

Proposed Hydrogen Fueling Facility

Air Products, Santa Clara

Project Description

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Air Products Santa Clara Facility Background

Air Products is a major global industrial gas company and is the world leader in hydrogen production, supply, and vehicular fueling equipment and technology. Air Products proposes to build a hydrogen vehicular fueling facility at 1375 Norman Ave as an ancillary activity to its hydrogen distribution hub located on the contiguous property at 1700 Russel Ave. The distribution hub at 1700 Russel currently supplies hydrogen by truck to a growing network of hydrogen vehicular fueling facilities throughout Northern California. Also contiguous to the hydrogen facility, Air Products operates an air separation facility at 1515 Norman Ave which has manufactured and supplied other industrial gases including nitrogen, oxygen, and argon to local customers via pipeline and truck since 1978.

Santa Clara Hydrogen Fueling Facility

The Santa Clara Hydrogen Fueling Facility entails installing one hydrogen dispenser (with provisions for a future second dispenser), an overhead fueling canopy, and an equipment container. The hydrogen fueling facility will be designed and built in compliance with applicable codes and standards including the National Fire Protection Association (NFPA), National Electrical Code (NEC), American Society of Mechanical Engineers (ASME), Occupational Safety and Health Administration (OSHA), and Compressed Gas Association (CGA). System operation and hazard reviews will be completed, and the appropriate engineering drawings and documentation will be submitted for local building permit approvals. The Air Products team has a broad experience base in industrial hydrogen supply chains and vehicular fueling, including equipment design, fabrication, installation, operation, maintenance, and project execution.

Project justification

This project supports California's Zero Emission Vehicle and Low Carbon Fuel Standard objectives under the California Energy Commission's Alternative and Renewable Fuel and Technology Program. The proposed fueling facility would require that the existing Conditional Use Permit for the hydrogen distribution hub be amended to include ancillary activity.

Hydrogen dispenser

The hydrogen dispenser will look and feel like liquid fuel dispensers familiar to drivers. The hydrogen dispenser will be dual sided such that two vehicles may fill on opposite sides simultaneously. Each side is equipped with a dedicated card reader, user screen, and keypad, as well as a dedicated hose and nozzle.

Hydrogen dispenser safety features include:

- Flame detector monitoring the fueling area shuts down the system if a flame is detected
- Two gas detectors per dispenser (one for each hose) shut down the system if gas is detected
- Emergency stop buttons located on the dispenser and at remote locations in the facility shut down the system
- Mechanical pressure relief devices protect the system from excess pressure
- Hydrogen fueling nozzle interlocks with vehicle receptacle to maintain a vapor tight seal when connecting, fueling, and disconnecting to prevent release of vapors at any time during the fueling sequence
- Dual-acting hydrogen breakaway on each hose seals on both sides in the event of a drive-away while the nozzle is connected (although drive-aways are nearly impossible because hydrogen vehicles cannot be started if the fuel door is open)
- Earthquake/vibration sensor shuts down the system in the event of earthquake/impact
- Bollards protect the dispenser from vehicular impact
- Automated fueling protocol monitors pressure and temperature continuously and stops the fill if parameters are not correct
- Automated fueling protocol performs system leak check prior to starting the fill and pauses at intervals during the fill to perform two more leak checks
- Communication between dispenser and vehicle stops the fill if an upset condition occurs on board the vehicle
- Automated valves close in a fail-safe condition during a shut down or a complete loss of power
- Automated valves are actuated with compressed air via plastic tubing which melts in the event of fire (fusible link) and closes valves in a fail-safe condition
- All piping is designed, installed, and pressure tested in accordance with the American Society of Mechanical Engineers
- All electricals are designed and installed for hazardous areas in accordance with the National Electrical Code
- All equipment is sited in accordance with the National Fire Protection Agency

Hydrogen equipment container

The hydrogen equipment container will be 40' long x 10' wide x 10' high. It will be enclosed and secured to prevent unauthorized entry. It is intended to be installed above ground anchored on a concrete pad. It will contain hydrogen storage, compression, and cooling equipment to include:

- 4,000 gallon hydrogen tank
- Hydrogen pump
- Vaporizer
- Compressed hydrogen storage tubes
- Cooling equipment

Operation

The Santa Clara Hydrogen Fueling Facility is intended to be an unmanned public facility that can operate 24/7. Fueling hours can be reduced per local requirements. Fuel will be dispensed via credit card only. An on-site employee is not required or anticipated. The facility will be monitored remotely by Air Products 24/7 Equipment Support Team. If customer assistance is needed, the telephone number to the Equipment Support Team shall be posted on the dispensers.

Capacity

The facility maximum daily capacity is 125 vehicles/day with one dispenser, or 200 vehicles/day with two dispensers. The facility maximum hourly capacity is 14 vehicles/hour with one dispenser, or 28 vehicles/hour with two dispensers. These capacities assume an average fill of 4 kilograms per vehicle. Actual kilograms per vehicle may vary.

Delivery

The facility will be resupplied by truck consisting of a tractor and 30' long trailer. Resupply will be every 1-2 days and will take approximately 30 minutes. The truck will park approximately 5-6 feet away from the equipment container and will offload via hose into the hydrogen tank. The site circulation plan is designed so that the delivery area does not obstruct customer traffic patterns.

Maintenance

Maintenance will be performed by dedicated local hydrogen fueling technicians. Preventative maintenance and testing of safety devices is performed on a recommended/mandatory frequency according to operational experience/code requirements. All system components and devices are archived in a maintenance data base which automatically generates technician work orders to ensure compliance with mandatory testing intervals. The Air Products Equipment Support Team will manually deploy a technician if an abnormal condition is detected.

Conclusion

The Santa Clara Hydrogen Fueling Facility project will be an important addition to the growing network of hydrogen fueling facilities in the Bay Area established by the California Energy Commission. Each new facility helps to strengthen a sustainable hydrogen infrastructure to serve the growing Fuel Cell Electric Vehicle market in California.