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# The Agricultural Gas Company (Ag Gas)

## PETALUMA, CA

*Technical Evaluation / Code Compliance Report (2018 ed. IFC)*

For:

Carbocation Control System

PCR TECCR – 0422 / Rev. 0822

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## Report Holder

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## Date of Evaluation

May, 2022  
Expiration – January, 2024

## Author of Report

The author of this report, is Justin H. Beal, Principal, Pacific Consulting & Risk, per California Fire Code §104.7.2 & California Building Code §107.1 (Exception 1) a qualified, technical specialist.

## Subject Evaluated

Proprietary Carbogation® system; specifically gas detection system.

## Scope of Evaluation

Code compliance with International Code Council – International Fire Code (IFC) (2018 ed.) gas detection system requirements (IFC §916)<sup>1</sup>.

## Application

The Ag Gas Carbogation® system is both an environmental control and gas detection system which is not partitioned. The system uses ambient environmental conditions (including temperature and light) which are provided to the control system via remotely located sensors to make real time adjustments to the release of carbon dioxide gas within the growing area. Additional input and output signals from the system are used to initiate additional features, for example the powering of mechanical exhaust fans and opening of make-up air vents to purge the interior of a growing area of carbon dioxide gas.

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<sup>1</sup> Re-evaluation required for International Code Council – International Fire Code (IFC) (2021 ed.) compliance.

## Equipment and Software Requirements

Tablet Computer Vendor: Various - Any tablet computer deemed compatible by the Agricultural Gas Company.

Tablet Computer Operating System: Alphabet, Inc. Android Operating System v9.0+ (Pie)

Browser Software: Google Chrome Release v103.0.5060.129+

Gateway Processor Vendor: Iconia Corporation, Sonoma, California

Supervisory Control and Data Acquisition (SCADA) system: v1.0.1.2

Required SCADA Software Modules:

- Point Cache Database: v1.3.1.3
- Scheduler: v1.1.11.10
- Alarm Processor: v1.1.5.0
- Calculation Engine: v1.1.9.8
- Application Dispatcher: v1.1.5.0
- Layout Viewer: v1.0.2.5
- Gateway Manager: v1.3.2.9

## Design and Installation

The control system uses multiple detectors arranged throughout the application area to provide inputs to the control system via a wi-fi signal. Detectors and alarm devices are powered via low voltage cabling which must be installed in accordance with the latest version of the National Electrical Code (NEC) and the applicable manufacturer's installation sheet for the detector. The detectors are powered through the low voltage cabling. In some cases the detectors have a built in alarm feature which is supplemented by other audible and visible notification appliances.

A series of other assemblies, including a gas manifold assembly, distribution manifold assembly, gas distribution piping, and emitting manifold assemblies are used to control the amount of carbon dioxide gas emitted into the application area.

The control system sits between the detectors noted above and the gas emitting equipment. As data is input from the sensors to the control system, the control system regulates the opening and closing of various solenoid valve assemblies to regulate the release of carbon dioxide gas from an independent source, piped into the application area. The control system is generally run on a table

style computer, which is powered by 110 – 120 VAC. The control system is also linked to Ag Gas corporate monitoring over the internet.

## Code Compliance

The control system has a continuous gas detection system which is designed for use with the gas being detected (IFC §916.3/§5307.4.3).

The gas sampling signals reporting to the control equipment is continuous, with each installed detector (both life safety and non-life safety detectors) reporting a reading to the control system every five minutes. Signal processing is performed by the control system continuously (IFC §916.7).

The control system is capable of activating trouble, supervisory and alarm signals, including audible and visible signaling (IFC §5307.4.3)

The control system is also capable of initiating peripheral actions including opening makeup air vents, and activating mechanical ventilation or exhaust systems, and keeping these systems operational until the system is remotely reset by Ag Gas corporate via the remote control system interface (IFC §5307.4.4(2)).

## Conditions of Use

Gas detectors used for the system must be installed within the manufacturers spacing requirements providing sufficient coverage of throughout the application area. Where necessary, additional detectors must be installed if there are other areas where carbon dioxide may be expected to accumulate, or where leaks are likely to occur (IFC §916.6). Installation of all detectors and associated wiring must meet the requirements of the NEC for conductors and equipment.

The control system must be programmed to activate the high-level alarm signaling required upon detection of a carbon dioxide concentration of 5,000 ppm (9,000 mg/m<sup>3</sup>). Therefore, the 30,000 ppm high level alarm requirement from IFC §5307.4.3.1 may be omitted.

The control system must be powered by a dedicated circuit, protected with a circuit breaker lockout clip, or when using electrical outlets, an approved method of restraint (and weatherproofing) shall be installed to ensure that the plug is secured to the receptacle (IFC §916.4).

The control system and detectors, shall be provided with standby or emergency power. This may be accomplished by a battery backup system. The emergency power system shall be designed to provide a minimum of at least 2 hrs. of continuous power and provide a trouble signal at an approved location (IFC §916.5).

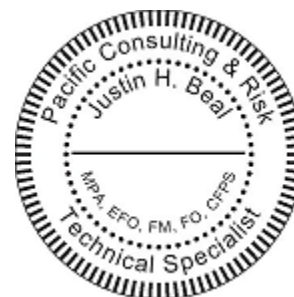
Carbon dioxide hazard identification signs must be provided as required in IFC §5307.4.5.

Inspection, testing, calibration, and maintenance of the control system during initial installation, as well as all peripheral equipment connected to it, must be performed in accordance with the IFC and applicable manufacturer’s instructions.

### Conclusion

Based on our evaluation, we feel that the Ag Gas Control system meets the intent of the applicable code requirements, subject to the provided conditions of use, and compliance with the additional requirements of the NEC, and IFC Chapter 53.

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