

# CNMI Typhoon Responses

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United States Public Health Service

## Breakdown

- Typhoon information
- Damages
- Assessments
- Restoration
- Water Task Force
- Lessons Learned
- Summary



## Typhoon Mangkhut –September 10<sup>th</sup>

- Sustained winds 105 mph
- Direct hit to Rota
- Osprey ride to Rota - September 11<sup>th</sup>



## Typhoon Yutu – October 25<sup>th</sup>

- Sustained winds of 180 mph
- Eye went directly over Tinian and the southern portion of Saipan
- Storm video
- Storm aftermath video



## Typhoon Yutu

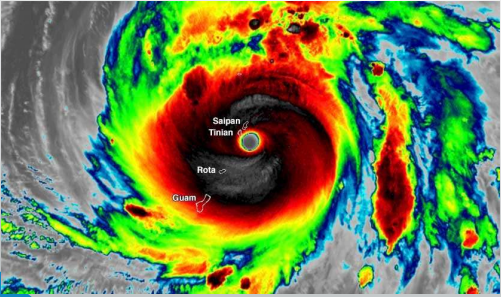



Image Credit: NOAA/RAMMB

## Damages from Storms

- Weatherheads
- Tanks
  - Panels
  - Air Vents
  - Roofs
- Fences
- Buildings
  - Railings
  - Doors
- Pipes



Damages Rota (cont.)



Damages Saipan (cont.)



FEMA/CUC Assessments

- Engineering/operations assessments of all assets
  - 23 Tanks (2 Rota, 4 Tinian) *includes sump tanks.*
  - 37 Lift Stations
  - 131 Wells
  - 2 Treatment Plants
  - Fences
  - Electrical components
- Damage assessments were used for disaster mitigation and recovery needs

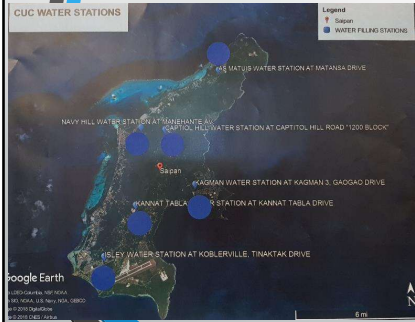


Restoration

- Phases:
  - Water Filling Stations
  - Generator Installation
    - Power Restoration/Coordination
  - Water Services
  - Sewer Services



Water Filling Stations



6 CUC sites  
450,000 gallons served  
7,580 Customers  
Multiple other sites set up through FEMA, DOD, Resorts, and CNMI gov't

Super Typhoon Yutu Restoration

Saipan Water Filling Stations Summary

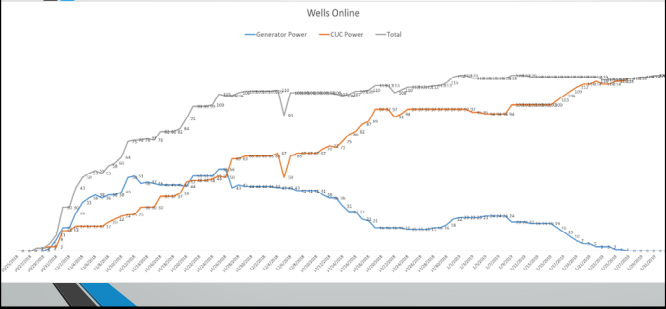
Date	Locations											
	An Matus		Capitlan		Capitol Hill		Gagao Springs		Kagman		Kannat Tabla	
	No. of Customers	Total Gallons Served	No. of Customers	Total Gallons Served	No. of Customers	Total Gallons Served	No. of Customers	Total Gallons Served	No. of Customers	Total Gallons Served	No. of Customers	Total Gallons Served
10/12/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/13/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/14/2017	41	1,700	20	6,000	20	6,400	11	17,300	10	3,000	120	24,000
10/15/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/16/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/17/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/18/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/19/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/20/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/21/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/22/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/23/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/24/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/25/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/26/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/27/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/28/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/29/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/30/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
10/31/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/01/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/02/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/03/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/04/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/05/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/06/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/07/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
11/08/2017	10	2,800	1	100	1	100	1	100	1	100	1	100
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### Generator Installation

- Water
  - CUC had zero operating generators within the water distribution system after the Typhoon
  - Prioritization of installations
  - Assessment of all sites
- Wastewater
  - 3-5 lift stations on truck generator
  - Many on CUC generators
  - Remaining needed FEMA generators varied from 1 to 12
- Coordination FEMA, Army Corps, Power Distribution

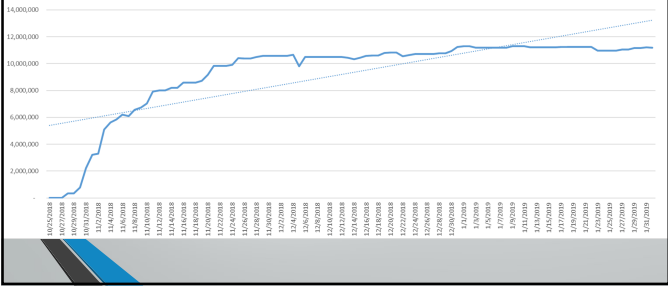


### CUC Operating Wells



### Water Production

GPD

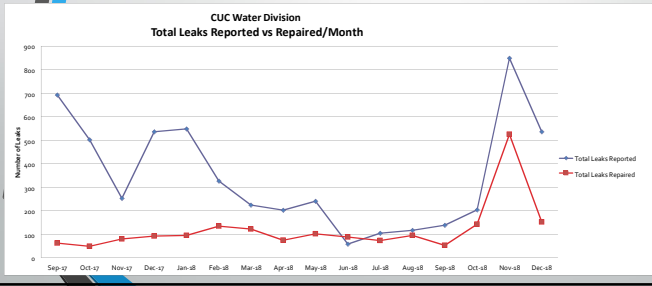


### Water Distribution

- Very limited service hours
- Moved water from tank service area to tank service area
- Lots of broken pipes (mainline, water meters, customers piping)



### Leaks



### Water Distribution

- Pressurized north side first
  - More wells online
  - Higher producing wells
- Capital Hill tank vital due to AG, CH wells, and Donnie Springs



### Off-Island Support

- Rota water operators/managers
  - 1-2 staff on island for 3 months
- Guam Water Authority Staff
  - 13 operators/managers
- Leak Repairs
- Leak Detection
- Generator Repair
- Great Learning Experience for all

### Water Task Force

- CUC
- Bureau of Environmental and Coastal Quality (BECQ)
- FEMA
- CNMI Department of Public Health (DPH)
- EPA Region 9
- Department of Defense
- CNMI Central Government
- Army Corps of Engineers

### Water Task Force Goals

- Coordinate Restoration of Water Services
  - Bottled Water, water buffaloes, city water
- Water Quality Testing
- Public Health
- Tank and Well Testing
- Issues
  - E coli found in many restaurants

### Lessons Learned

- Communication is Critical
  - Top down needed as well as bottom up
  - Public Information needs to be timely
  - Interagency
- Flexibility within CUC water system to optimize delivery to customers
- Make the formal request to FEMA early and often
- Pressurize system systematically
- Generator Maintenance is Critical



### Lessons Learned (cont.)

- Learned a lot from Typhoon Souldedor
  - Where to place filling stations
  - Critical Generator Placement
- Important to prepare early
  - Fill storage tanks
  - Ensure generators work
- Reach out for support!!
  - Other Islands (Guam, Rota, Tinian, etc.)
  - Contractors

### Summary

- Prepare
- Communicate
- Coordinate
- Appreciate

