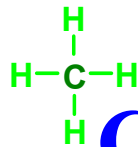
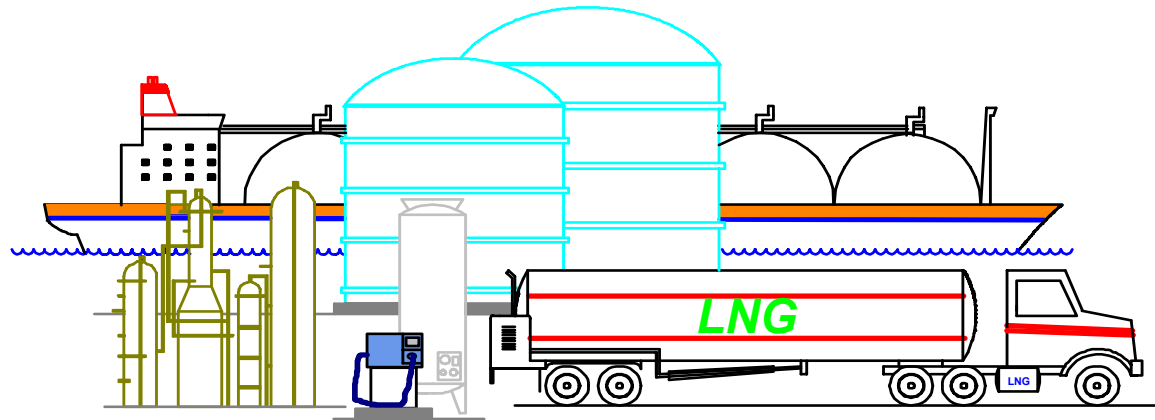


# *LNG Import Terminal* *Operating and Maintenance Jobs* *and* *Training Requirements*



**CH·IV International**

Arthur Ransome

Robbinston, Maine November 17<sup>th</sup>, 2005



# Introduction

- **Arthur Ransome**

- ✓ **LNG Consultant – CH·IV International**

- ✓ **Plant Manager - EcoElectrica Facility in Puerto Rico**

- LNG Import Terminal and CCGT Power Plant

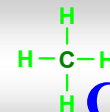
- Robbinston project is an LNG Import Terminal only

- Puerto Rico is USA Territory

- The same codes and standards related to the operation and maintenance of an LNG Import Terminal apply as if the facility was located within the Continental USA.

- **Personal Experience**

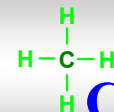
- ✓ **Recruitment and Development of Operating and Maintenance Teams**



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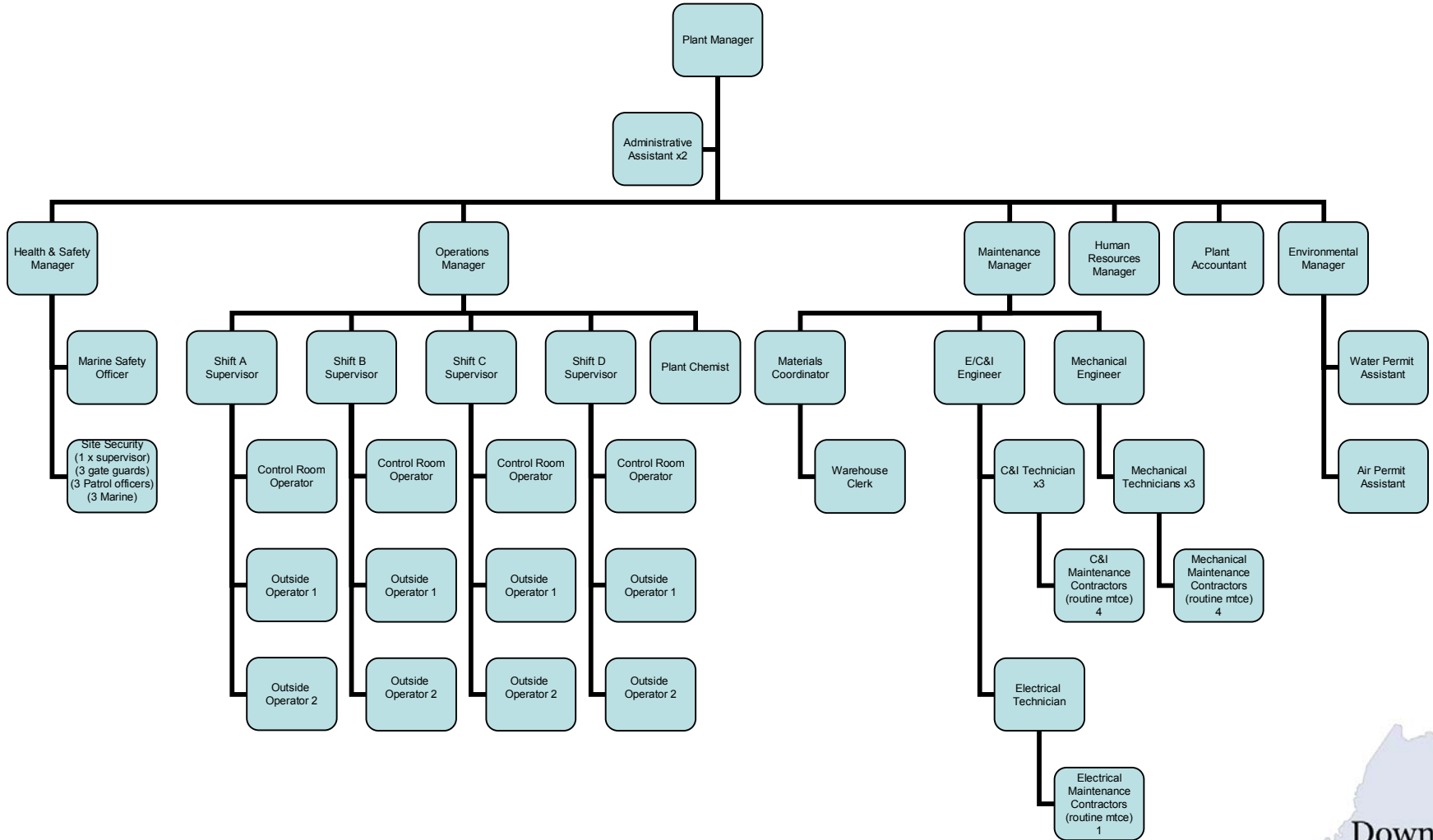
# Operating and Maintenance (O&M) Team Description

- **O&M Team Organizational Structure**
- **Roles and Responsibilities**
- **Skills and Qualifications**
- **Training Requirements**



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# Typical LNG Terminal O&M Team



Total Headcount = 63



# O&M Team Organization Structure

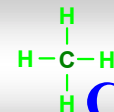
- **Organizational Structure**

- ✓ **Functional, “flat” organization structure**

- ✓ **Promotes team work**

- ✓ **Contains all key functions**

- Management and Administration
- Operations
- Maintenance
- Health, safety and security
- Environmental

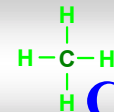


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# Roles and Responsibilities

## - Management Team

- Provide the “tools” the O&M Team requires for safe and efficient operation of the LNG Import Terminal
- Develop and implement policies and procedures to maintain compliance with applicable codes, regulatory requirements, permits and project agreements
  - ✓ Employee Development and Management
  - ✓ Environmental, Health and Safety
  - ✓ Emergency response
  - ✓ Accounting and Operating Procedures
  - ✓ Maintenance Management System
  - ✓ Materials coordination
  - ✓ Reporting and communications
  - ✓ Supplier and customer interfaces
  - ✓ Best industry practice



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# Roles and Responsibilities

## - Operating Team

- Operate the Terminal safely and efficiently and in accordance with established Policies and Procedures
- Meet Key Business Targets
  - ✓ Availability
  - ✓ Efficiency
  - ✓ Customer Demand Requirements
  - ✓ Natural Gas Supply Quality
- Respond to daily operational needs
- Respond to emergency conditions

# Roles and Responsibilities

## - Maintenance Team

- **Maintain the Terminal**
  - ✓ In accordance with the Maintenance Management System Policies and Procedures
  - ✓ In accordance with established Safe Working Procedures
- **Equipment Maintenance (in accordance with vendor recommendations)**
  - ✓ Preventative maintenance
  - ✓ Corrective maintenance
  - ✓ Predictive maintenance
- **Supervise sub-contractors and specialist service providers**

# Roles and Responsibilities

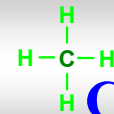
## - Health, Safety and Environmental Team

- **Health and Safety**

- ✓ Maintain a safe system of work
- ✓ Site security protocols and systems
- ✓ Health and safety training program
- ✓ Accident and incident investigation protocols
- ✓ Reporting requirements in accordance with code

- **Environmental**

- ✓ Environmental monitoring and reporting in accordance with permits
- ✓ Interface with agencies



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# Skills and Qualifications

- **Key Considerations**

- ✓ There are no local LNG Import Terminals
- ✓ Established local manufacturing and industrial base
- ✓ Operating principals of an LNG Import Terminal are very similar to those of traditional manufacturing and industrial facilities
- ✓ “Similar” jobs do exist

- **Key Requirements**

- ✓ An ability to learn new skills, adapt and expand on existing skills

- **Training and Development**

- ✓ “Base Level” approach
- ✓ Detailed training plans developed for each individual



# Regulatory Requirements for Training

## ✓ 49 CFR Part 193 – Subpart H – Personnel Qualifications and Training

- Construction, installation, inspection and testing personnel qualifications
- Operations and maintenance personnel qualifications
- Security personnel qualifications
- Personnel health
- Operations and maintenance
- Security, fire protection, records

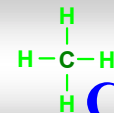
## ✓ NFPA 59A Chapter 14 – Operating, Maintenance and Personnel Training

- Operating procedures manual
- Maintenance procedures manual
- Marine shipping and receiving
- Product transfer
- Unloading operations
- Site housekeeping
- Control systems inspection and testing
- Corrosion control
- Record keeping



# Training Approach

- **Meet or exceed regulatory requirements**
- **Training Plan**
  - ✓ **Basic Training**
    - Regardless of existing skills, qualifications and experience all O&M staff will initially be trained to the same “Base Level”.
  - ✓ **Vendor Supplied Training**
    - Training on operation and maintenance of specific pieces of equipment for specific disciplines
  - ✓ **Health, Safety & Security Training**
  - ✓ **Environmental training**
  - ✓ **“Hands on” Training**
    - Classroom training put into effect in the field during construction, commissioning and testing
    - Preparation for Commercial Operation
  - ✓ **Ongoing Training**
    - Refresher training
    - Individual training plans



# Basic Training

- **Technical Reference Manual**

- ✓ **Typical Table Of Contents**

- Introductory Information
- Design basis, P&IDs and other technical references
- Process Systems
- Utility / Auxiliary Systems
- Hazard Detection & Mitigation Systems
- Equipment operation & maintenance and troubleshooting procedures

- **Basic Training**

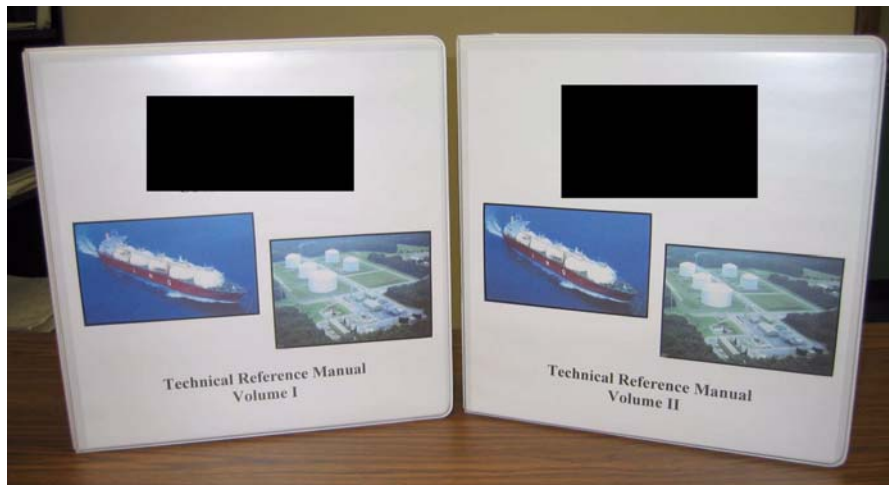
- ✓ **Based on the Technical Reference Manual**

- Basic orientation
- Basic equipment study
- Plant operations overview
- Basic utilities and ancillary systems
- Hazard detection and mitigation
- Plant communications
- Send-out pipelines
- Maintenance Procedures
- Operations Procedures

- ✓ **Classroom Based**

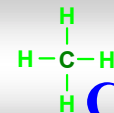
- Approximately 4 Weeks
- Lectures, video, demonstrations, handouts

- ✓ **System walk-downs**



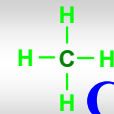
# Vendor-Supplied Training

- **Training Provided By Equipment Vendors**
  - ✓ Based on the Operation and Maintenance Manuals
  - ✓ Specific pieces of equipment installed at the Terminal
  - ✓ Covers, in detail, equipment operation and maintenance
- **Classroom Based**
  - ✓ Approximately 4 – 6 Weeks
  - ✓ Lectures, presentations and handouts
  - ✓ Equipment demonstrations when possible



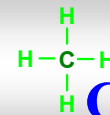
# Health, Safety and Environmental Training

- **Health, Safety and Security Training**
  - ✓ Safe systems of work
  - ✓ Personal protective clothing and equipment
  - ✓ Emergency response
  - ✓ Port Security Plan - encompassing Facility Contingency Plan, Spill prevention control and countermeasures (SPCC) plan and Facility response plan (FRP)
  - ✓ Process safety management training in accordance with 29 CFR 1910.119 (if adopted as company standard)
  - ✓ OSHA required training, including training specific for the Terminal
- **Environmental training**
  - ✓ Environmental management
  - ✓ Mitigation



# “Hands On” Training

- **Factory Acceptance**
  - ✓ Review of equipment design parameters
  - ✓ In factory witness
  - ✓ Review of test results
  - ✓ Final inspection of completed equipment package
  - ✓ Report any discrepancies or non-compliances
- **Construction**
  - ✓ Software systems development – including policies and procedures and management information systems
  - ✓ Quality control checks
- **Mechanical Completion**
  - ✓ Preparation for mechanical completion
  - ✓ Equipment and system clean out, flushes and cool-down
  - ✓ Mechanical completion verification
- **Start-up and Commissioning**
  - ✓ Review start-up and commissioning procedures and checklists.
  - ✓ Complete “valve out” of equipment and systems in accordance with commissioning procedures
  - ✓ Prepare instrumentation in accordance with commissioning procedures.
  - ✓ Prepare electrical supplies and distribution in accordance with commissioning procedures.
- **Performance Testing**
- **Acceptance, Substantial Completion, Final Completion**



# Ongoing Training

- **Individual Training Plans**

- ✓ Required for all persons permanently employed in the operation and maintenance of the LNG Terminal

- **Refresher Training**

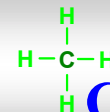
- ✓ **Two year refresher training**
  - Operation and maintenance
  - Safety
  - Security
  - Fire protection

- **Training Records**

- ✓ Required by code
- ✓ Will be subject to audit during annual FERC and USCG inspections

# O&M Team Training Summary

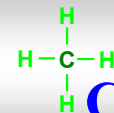
- **Statutory Requirements**
  - ✓ Define Training Needs
- **Training Approach**
  - ✓ Developed to meet (as a minimum) statutory requirements
- **Training Plan**
  - ✓ Basic training – @ 4 weeks
  - ✓ Vendor supplied training – @ 4 to 6 weeks
  - ✓ Health, safety and security training – @ 2 to 4 weeks
  - ✓ Environmental training – @ 1 week
  - ✓ “Hands-on” training – ongoing during construction, commissioning and testing
- **Refresher training**
  - ✓ During commercial operation
  - ✓ Two year refresher training
    - Operation and maintenance
    - Safety
    - Security
    - Fire protection



# Thank you



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