UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460

OFFICE OF
AIR AND RADIATION

Approval Date: August 12, 2020

Mr. Robert Heinz
Mi-Jack Products Inc.
3111 W. 167St
Hazel Crest, IL 60429

Dear Mr. Heinz:

The U.S. Environmental Protection Agency (EPA) has reviewed your request for verification of the Mi-Jack Products, Inc. (Mi-Jack) EcoCrane Hybrid System (EcoCrane). The EcoCrane is a hybrid power system that replaces the conventional diesel generator set(s) on a rubber tired gantry crane (RTG). The EcoCrane includes a new diesel engine generator, batteries, inverter, rectifier, control system and energy recovery capabilities. This verification is an extension based on information and analysis provided by Mi-Jack and the approved EcoCrane Hybrid System described in the verification approval letter dated June 18, 2013.

The original June 18, 2013 verification letter approved a Tier 3 diesel engine-equipped EcoCrane which replaced the RTG generator system equipped with a Tier 0, Tier 1 or Tier 2 diesel engine. The emissions reduction shown below are based on when the original RTG is equipped with a generator using a Tier 2 engine and is replaced with the EcoCrane utilizing a Tier 3 engine:

Technology	Particulate Matter (PM) %	Carbon Monoxide (CO) %	Hydrocarbons (HC) %	Oxide of Nitrogen (NOx) %	Carbon Dioxide (CO_2) %
EcoCrane Hybrid System	74	71	96	84	58

The original EcoCrane demonstrated a 56% fuel economy improvement.

This extension approval is to replace an original Tier 0, Tier 1, Tier 2 or Tier 3 diesel engine-equipped RTG with an EcoCrane Hybrid System equipped with an engine meeting final Tier 4 (Tier 4F) emissions standard. Based on our evaluation of the application, original Tier 3 EcoCrane test data, additional information provided, and applicable emissions standards, EPA hereby verifies that this technology should achieve following emissions reduction (or more) of certain pollutants and fuel consumption improvement when the EcoCrane Hybrid System is equipped with a Tier 4F diesel engine provided all of the operating criteria are met:

Technology	Particulate Matter (PM) %	Carbon Monoxide (CO) %	Hydrocarbons (HC) %	Oxide of Nitrogen (NOx) %	Carbon Dioxide (CO_2) %
Tier 4F EcoCrane Hybrid System	95	37	58	95	56

Note that these values are based on Tier 4F EcoCrane Hybrid System equipped with an engine that does not use emission credits. If a Tier 4F engine certified using credits is incorporated in this system, the reductions may be lower.

The following operating criteria must be met to achieve the aforementioned emissions reduction.

1) The original RTG generator(s) must be equipped with Tier 0, Tier 1, Tier 2 or Tier 3 engines.
2) The original RTG should be equipped with a DC bus and AC motors or the EcoCrane package needs to be equipped with a properly sized power inverter to power the DC motors.
3) Prior to installation, Mi-Jack must appropriately size the EcoCrane Hybrid System for the original RTG. In sizing the EcoCrane, a smaller horsepower new Tier 4F diesel engine-equipped generator and battery-equipped energy system must be optimized to satisfy application-specific requirements.
4) The EcoCrane Hybrid System includes the components necessary to replace a conventional RTG diesel engine generator and other original power system components as necessary. The EcoCrane components include a new genset equipped with a new Tier 4F diesel engine, battery energy storage system, rectifier, auxiliary inverter and regenerative brake/energy recovery system integration.
5) Mi-Jack and the RTG owner must evaluate battery technology options for the specific RTG. Different battery technologies may be preferred due to individual preference and performance requirements, so it is the responsibility of Mi-Jack and the RTG owner to select a technology based on these needs.
6) The EcoCrane system must include a battery monitoring system to alarm operators for necessary actions to ensure the proper operation of the batteries.
7) The owner's manual must include maintenance procedures, safety information and battery disposition.
8) The engine must be operated on ultra-low sulfur diesel fuel (ULSD) of 15 ppm or less.
9) The engine used in the EcoCrane Hybrid System must be certified for use in generator sets and meet current model year standards.

If Mi-Jack's EcoCrane Hybrid System is modified from the application description provided to EPA, you must notify EPA immediately. This verification does not automatically confer to modified devices or devices that are similar to this original verification.

Information on Mi-Jack's EcoCrane Hybrid System, percent reduction, and applicable engines will be posted on the EPA's Verified Technology List website at: https://www.epa.gov/verified-diesel-tech/verified-technologies-list-clean-diesel. As you know, Mi-Jack will be responsible for completing the required in-use testing program and for submitting all in-use testing data to EPA as outlined in EPA's in-use test methods.

Thank you for participating in EPA's Technology Assessment Center Verification Program. If you have any questions or comments, please contact Kuang Wei, of my staff, at 202-343-9329.

Sincerely,

Karl Simon, Director
Transportation and Climate Division
Office of Transportation and Air Quality