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GSA

Phoenix, AZ

August 3-6, 2008

Automated Meter Reading (AMR) at NAVFAC Midlant

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Introduction

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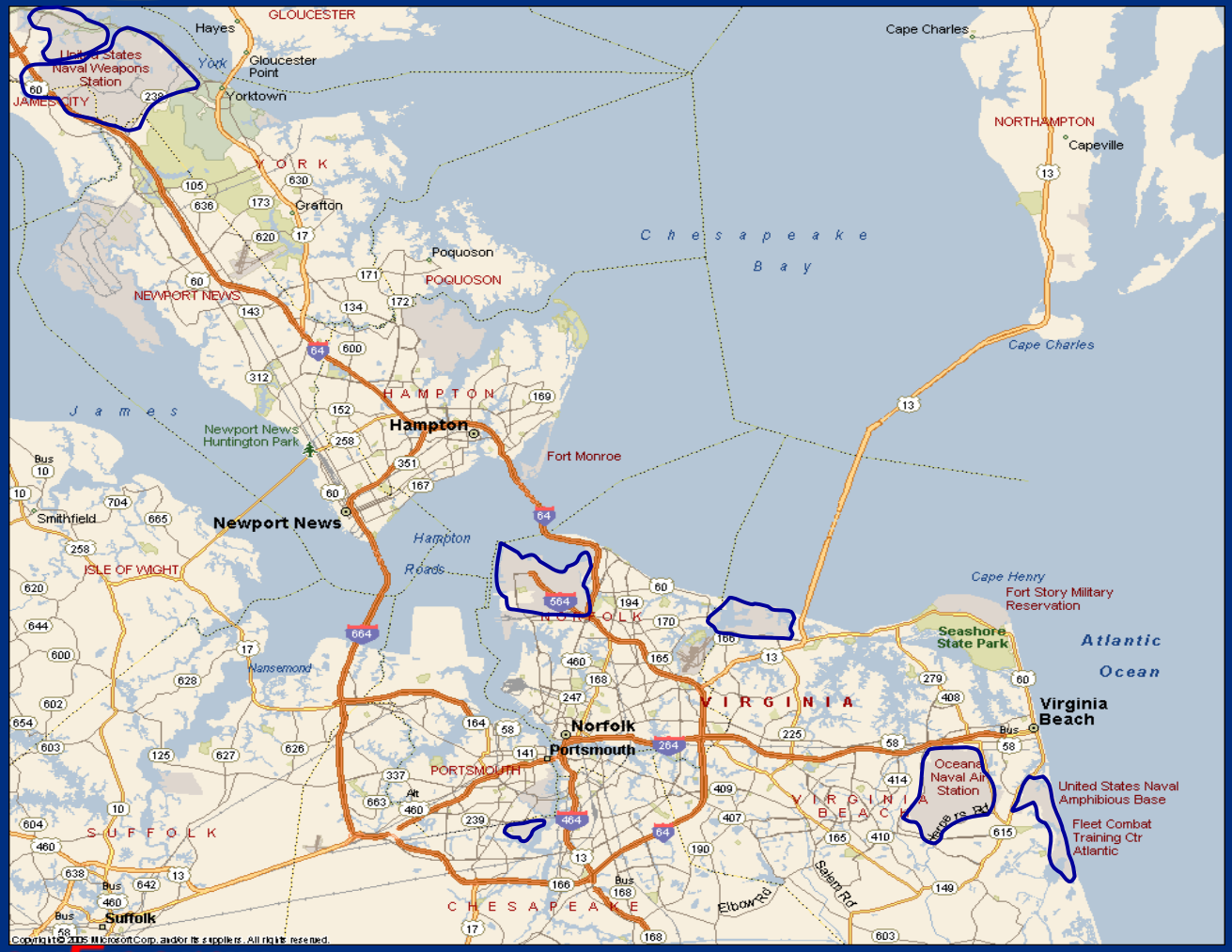
Agenda

- Project Overview
- AMR System Components
- Project Features
- Project Benefits
- Lessons Learned
- Screen Shots

Project Overview

- Technical Aspect
  - 7 Bases located in SE Virginia
  - ~1700 Meters
  - 10 Substations
  - System & Manufacturer:
    - Two Way Automatic Communication System (TWACS®)
    - Aclara™ Power Line Systems Inc.
      - Formerly known as Distributed Control Systems, Inc. (DCSI)

Project Locations



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Situation Prior to New System

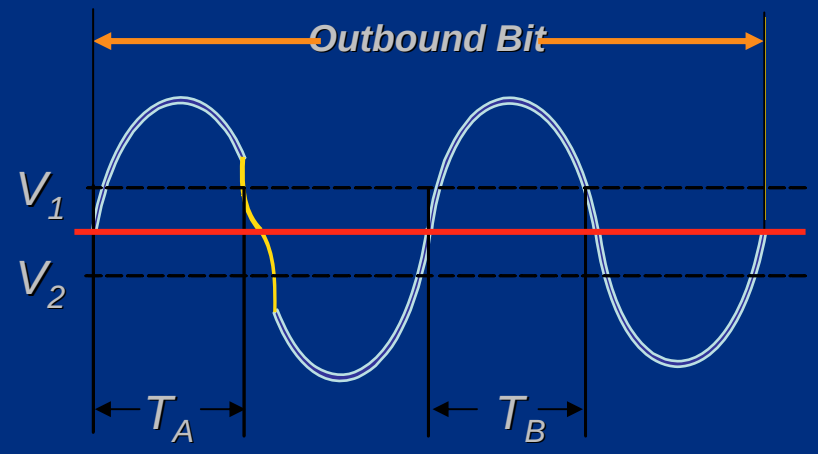
- Meter reads performed by high voltage electricians
  - Travel time & expense
  - Inefficient use of skilled personnel
- Meter reads hand entered into billing system
  - Many estimates & high bill complaints
- Impossible to manage or evaluate energy consumption data

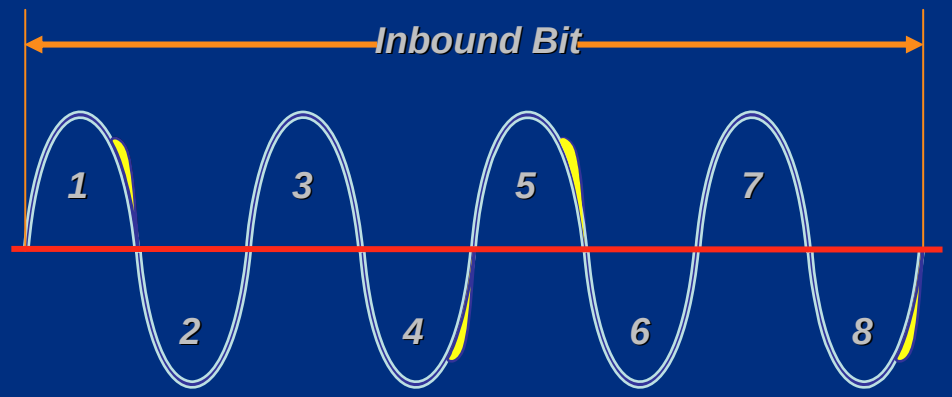
Project Overview

- Financial Aspect
  - Cost: $4.3M
  - Savings:
    - $ 474,000 : Energy (1% per Navy Energy Project Execution Guide)
    - $ 140,000 : Eliminated 2 Funded/Unfilled Positions
- Contractual Aspect
  - Ameresco designed and installed system
  - Utility Energy Services Contract (UESC) via Virginia Natural Gas (VNG) Areawide Contract

How does TWACS® work?

Outbound Communication (Sub ➡ Meters)





Inbound Communication (Meters ➡ Sub)

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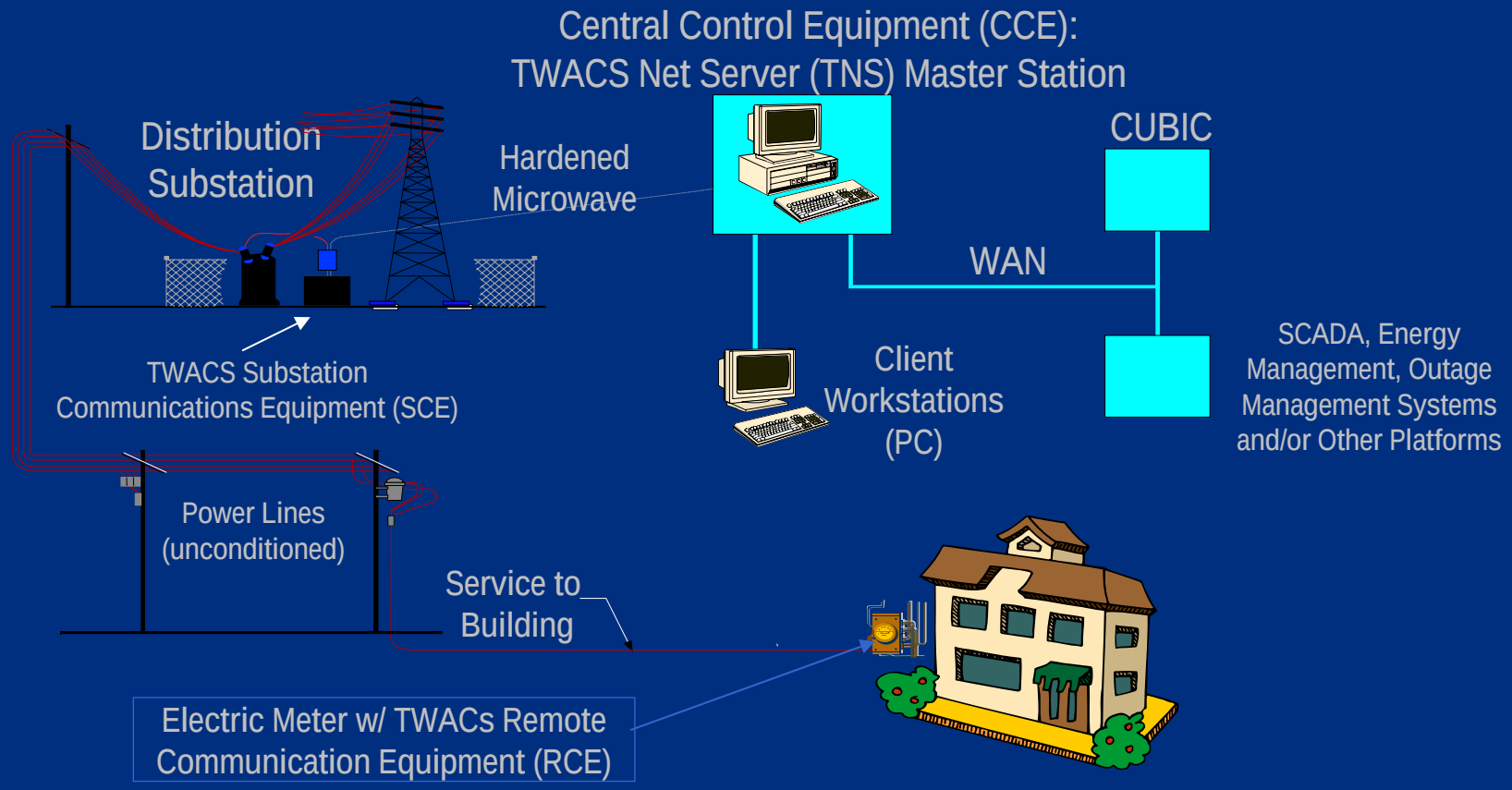
System Overview

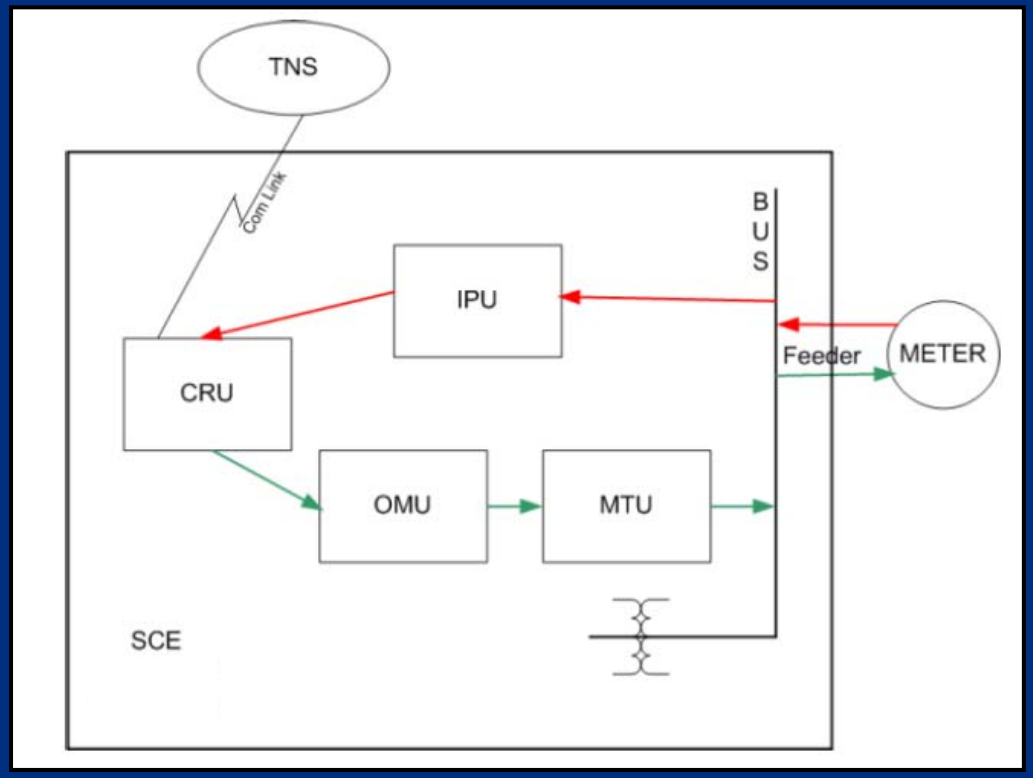


System Components

- Central Control Equipment (CCE)
  - Provides system control and operation
- Substation Communications Equipment (SCE)
  - Located at substations
  - Converts and relays TWACS signal between CCE & RCE
  - Communicates with CCE via phone, cable, DSL, microwave
  - Communicates with RCE via utility distribution line
- Remote Communication Equipment (RCE)
  - TWACS transponder located in utility meter
  - Unique serial number address allows system to isolate and communicate with each meter

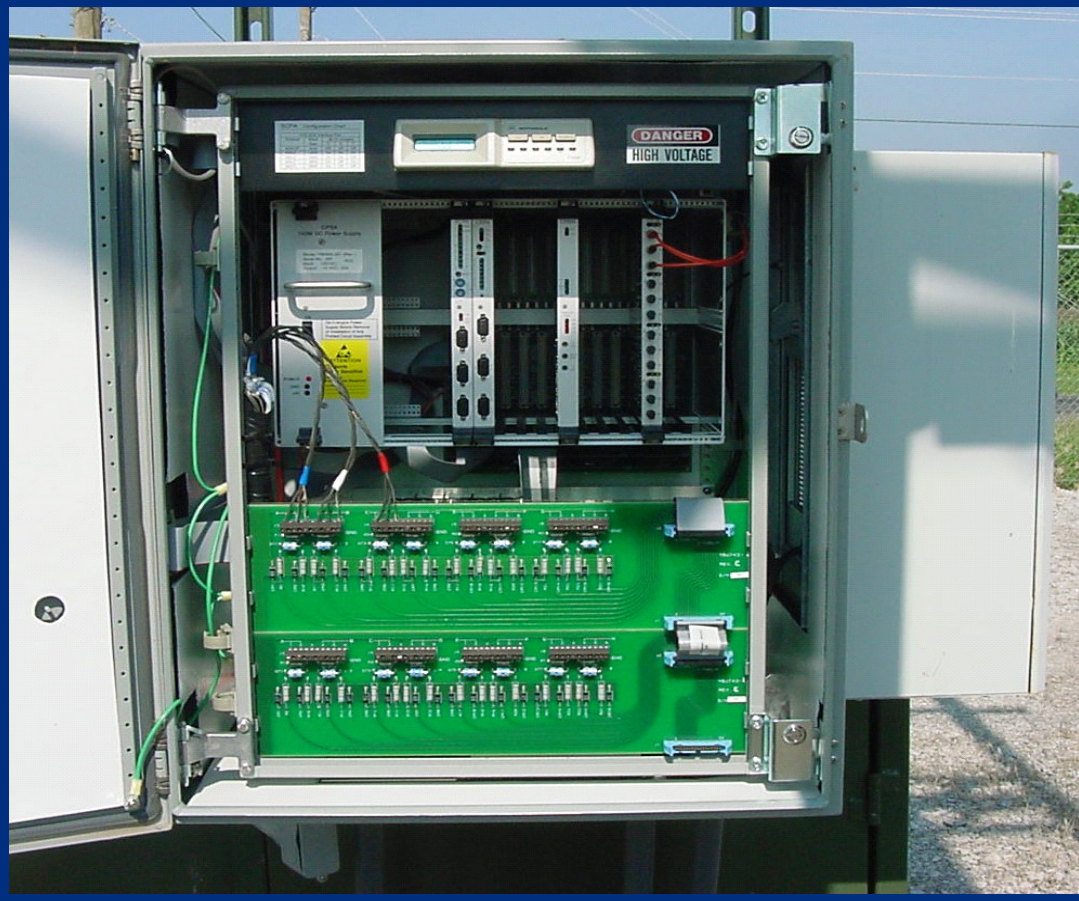
TWACS® System Flow of Information

- Outbound (shown in green)
  - TNS to CRU to OMU to MTU to Meter (RCE)
- Inbound (shown in red)
  - Meter to IPU to CRU to TNS



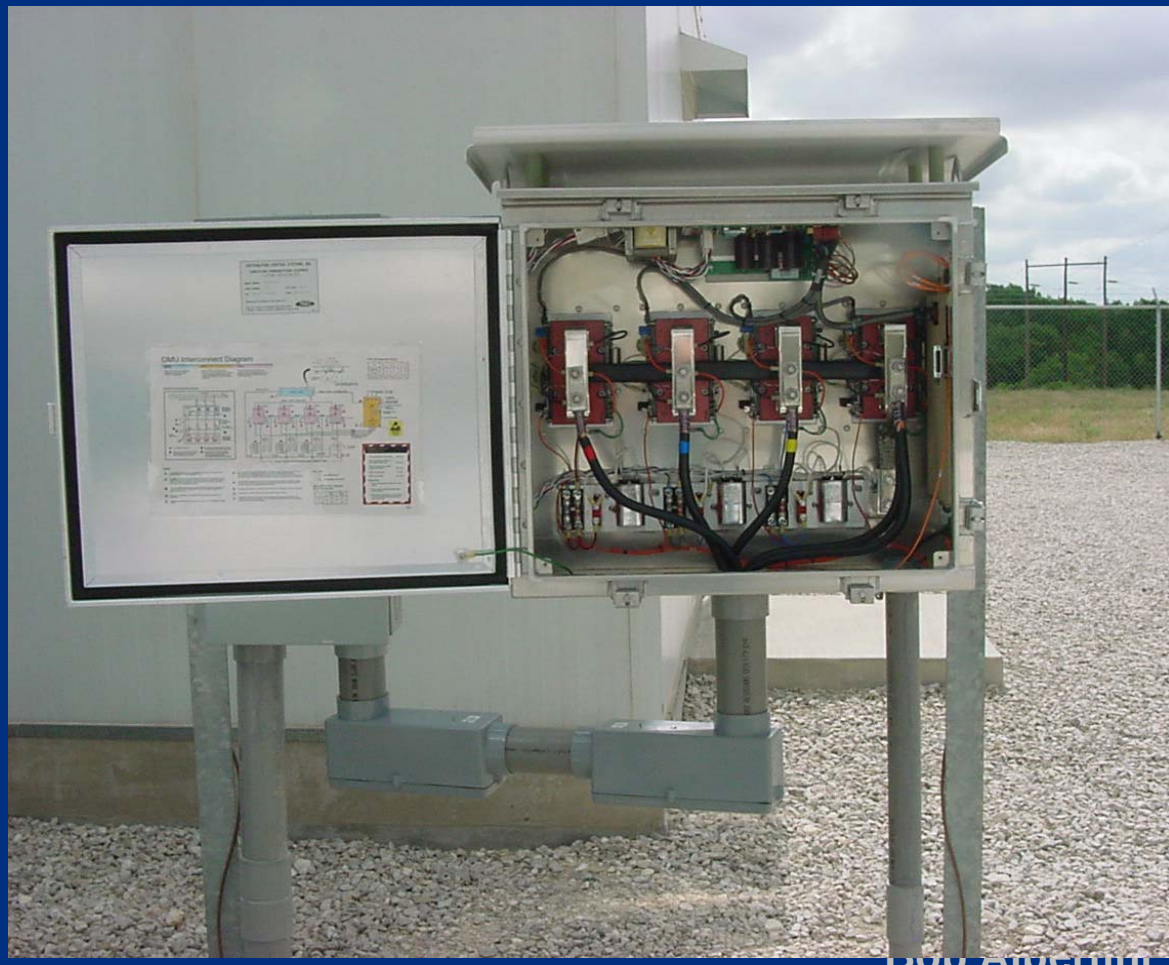
Control Receiving Unit (CRU)

- CRU serves as the substation “Supervisor”
- Communicates with Master Station
- Controls “outbound” and processes “inbound” TWACS signals
- Can be configured for indoor or outdoor use
- Can handle up to 12 independent busses or 32 feeders



Outbound Modulation Unit (OMU)

- OMU serves as TWACS' "outbound" signal generator
- Powered from low-voltage side of MTU (480/277 volts)
- Connected to MTU through current-limiting fuses
- Sends zero-crossing information back to CRU
- Communicates to CRU through fiber-optic cables



Modulation Transformer Unit (MTU)

3 PHASE PADMOUNT

SINGLE PHASE CANS

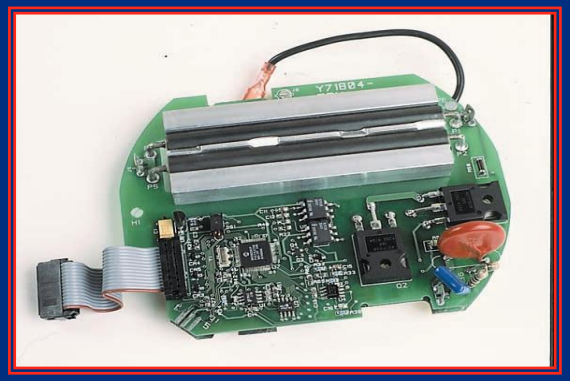
- MTU steps down Bus voltage to 480/277V
- Supplies power to the OMU

- MTU kVA rating depends on:
  - OA rating of Sub Transformer
  - Impedance of Sub Transformer
  - 3- or 4-wire Distribution

Remote Communications Equipment - (RCE)

Commercial Metering Transponder (CMT)

- L+G S4/S4e
- Itron Sentinel
- Itron Vectron



Universal Metering Transponder - Commercial (UMT)

- Elster A3
- GE KV2c

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Inbound Pickup Unit (IPU)

- 3 auxiliary current transformers in one enclosure to provide:
  - Isolation between the power system's current transformers (CTs) and CRU
  - 200:1 current signal level reduction
- Effective burden = 0.0055 Ohms per phase

Termination Panel Inside CRU

Non-integrated Substation Communications Equipment (SCE)

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Integrated Modulation Transformer Unit (MTU) Package

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Why is TWACS® ideal for electric utilities?

- Provides virtually 100% coverage
- Effective regardless of customer density, terrain, customer type
- Uses existing utility infrastructure
  - No dedicated communication network to engineer, construct, or “tune”
  - Handles multiple step-down transformers, and long lines
- Self-restoring network when distribution system is restored
- Independent of RF regulatory environment or licensing concerns
- Minimal incremental investment to add meters
  - No additional network investment is needed
- Full Two-Way Access to and into each premise
  - Provide immediate benefits and future functions

Project Features

- New meters installed at existing meter locations
- Data collected in 15 minute intervals for 3 phase meters
  - 60 minute intervals for single phase
- Communication between SCE and CCE over Navy's existing hardened microwave system
- Data transmitted from every meter every 2 hours
  - Stored in relational database (Oracle database)
- Metering system communicates with CUBIC via flat file import/export
- Accessible via web-based interface

Project Benefits

- Automatic metering and tenant billing
  - Reduced metering costs and administrative efforts
  - Standard billing periods across all tenants/sites
- Allows for kW Demand rate structure
- Improved accuracy
  - Reduced tenant high-bill complaints
  - Improved credibility w/ tenants
- Energy Management
  - Trending
  - Anomalies
  - Target high consumption buildings

Main Screen

NAVFAC Naval Facilities Engineering Command

Utilities and Energy Management
Mid-Atlantic Region

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Automated Meter Reading System

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- Yorktown Naval Weapons Station
- Cheatham Annex
- Oceana Naval Air Station
- Dam Neck Annex
- St. Juliens Creek Annex

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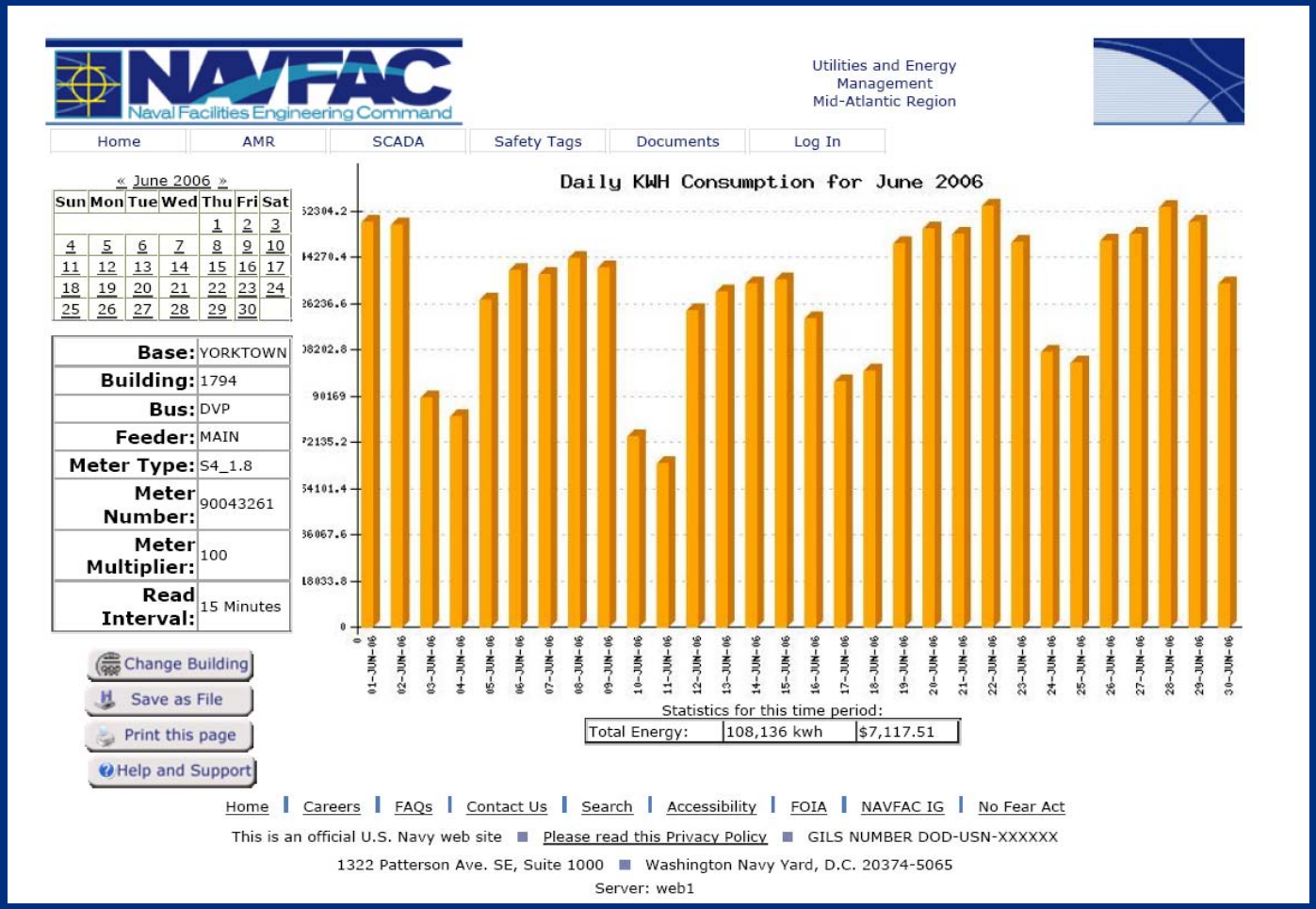
Typical Screen-Daily Data



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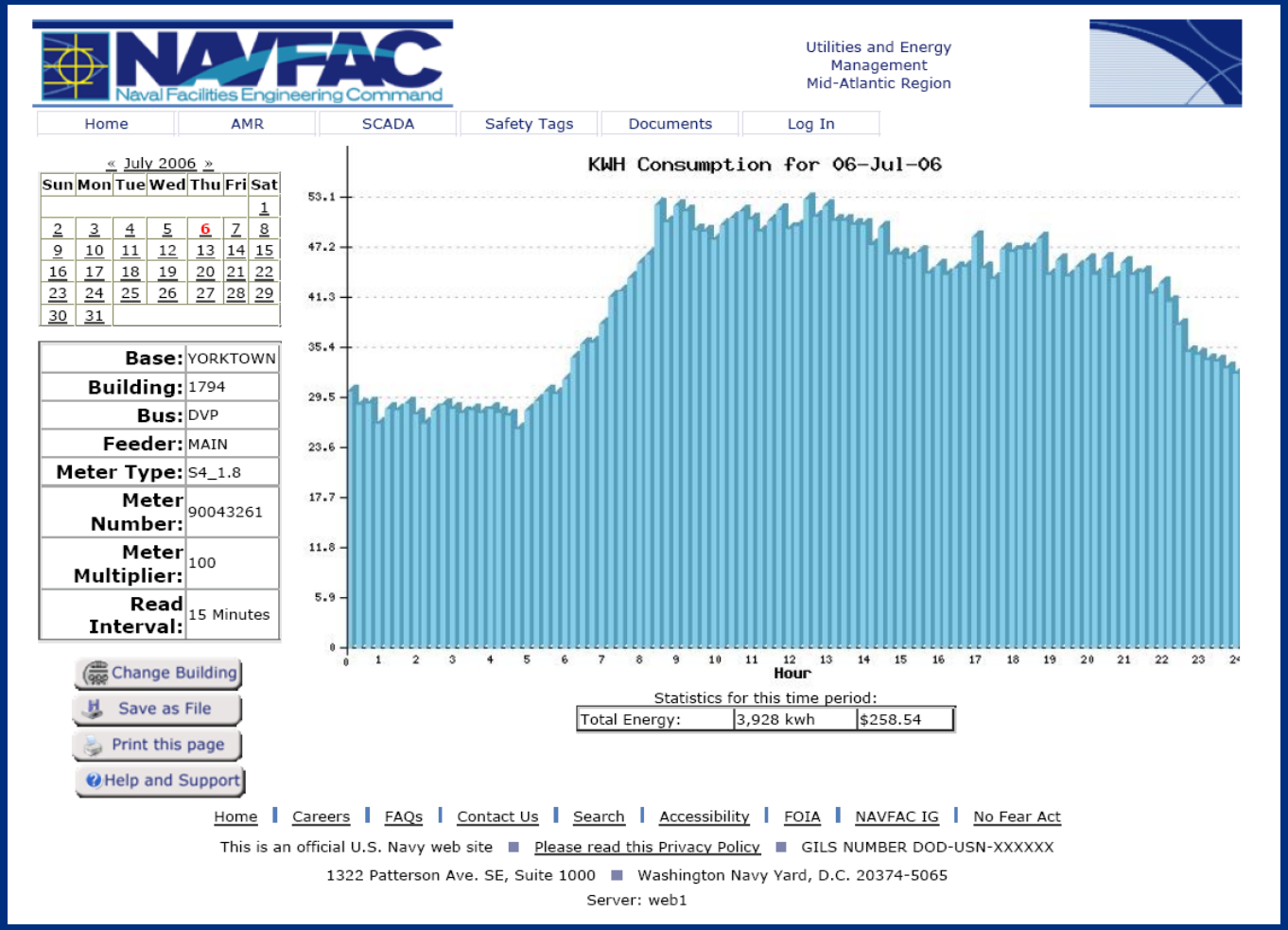
Typical Screen-15 min. Data



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Lessons Learned

- Communication
  - Housing Privatization
  - Outages for some meter installations
- Flexibility
  - Solutions to issues in field & contract
- Strong Team
  - Good Contracting Officer
  - Good subcontractor

For More Information

Would you like to know more about this session?

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