Coal Handling System
Fire Protection Replacement Project
Case Study

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The Utility FPE Group
Fire Protection System Replacement Case Study

March 30, 2004

Harrington Energy Services
Harrington Energy Services

Harrington Generating Station:

- Xcel Energy - Power Generation
- TUCO - Coal Service Agreement
- Savage - Coal Handling Facility
  - Operations & Maintenance Services
Harrington Generating Capacity:

- 3 Units @ 350 Megawatts (1050 MWG)
  - Burn Rate: 12-14,000 TPD
  - Annual Burn: 4.5 million Tons
  - Historic PRB Plant (25+ years)
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- **Coal Handling Facility:**
  - 5 - 600 ton silos per unit
  - Parallel conveyor & crushing
  - 18 conveyors, 14 feeders & 2 crushers
  - Bottom Dump Trestle with Thaw Shed
  - Wheel loader based operation
Lower Coal Handling System
• **Coal Handling Facility:**
  
  • *Savage Energy Services acquired ownership & operational responsibilities of the fuel handling facility November 2000*
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• **Asset Management & O&M Programs initiated:**

  • System performance
  • Housekeeping & Washdown systems
  • Fire Protection
  • Dust Collection
  • Spare parts inventories
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- **Fire Protection Project Evolution:**
  - *Initial Full Scope Fire Protection Assessment Conducted*
    - July 2001
    - Formal Report accomplished
  - *Design, Operational & Practice Deficiencies* were identified with short and long term plans being created
Short-term measures:

- *July 2001 implementation of monthly system flushing program*

- *Fire walk-down program initiated*
  - *Conducted at strategic times to monitor system conditions*
<table>
<thead>
<tr>
<th>Area</th>
<th>Total Sprays</th>
<th>Plugged Sprays</th>
<th>%</th>
<th>Plugged Sprays</th>
<th>%</th>
<th>Plugged Sprays</th>
<th>%</th>
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<tbody>
<tr>
<td>Unit 1</td>
<td>58</td>
<td>35</td>
<td>60%</td>
<td>36</td>
<td>60%</td>
<td>41</td>
<td>71%</td>
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<td>Unit 2</td>
<td>36</td>
<td>13</td>
<td>36%</td>
<td>10</td>
<td>36%</td>
<td>3</td>
<td>8%</td>
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<td>Unit 3</td>
<td>38</td>
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<td>50%</td>
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<td>20</td>
<td>53%</td>
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<tr>
<td>Total Sprays</td>
<td>132</td>
<td>67</td>
<td>51%</td>
<td>67</td>
<td>51%</td>
<td>64</td>
<td>48%</td>
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</table>
Plugged Pipes from Existing system
Rusted Pipe section from existing system
Long-term measures:

- Early Warning Fire Detection System
  - Installed September 2002
  - CO based monitoring
  - Full coal handling system coverage
  - Proven Technology
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- **Early Warning Fire Detection System**
  - Air current analysis for detector head placement
  - Network viewable
  - Addressable
  - Expandable
    - Multiple devices
    - System control
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- Early Warning Fire Detection System
  - Notification capabilities
    - Strobe lights
    - Plant pager system
    - Handheld radios
Conspec Controls
Main PC station
CO Sensor
Installed at Unit #1
Tripper Deck
Unit #2 Control Transformer Fire

33 ppm

Zoom Level 2

Right click to go back.
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• **Existing Fire Protection systems**
  
  • Mixture of 1970’s High Expansion Foam systems & dry pipe systems on all above ground conveyors
  
  • High Pressure CO$_2$
  
  • Dry Pipe in Crusher House
  
  • Deluge in Reclaim Tunnel (newer addition)
Old Foam System
In 400/410 Gallery
Old Dry Pipe System
On Unit #1 Tripper Deck
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- **Replacement Fire Protection System:**
  - **Budgetary approval - 2003**
  - **Phased project approach**
  - **Conveyors: Deluge Based Design**
  - **Dust Collectors (F-500 supplemented)**
  - **Sampler building: Dry Pipe**
  - **Crusher House: Auto fire hose standpipe system**
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• **Project Engineer**
  - **The Utility FPE Group, Inc.**
    - Years of practical in-plant experience
    - PRB coal expertise
    - Practical approach
    - Out-of-the-box design applications

• **Concept Development**
• **Design Specifications**
• **Contractor Bid Evaluation**
• **Contractor Drawings Review**
• **Inspection of Contractor Work for Quality Control**
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• **Replacement Fire Protection System:**
  
  • **Concept Development:** April-June
  • **System Design Engineering:** June-August
  • **Contractor Bid Process:** August-September
  • **Project Awarded:** September
  • **Project Start-up:** December 2003
Rigorous Design Specifications
<table>
<thead>
<tr>
<th>Flow Rate (GPM)</th>
<th>Maximum Pressure (PSI)</th>
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<tbody>
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<td>513.6</td>
<td>82.00</td>
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**F.E. Moran, Inc.**
Special Hazard Systems

SAVAGE–HARRINGTON ENERGY SERVICES
F P REPLACEMENT PROJECT SH03001F
AMARILLO, TEXAS

DATE: 12–12–03
DWG. NO.: FP–101

**Extensive Contractor Evaluation Process**
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• **Replacement Fire Protection System:**
  
  • **Current Technology Detection**
    • **Linear Heat Detection**
    • **Strategic Spot Thermal Detection**
    • **Full System CO Monitoring**
    • **Strategic Infrared Detection**
Infrared Detection
Strategic Locations In Reclaim

- Air Purged
- Heat Detection
- Pre-Ignition
- Moving Material
- Remote Indication
- Conveyer Shutdown
- Control
- Fire Prevention
- Conveyors
- Vehicles
- Process
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- **Replacement Fire Protection System:**
  - **Suppression Concepts**
    - Deluge - water where you need it when you need it
    - Tail & Head Chute Protection
    - “Car Wash” Concept in Tripper Galleries - Targeted coverage with minimum flow
“Car Wash” Concept
Direct Conveyor Protection
Zoned For Involved Conveyor Only
Minimize Water Volume
New Valve Station
At Unit #3 Tripper
Deck area

2004  2  19
Replacement Pumphouse & Lower Valve Manifolds

Replacement Crusher Building Baghouse

New Sampling System Building & Storage area
Piping Installation along 240/250 conveyors
Piping installation along 240/250 Conveyors
Spray head installation along 240/250 Conveyors
Piping installation along 400/410 Gallery conveyors
Old MCC Room
Unit #1 Tripper
Deck area
Replacement MCC
Room located outside
the Unit #1 Tripper
Deck area
Old Dust Collector
On Unit #1
Replacement Dust Collector installed on Unit #1
Structural Steel & Placement of Replacement Dust Collector on Unit #3.
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- **Fire Prevention:**
  - Frequent system inspections
  - Daily system washdown
  - Material control & containment
  - Pile management
  - Team Member awareness
  - Early Warning Detection System
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• **Safety:**
  • *Active Participant in Integrated ERT Team*

**Xcel Harrington/ Nichols - Savage**

• *One Team Member is strategically placed on each Team*

• *ERT Training includes EMT certification*
Structural Fire Team
With Hands-On Coal Handling Fire Training