low quality gas (35% methane) that is currently flared.

This site is a good match for the proposed 250kW demonstration as it will eliminate the flaring of the otherwise unusable gas by generating electricity for on-site use and use in other County-owned facilities as facilitated by SB 1122 or SB 43. The project will be carried out in collaboration with Orange County Waste & Recycling who is responsible for the Santiago Canyon test site. All parties on the team are located in California and thus all project funds will be spent within the State.

Project Overview

UCI and Ener-Core will design, permit, install and operate an Ener-Core EC250 system at the Santiago Canyon Landfill (the “Landfill”). The landfill gas (“LFG”) from the landfill will be compressed and directly injected into the EC250 without complex pretreatment. The demonstration facility will utilize approximately 13% of the available gas at the landfill. The site will be on the land adjacent to the existing flare station. The EC250 has a footprint of 17 ft. long by 15 ft. wide. It is approximately 25 ft. high. The EC250 weighs 52,000 lbs. so a concrete pad will be needed to mount the systems and associated equipment. The EC250 system operation will require a landfill gas compressor to divert landfill gas from the flare to the EC250 for power generation. The landfill gas compressor has a footprint of 17 ft. long by 9.5 ft. wide and it weighs 10,000 lbs.

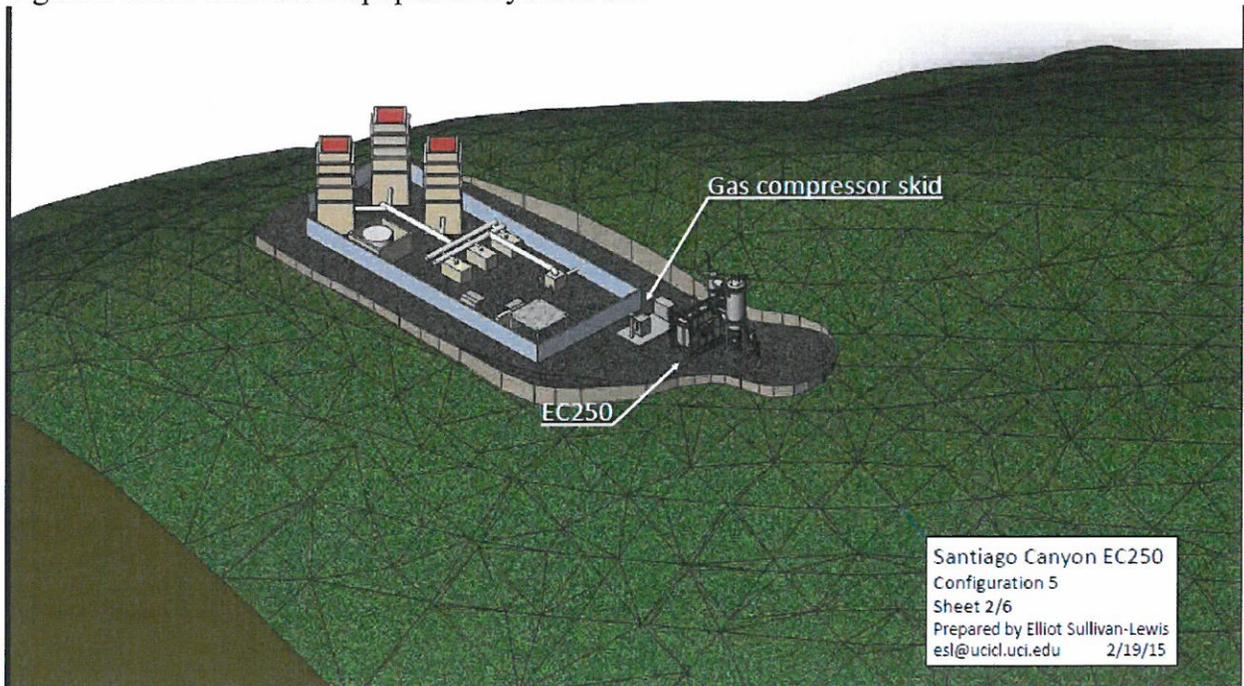
The EC250 will use propane as the start gas. A 500 gallon propane tank will be installed inside the flare station near the incoming landfill gas feed. The propane tank has an overall footprint of 10 ft. long by 4 ft. wide. The weight estimate of the filled propane tank is approximately 3500 lbs.

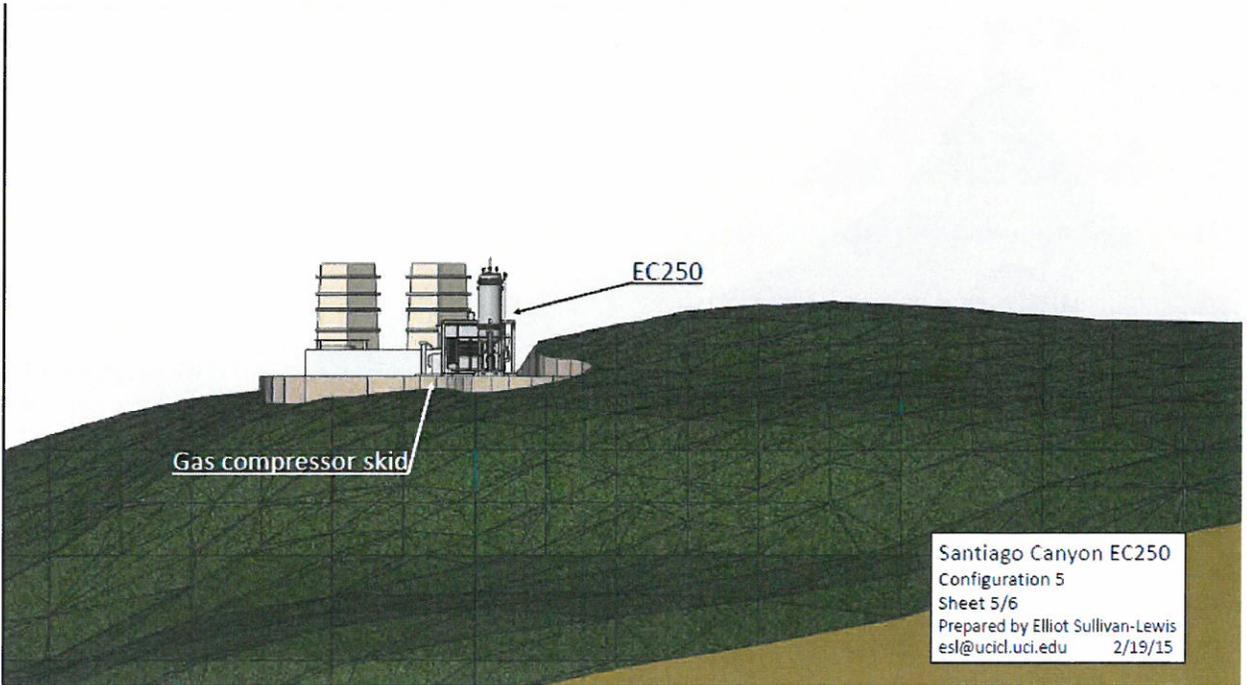
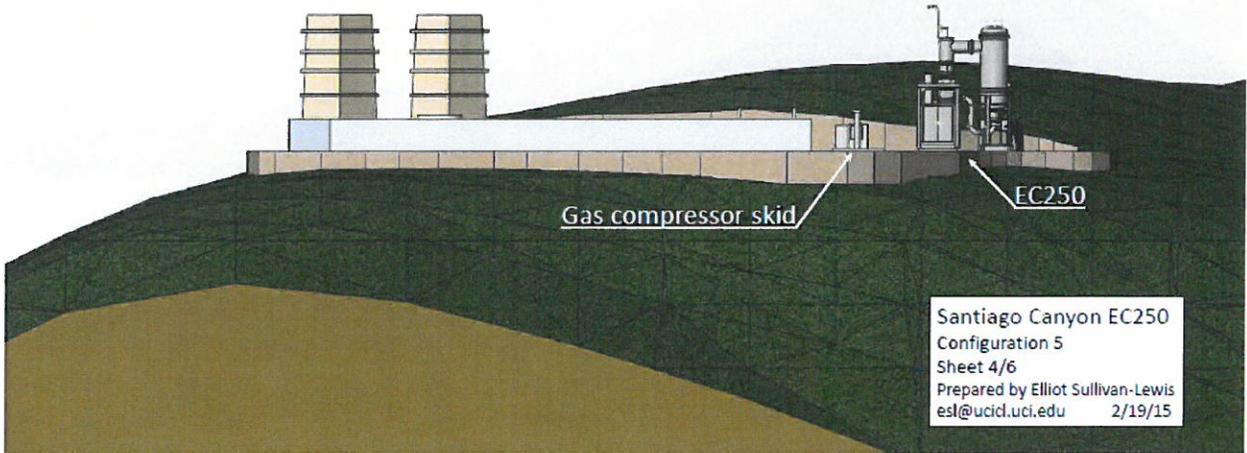
The EC250 will interface with the existing flare station motor control center for the electrical power interconnection. The electric power connection is proposed to be completed through a dedicated generation facility switchboard. Additionally, the EC250 is supplied with a generator braking resistor (“GBR”). The GBR is used to control the EC250 during start-up and shutdown. Figure 1 below shows the equipment layout adjacent to the flare station.

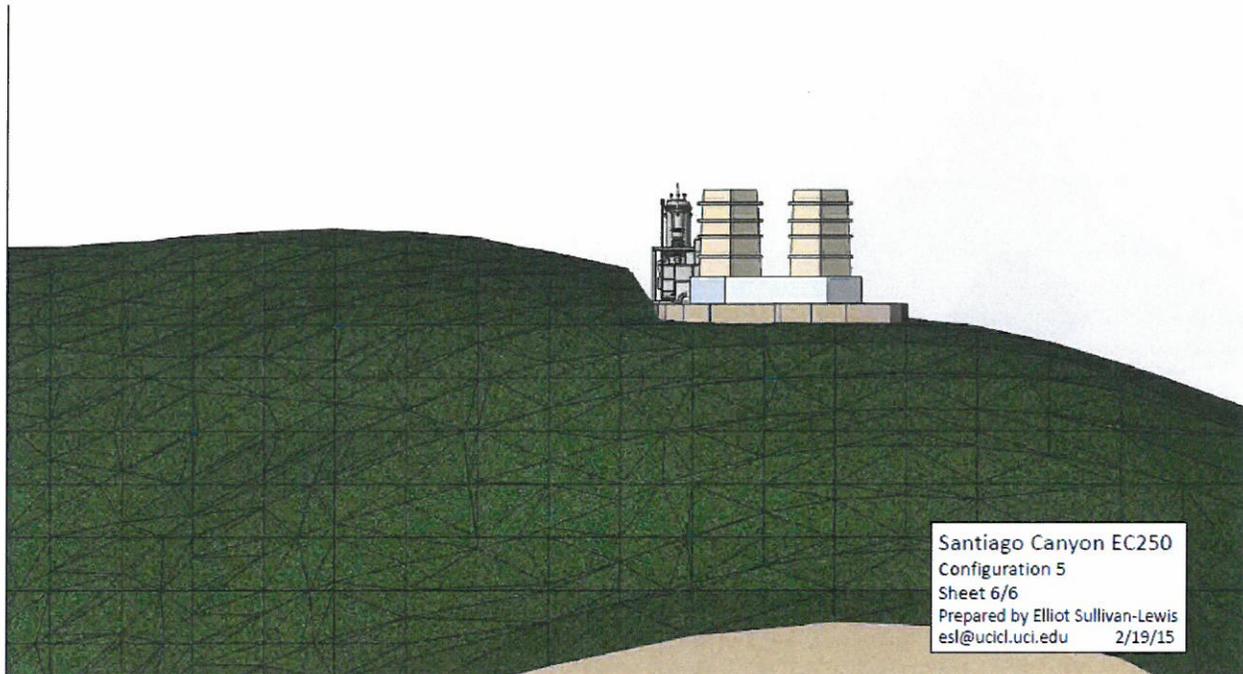


Figure 1: Equipment Layout Adjacent to Existing Flare Station

Figure 2 below shows the equipment layout in 3D.







UCI/Ener-Core will commission the systems after receiving all local authority approvals, utility interconnection agreements and completion of the facility installation. Based on the gas methane content of approximately 35%, the system will use 170 scfm of landfill gas with the estimated maximum consumption at 200 scfm. The annual electrical energy output is projected to be 1,800,000 kWh. The electricity generated will offset the current flare blower system and other electric loads at the flare station. The electricity not used by the flare station will be used by OCWR to offset other Southern California Edison (“SCE”) energy bills via a standard SCE tariff.

The responsibility for the Gas Collection and Control System (“GCCS”) will remain with the current OC Waste & Recycling contractor for post-closure care. UCI/Ener-Core will tap the existing flare gas piping and route the required portion to the EC250. The associated condensate will be collected and injected into the flare station for destruction.

The proposed project will not result in any disturbance to biological resources and therefore no significant impacts to biological resources will occur. In addition, although the closed Santiago Canyon Landfill is located within the Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) for the Central and Coastal Subregion of Orange County, the development of a landfill gas renewable energy facility at the Santiago Canyon Landfill was anticipated by the NCCP/HCP and is therefore an allowable, approved use.

Landfill Site Integration

The system will use a portion of the landfill gas (~12.5%) and is not expected to impact the operation of the existing landfill gas (“LFG”) collection system. The system has been designed to allow for electricity production from methane at highly variable concentrations including low-Btu methane not previously usable by conventional combustion-based systems. The system has

been designed to function with the daily, seasonal and long term variations in LFG availability with near-zero emissions output.

The block diagram (**Figure 3**) below shows the proposed connection points to the flare station gas and electricity. The landfill gas will be compressed and directly injected into the oxidizer for the lowest emissions profile.

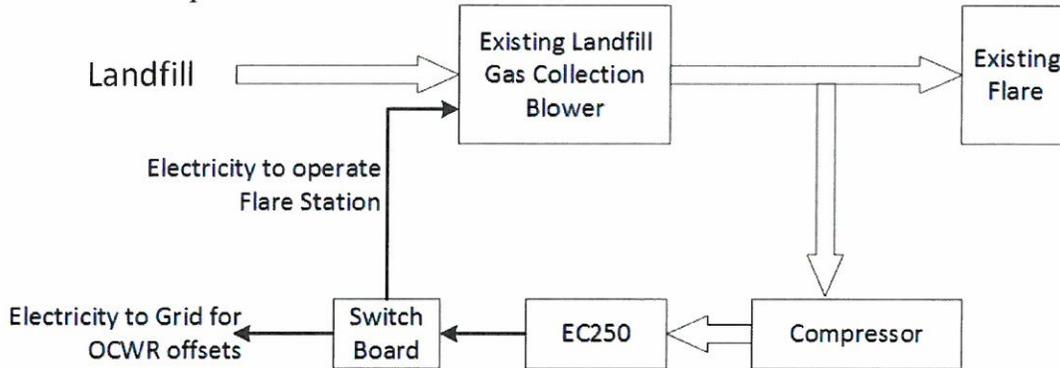


Figure 3: Project Block Diagram

Air Emissions

The EC250 steady state emissions are shown in **Table 1** below. The “Permit Level” is the expected South Coast Air Quality Management District (“SCAQMD”) air permit application entry. The Expected Level is the actual anticipated low emissions performance to be demonstrated at Santiago Canyon.

The last column lists the SCAQMD Best Available Control Technology (“BACT”) for landfill gas fueled gas turbines. The three pollutants listed NOx (oxides of nitrogen), CO (carbon monoxide) and VOC (volatile organic compounds) are the main criteria pollutants for the South Coast Air Quality Management District.

Table 1 shows that the EC250’s steady state emissions are well below the SCAQMD BACT or most stringent emissions limit under its guidelines.

Table 1: EC250 Steady State Emissions

	Steady State Permit Level			Steady State Expected Level			SCAQMD BACT Landfill Gas ppmv 15% O2
	ppmv 15% O2	lb/hr	tons/year	ppmv 15% O2	lb/hr	tons/year	
NOx	5	0.13	0.6	1	0.03	0.1	25
CO	5	0.08	0.4	1	0.02	0.1	130
VOC	5	0.05	0.2	1	0.01	0.0	N/A

The EC250 steady state emissions are also compared to the air emissions from the existing flare. The NOx, CO and VOC emitted by the EC250 are lower than corresponding flare emissions, as

shown in **Table 2**, below. The largest reduction is achieved with NOx. The proposed project will not result in any significant impacts to air quality and will not result in significant greenhouse gas emissions.

Table 2: EC250 Steady State Emissions vs. Existing Flare Station Emissions

	Santiago Canyon Landfill Flare Existing Emissions lbs/hr	EC250 Permit Steady State Emissions lbs/hr	EC250 Actual Steady State Emissions lbs/hr
NOx	0.71	0.13	0.03
CO	0.1	0.08	0.02
VOC	0.25	0.05	0.01

Noise Levels

As shown in **Figures 1 and 2**, there are two main sources of continuous sound (noise) from the project: the EC250 and the gas compressor. Each of these systems have noise level ratings of 81 dBA at 1 meter. Combined the two sources will have a noise level of 84 dBA at 1 meter, that is adding a second similar source effectively adds 3 dBA to the noise level. At 10 meters, the noise level drops by 20 dBA to 64 dBA. At 20 meters, the noise level decreases to 58 dBA. **Figure 4** below shows the noise levels relative to the distance away from the EC250 and gas compressor. The proposed project will not result in any significant noise impacts. In addition, there are no sensitive noise receptors located near the project site.

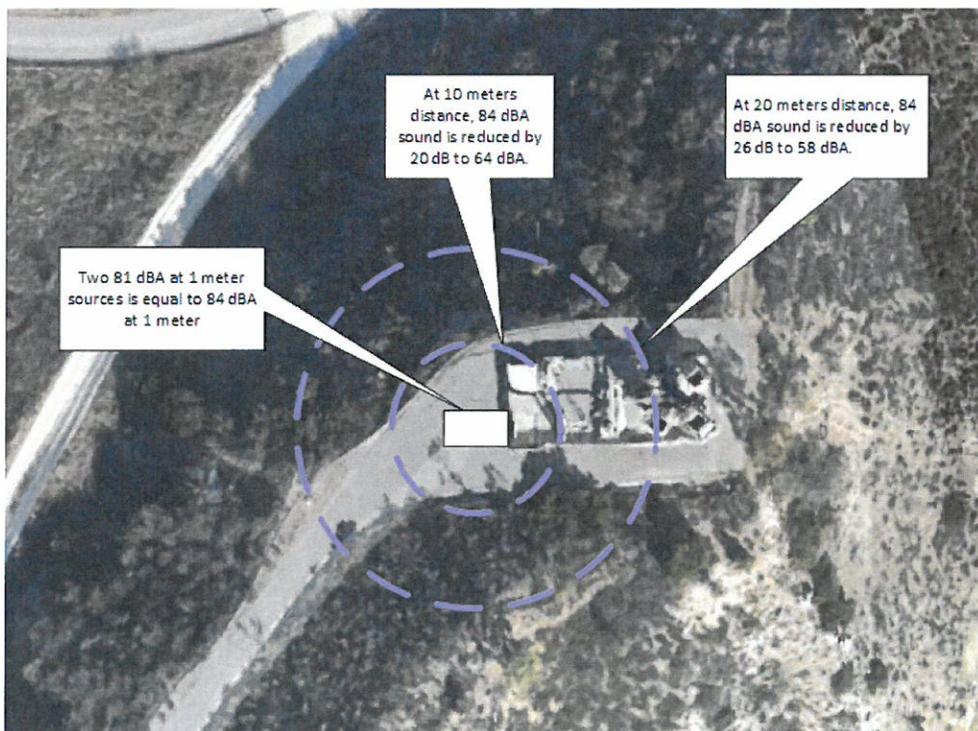


Figure 4: EC250 Project Noise Levels vs Distance Away

Standards for Preparing an Addendum

The CEQA Guidelines (Section 15164) provides for an Addendum as the vehicle to make minor changes when no new documentation is needed, as demonstrated by satisfying the following tests:

- The circumstances of the project are substantially the same, and Final MND No. 191 adequately addressed the effects of the proposed project.
- No substantial changes have been made in the project and there are no substantial changes in the circumstances under which the project is being undertaken.
- There is no new information of substantial importance to the project that is now known, which was not known or could not have been known when the prior Final MND No. 191 was adopted.
- The minor and/or technical additions, clarifications and/or changes to Final MND No. 191, disclosed in Addendum No. 1 to Final MND No. 191 do not raise new significant issues which were not addressed by Final MND No. 191.
- None of the circumstances described in CEQA Guidelines Section 15162, which require the preparation of a new Subsequent EIR or Negative Declaration, apply to the project.

Basis for Addendum

The project makes only minor changes to the project as originally approved by the County of Orange on December 15, 1999. No new environmental conditions or circumstances have occurred that would make the analysis included within Final MND No. 191 invalid, and all adopted mitigation measures remain enforceable.