

**Commonwealth Utilities Corporation**  
 Bulk Chlorine Storage Facility  
 Project Manager: Birhen Martinez  
 CUC Sr. Engineer



**Design Team**  
**Paul Baron, PE** | Principal  
**Viveth Jimenez, PE** | CM Safety Officer/ Inspector  
**Geoff Melchor, PE** | Alternate CM  
**Andre Tenorio, PE** | Structural Support  
**Rufin Inos, EIT** | Stakeholder Consensus

**Presentation Overview**

- Facts About Chlorine
- Project Background
- Design Team and Contractor
- Key Contract Details
- Construction Elements
- Issues Encountered
- Benefits



**Some Facts About Chlorine**

- ▶ Chlorine is a clear amber-colored liquid about 1.5 times heavier than water.
- ▶ Gaseous chlorine is greenish-yellow, about 2.5 times heavier than air.
- ▶ Chlorine gas can be recognized by its pungent, irritating odor, which is like the odor of bleach. The strong smell may provide adequate warning to people that they are exposed.
- ▶ Chlorine itself is not flammable, but it can react explosively or form explosive compounds with other chemicals such as turpentine and ammonia.

10/30/2019

**Project Background**

- ▶ Chlorine disinfection is the primary form of water treatment used by CUC and is carried out by transporting chlorine gas cylinders to specific well and reservoir sites throughout the island.
- ▶ Prior to this facility's construction, the former storage area for CUC's chlorine gas supply was an uncovered fenced area on a concrete pad located in Lower Base. This was a relatively unsecured site and posed security risks which had to be mitigated through a dedicated storage facility with proper security and safety measures.


**Project Background**

- ▶ Under Stipulated Order 1, a plan was approved for the construction of a storage facility to protect a bulk inventory of chlorine gas cylinders sufficient for at least a 90-day supply for the island's municipal water system. A study was carried out by CUC consultant to evaluate three sites for a bulk chlorine storage facility and determine most viable option. The three options presented to CUC were:
  1. Adapting an existing World War II (WWII) bunker in Lower Base, adjacent to the CUC's Power Plant I & II.
  2. Constructing a new facility at the existing CUC chlorine storage yard in Lower Base.
  3. Constructing a new facility at the Agingan Wastewater Treatment Plant.

10/30/2019

**Project Background**

- ▶ The feasibility study considered the following criteria for each alternative site:
  - General location
  - Public health and safety
  - Vulnerability
  - Architectural and engineering requirements
  - Cost
  - Schedule to complete project



### Project Background

► This project was designed through coordination with CUC, USEPA and Department of Homeland Security. The project design followed EPA recommendations and other requirements identified in the Process Hazard Analysis, Risk Management Plan and Emergency Planning and Community Right to Know Act (EPCRA).


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### Project Background


► The primary use of this facility is to secure and store CUC's chlorine gas cylinders. This project was designed to improve operation and maintenance of the CUC disinfection program by providing a superior facility for chlorine storage. It was also designed to advance safety to workers and the surrounding area by installing an emergency gas scrubber, mechanical duct and dampers, and alarm system and sensors in the event of accidental discharge of chlorine gas. An emergency generator set was also installed on site which will serve as a back-up supply of power for in the event of power interruption to ensure continuous operation.

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### Project Team







Feasibility Study

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Design

→

Construction Support

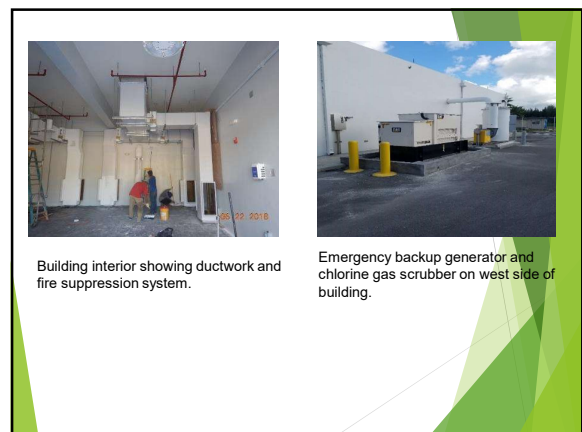
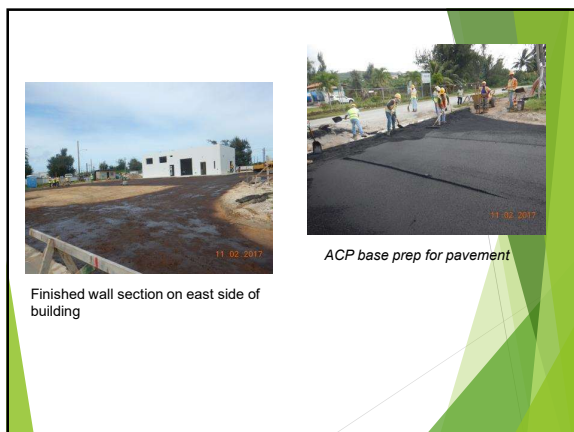
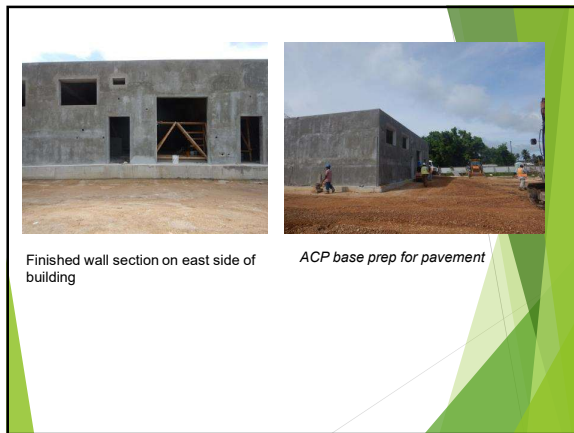
### Key Contract Details

Contractor	RNV Construction
Original Contract Amount	\$1,034,578.00
Change Orders	+ \$1,741.89
Revised Contract Amount	\$1,036,319.89
Contract Start Date	February 3, 2017
Contract Time	270 calendar days
Time Extension	+ 126 calendar days
Revised Completion Date	March 6, 2018

### Notable Construction Elements

- Demolition of existing storage facility
- Perimeter security fencing
- Security yard lighting
- Stormwater management
- Chlorine gas leak detection
- Chlorine gas scrubber
- Fire suppression
- Automated dial-in emergency contact
- Emergency backup generator
- Temperature controlled interior cooling





### Issues Encountered

- ▶ Some challenges were encountered during the construction phase of the project. The procurement of specialized materials required thorough review of product and technical specification submittal, which caused delays on the delivery and installation of these materials, but ultimately was completed within the approved performance period.

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### Benefits

- ▶ Benefits:
- ▶ Proper chlorine gas handling and storage facility are beneficial for the safety of CUC personnel, public and the environment.
- ▶ Saipan, Tinian and Rota will have adequate inventory of Chlorine gas for water treatment.
- ▶ Complies with Stipulated Order No. 1 Par. 29 and 30.
- ▶ Meets all safety requirements.

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