ENERGY PROGRAM AT ROCK ISLAND ARSENAL

COLONEL Mike G. Mullins, Commander

INDUSTRY WORKSHOP, FEBRUARY 25-27, 2004

PUBLIC WORKS
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### Report Documentation Page

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ROCK ISLAND ARSENAL

- 200 BUILDINGS
- 6.5 MILLION SQ FT
BRIEFING OUTLINE

• ARSENAL ISLAND HISTORY
• MANUFACTURING HISTORY
• ENERGY PLAN
• ENERGY PROJECTS
• INDUSTRIAL BUILDINGS - ENERGY OPPORTUNITIES
ARSENAL ISLAND HISTORY

- Ft Armstrong occupied island from 1812 – 1836
- The Arsenal was established in July 1862
ARSENAL ISLAND HISTORY

- Civil War Prison Barracks, 1864-1865
- 84 Barracks, 10,000 Prisoners at peak
ARSENAL ISLAND HISTORY

Rock Island Arsenal Ordnance Department

Roll Call, Rock Island Prison Barracks 1864-1865.
ARSENAL ISLAND HISTORY

- Telodynamic Hydro Power, 1879
- Wire-cable power transmission
ARSENAL ISLAND HISTORY

- 1st Hydro-electric Conversion, circa 1900
ARSENAL ISLAND HISTORY

• Blacksmith Shop, 1904
• Current Hydro-electric Plant, circa 1919
MANUFACTURING HISTORY

- History of Products
- Current Products
- Capabilities & Skills
- Quality Assurance

The Army’s Industrial Strike Force
Enabling the Warfighter at Every Level
History of RIA Manufacturing

- **1904 - 1920**: .30 cal Springfield Rifle M1903
- **1910s**
  - Mark VIII Tank
- **1921 - 1935**: Items for Army, Army Air Service, Navy, Corps of Engineers
- **1917**: Assistance to Industry, 3” Gun Caissons, 6” Howitzer Carriage
- **1930s**
  - 1938 Browning Machine Gun M1919A4
  - 1919 Honest John Rocket Launcher
- **1940s**
  - 1946 - 1952 M114 155 mm Towed Howitzer
  - 1954 - Present M1127/M182 Gun Mount for 155mm SP Howitzer
- **1950s**
  - 1952 - 1984 M101A1 105mm Towed Howitzer
  - 1965 - 1984 M101A1 105mm Towed Howitzer
  - 1967 - 1976 M102 105mm Towed Howitzer
- **1960s**
  - 1967 - 1976 M174 Gun Mount for 8” SP Howitzer
- **1970s**
  - 1967 - 1991 M198 155mm Towed Howitzer
  - 1969 - 1975 .50 cal M85 Machine Gun
  - 1967 - Present M140/M1A1 Tank Gun Mount
- **1980s**
  - 1965 - 1984 M174 Gun Mount for 8” SP Howitzer
  - 1969 - 1975 .50 cal M85 Machine Gun
  - 1977 - 1991 M198 155mm Towed Howitzer
- **1990s**
  - 1990 - 1997 M119 105mm Towed Howitzer
  - REARM
  - Tomorrow ???
CORE Products
Only Domestic Producer of Hydro-Pneumatic Recoil Mechanisms

Howitzers, Cradles, Recoils, Mounts, BII, Tool Sets, & Shelters
Manufacturing Capabilities

WELDING

FOUNDRY

FORGING

MACHINING

CASTINGS

SIMULATION

INSPECTION

LARGE ASSEMBLY

ASSEMBLY CLIMATE CONTROLLED

Rock Island Arsenal
Kingsbury Manufacturing Complex
Manufacturing Capabilities

Foundry

Forging

Rock Island Arsenal
Kingsbury
Manufacturing Complex
Manufacturing Capabilities

Rock Island Arsenal
Kingsbury Manufacturing Complex
Manufacturing Capabilities

Rock Island Arsenal
Kingsbury
Manufacturing Complex
Manufacturing Capabilities

4-Axis Machining Centers
Manufacturing Capabilities

Wire Electrical Discharge Machine

7-Axis Machining Centers
Manufacturing Capabilities

LARGE ASSEMBLY

Rock Island Arsenal
Kingsbury
Manufacturing Complex

ASSEMBLY CLIMATE CONTROLLED
Manufacturing Capabilities

Rock Island Arsenal
Kingsbury
Manufacturing Complex
Other Manufacturing Capabilities

- Precision Cutting Tools
  - Lasers, Water Jets, etc
- Robotic Welders
- Electron Beam Welder
- Investment Casting
- State-of-Art Plating Shop
- Optical Scanning, 0.0001 inch

Rock Island Arsenal
Kingsbury Manufacturing Complex
Pride in Excellence

- **Army Communities of Excellence:**
  - Chief of Staff Award - 1998, 1999, 2000, 2001
- **Presidential Quality Award:**
  - Award of Merit - 1998
  - Army Nominee - 1999 & 2000
- **Navy’s Best Manufacturing Practices:**
  - 35 of 72 Practices documented as BMPs
- **National Partnership Council**
  - National Award Winner - 1997
- **International Standards Organization (ISO)**
  - Certified to ISO 9002 - 1997 - Present
- **Army Contractor Performance Certification Program**
  - Certified to (CP)² - 1995 - Present
ARSENAL ENERGY PROGRAM

ENERGY RESOURCE

ROCK ISLAND ARSENAL
AN ENERGY EFFICIENT INSTALLATION
MANAGEMENT PLAN
ARSENAL ENERGY PROGRAM

• ENERGY GOALS
• PROGRESS REPORT
• CONSERVATION PROJECTS
• FUNDING SOURCES
• METERING PLAN
• AWARENESS PLAN
• ENERGY PLANS & POLICIES
RIA ENERGY PROGRAM
PROGRESS TOWARDS GOALS

- FY 1985 BASELINE: 201 MBTU/Ksf
- FY 2010 GOAL (35%): 131 MBTU/kSF
- FY 2004 GOAL: 150 MBTU/kSF
- FY 2003 RESULTS: 138 MBTU/kSF
- FY 2004 TO DATE: 5.5 % Decrease
PUBLIC WORKS
FY 2004 FACILITY ENERGY GOAL
ROCK ISLAND ARSENAL

MBTU/KSF

FISCAL YEAR

- GLIDE PATH  ---- RESULTS  ◇  2004 GOAL
RIA ENERGY PROGRAM
GENERAL COST REDUCTION PLAN

• REDUCE PRICE OF PURCHASED ENERGY
• REDUCE LOAD OR NEED
• REDUCE EQUIPMENT OPERATING HOURS
• IMPROVE OPERATING EFFICIENCY
RIA ENERGY PROGRAM
REDUCE PRICE OF ENERGY

- PURCHASE COMPETETIVELY
- AVOID PEAK DEMAND CHARGES
- USE CHEAPEST FUELS
- MAINTAIN ACCOUNTING SYSTEM
RIA ENERGY PROGRAM
REDUCE LOAD OR NEED

• CONSOLIDATE BUILDING SPACE
• ENERGY EFFICIENT ENVELOPES
• REDUCE OVERHEATING & OVERCOOLING
• ELIMINATE LEAKS
RIA ENERGY PROGRAM
REDUCE EQUIPMENT OPERATING HOURS

• DDC HVAC CONTROL SYSTEMS
• OPERATE LIGHTING ONLY WHEN NEEDED
• USE OCCUPANCY SENSORS
• SHUT OFF COMPUTERS AT NIGHT
RIA ENERGY PROGRAM

IMPROVE OPERATING EFFICIENCY

• ENERGY EFFICIENT LIGHTS
• HIGH EFFICIENCY MOTORS & PROCESS
• HEATING PLANT IMPROVEMENTS
• HVAC IMPROVEMENTS
• CHILLER REPLACEMENTS
RIA ENERGY PROGRAM
MAJOR PROJECTS TYPES

- HEATING PLANT & STEAM SYSTEM
- HYDROPLANT
- LIGHTING & ELECTRICAL
- HVAC & CHILLER PLANTS
- BUILDING ENVELOPE
- WATER SYSTEM
<table>
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<th>Project Description</th>
<th>Year</th>
<th>Project Cost</th>
<th>Savings/Yr</th>
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<td>NAT. GAS TO V AREA</td>
<td>94</td>
<td>$170K (FEMP)</td>
<td>$30K</td>
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<td>EXPAND EMCS SYST.</td>
<td>94</td>
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<td>WAREHOUSE LIGHTS</td>
<td>94</td>
<td>$300K (FEMP)</td>
<td>$90K</td>
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<td>HYDROPLANT MOD</td>
<td>95</td>
<td>$3,000K (ECIP)</td>
<td>$500K</td>
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<td>HYDRO TURBINES (4)</td>
<td>95</td>
<td>$2,500K (FEMP)</td>
<td>$500K</td>
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<td>N. GAS TO PVG GNDS</td>
<td>95</td>
<td>$277K (FEMP)</td>
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<tr>
<td>LIGHTING, BLDG 350</td>
<td>95</td>
<td>$820K (ECIP)</td>
<td>$150K</td>
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<tr>
<td>LIGHTING, BLDG 220</td>
<td>95</td>
<td>$778K (ECIP)</td>
<td>$140K</td>
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### RIA ENERGY PROGRAM

**HQ FUNDED PROJECTS**

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<th>Year</th>
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<th>Savings/YR</th>
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<tr>
<td>95</td>
<td>$458K (FEMP)</td>
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<td>97</td>
<td>$2,500K (ECIP)</td>
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<td>97</td>
<td>$712K (FEMP)</td>
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<td><strong>Totals</strong></td>
<td><strong>$11,710K</strong></td>
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# RIA ENERGY PROGRAM

## LIGHTING PROJECT STATISTICS

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<th>Building</th>
<th>Cost</th>
<th># Fixtures</th>
<th>Old KW</th>
<th>New KW</th>
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<td>$300k</td>
<td>1,100</td>
<td>459</td>
<td>145</td>
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<td>BLDG 220</td>
<td>$864k</td>
<td>3,100</td>
<td>891</td>
<td>273</td>
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<td>ESPC - LITES</td>
<td>$5,106</td>
<td>25,185</td>
<td>4,078</td>
<td>1,904</td>
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<td>TOTALS</td>
<td>$7,090k</td>
<td>34,385</td>
<td>6,228</td>
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**TOTAL REDUCTION:** 3,572 KW
RIA ENERGY PROGRAM
RECENT AWP PROJECTS

• LIGHTING, BLDG 390, BLDG 68 (FY 99)
• LIGHTING, ELECTRIC SERVICE, 62 (FY 01)
• HVAC CONTROLS, 210, 211, 212E (FY 01)
• HVAC CONTROLS, 208, 212W, (FY 02)
• HVAC VFD’s, 102-110, (FY 02)
• HVAC VFD’s, REARM, (FY 02-03)
• WATER SYSTEM VFD’S, 9, 52, (FY 02)
RIA ENERGY PROGRAM

5 ESPC PROJECTS (PR 1999-3066)
DEAM36-02-C-4500-A00001

• GEOTHERMAL IN HOUSING (PR 2002-6206)
• LIGHTING CONVERSIONS (PR 2002-6207)
• HVAC CONTROLS (PR 2002-6208)
• HYDRO-ELECTRIC TURBINES (PR 2002-6209)
• PEAK GENERATOR (PR 2002-6210)
ESPC DEFINITION: ENERGY SAVING PERFORMANCE CONTRACT

• A MECHANISM TO CREATE PARTNERSHIPS TO FINANCE AND IMPLEMENT ENERGY PROJECTS

• THE PRIME CONTRACTOR CARRIES THE CONTRACTING RISK

• THE ARSENAL’S ONLY UP-FRONT COSTS ARE FOR PROCUREMENT AND ADMINISTRATION

• ESPC’s MAY INVOLVE THIRD PARTY FINANCING

• PROJECTS ARE PAID FOR OVER AN AGREED UPON TERM WITH ENERGY AND O&M SAVINGS
## RIA ENERGY PROGRAM

### CURRENT ESPC COST SUMMARY

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<td>GEOTHERMAL</td>
<td>$352</td>
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<td>$5,106</td>
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<td>HVAC CONTROLS</td>
<td>$417</td>
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<td>HYDRO-ELECTRIC</td>
<td>$2,836</td>
<td>$155.1</td>
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<td>PEAK SHAVER</td>
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<td><strong>TOTALS:</strong></td>
<td><strong>$9,794</strong></td>
<td><strong>$688.2</strong></td>
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RIA ENERGY PROGRAM
ESPC: GEOTHERMAL IN HOUSING

- AFFECTS BUILDINGS 90 THRU 100
- 40 FAMILY HOUSING UNITS
- CLOSED LOOP SYSTEMS
- 2 WELLS PER APARTMENT
- 4 INCH BORE HOLE, 200 FEET DEEP
- GROUND-SOURCE HEAT PUMPS REPLACE FURNACES AND A/Cs
RIA ENERGY PROGRAM
ESPC: LIGHTING ACTIONS

- AFFECTS 56 BUILDINGS
- 24,000 LIGHT FIXTURES CONVERTED
- WILL STANDARDIZED ALL HIGH INTENSITY DISCHARGE FIXTURES IN REARM
- T-8 FLUORESCENT THROUGHOUT ADMIN SPACE
- OCCUPANCY SENSORS IN RESTROOMS AND SIMILAR APPLICATIONS
- LIGHT EMITTING DIODE TRAFFIC LIGHTS
RIA ENERGY PROGRAM
ESPC: HVAC CONTROLS

• PHASE III OF REARM AREA
• BUILDINGS 220, 222, 230
• INSTALLS DIRECT DIGITAL CONTROLS
• AFFECTS 21 EXHAUST FANS, 26 HEATING AND VENTILATING UNITS, & FIVE MISC. UNITS.
RIA ENERGY PROGRAM
ESPC: HYDRO-ELECTRIC TURBINES

• RENOVATES UNITS 2, 5, & 9
• RESULTS IN ADDITIONAL 700 KW OF POWER
• REPLACES DETERIORATED RUNNERS WITH STAINLESS STEEL, RECONDITIONS OTHER MECHANICAL COMPONENTS
RIA ENERGY PROGRAM
ESPC: PEAK SHAVER

• 1000 KILO-WATT STANDBY GENERATOR
• DIESEL ENGINE
• 200 HRS PER YEAR ANTICIPATED
• 3000 GALLON BASE MOUNTED TANK
RIA ENERGY PROGRAM
FY 05 & 06 ECIP PROJECTS

• CHILLER REPLACEMENT, PR 2004-0730
  • 2375 TONS COOLING
  • BLDG 348 PLANT
  • BLDG 73 PLANT
  • STEAM MAIN IMPROVEMENTS

• CHILLER REPLACEMENTS, FY 2006
  • BLDG 114 PLANT
  • PACKAGE BOILER?
RIA ENERGY PROGRAM
INDUSTRIAL ACCOMPLISHMENTS

- REARM – MAJOR INDUSTRIAL RENOVATION COMPLETED IN 1990’S
  - BUILDING CONSOLIDATION
  - HEATING PLANT RENOVATION
  - AUTOMATED STORAGE
  - STATE OF ART MFG TECHNOLOGIES
  - ENERGY EFFICIENT STRUCTURES
- SHORT CYCLE HEAT TREAT STUDY
- ENERGY EFFICIENT MOTORS
RIA ENERGY PROGRAM
INDUSTRIAL OPPORTUNITIES

• PACKAGE BOILER FOR SUMMER
• MANUFACTURING VENTILATION
  • PLATING SHOP TANKS
  • MIST CONTAINMENT
• PAINT BOOTH CONTAINMENT AND HEAT RECOVERY
• BUILDING ENVELOPE IMPROVEMENTS
• EFFICIENT SPACE UTILIZATION
• WATER CONSERVATION?
RIA ENERGY PROGRAM
FUTURE INITIATIVES

• MODERNIZE OR REPLACE HEATING PLANT (DETERMINE BEST OPTION)

• INSULATE ADMIN BUILDINGS

• INSTALL THERMAL WINDOWS

• GEOTHERMAL FOR ADMIN BLDGS

• MANUFACTURING VENTILATION & INDUSTRIAL PROCESSES
RIA ENERGY PROGRAM
WATER CONSERVATION PLAN
- SYSTEM AUDITS

• ULTRASONIC MONITORING CONDUCTED ANNually

• WASTEWATER FLOW MONITORED REGULARLY

• WATER FLOW MONITORED MONTHLY
• BY CONTRACT, BASE OPERATIONS MUST MAINTAIN 70% CONDENSATE RETURN
RIA ENERGY PROGRAM
WATER CONSERVATION PLAN
- COOLING SYSTEMS

• ONE-PASS COOLING HAS BEEN NEARLY ELIMINATED OVER PAST 10 YEARS

• FOUNDRY PROJECT

• COMPRESSOR PLANT PROJECT
RIA ENERGY PROGRAM
WATER CONSERVATION PLAN
- COOLING TOWER MANAGEMENT

• REQUIREMENTS DEFINED AND MONITORED THROUGH BASE-OPS CONTRACT
RIA ENERGY PROGRAM
WATER CONSERVATION PLAN
- HIGH USING PROCESS

• NONE DEFINED AT THIS TIME