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Sam Rayburn System Restoration - 2005

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Sam Rayburn Power Plant 1965

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Hurricane Rita

- Hurricane Rita Made Landfall 24 Sept 2005
- Moved Up Eastern Part of State of Texas
- Extensive Damages were Sustained in the Counties in Eastern Texas
- Area Around Sam Rayburn and R D Willis Power Plants
  - Counties Issued Evacuation Orders
  - Trees Down, Roads Blocked
  - Homes Damaged, People Stranded
  - Uninhabitable Conditions

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Tailrace right after the storm

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North side of Levee

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10 foot tall Levee Segment

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End of Levee after the Storm

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Main Embankment Damage

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Close-up Main Embankment

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Pine Trees broken 30 feet up

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Hurricane Rita

- Generating Plants Were Knocked Off Line
- Widespread Power Emergency Existed
  - Gasoline Could Not Be Pumped
  - Food Could Not Be Cooled
  - No Lights or Phones
  - Water/Sewage Treatment Plants Not Functioning
  - Hospitals On Emergency Power Only
  - Looting to Survive
  - Jasper Newton Office Without Power
- Restoration of Power Was an Imparative

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Situation At Sam Rayburn

- Emergency Generator Power Only
- 2 to 3 weeks food supply (staff donations)
- 3 to 5 days Fuel Supply
- Road Blocked, Campers Stranded
- Area Evacuation Ordered
- Most Employees Stayed on Job Anyway
- Widespread Power Emergency Existed
- Powerhouse Became a Bed and Breakfast for Relief Workers

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Situation At Sam Rayburn

- Fuel, Food, and Water Critical - Provided by Lake O the Pines Personnel
- Larger Generators Required - Provided By Somerville and Benbrook Personnel
- Corps First Strike Teams Housed at Sam Rayburn
- Provided Park Camp Areas for Other Agencies Emergency Teams

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Damage to Parks

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Damage to Marine Facilities

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Blocked Roads and Highways

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Vehicle damage during RITA

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Restoration Of Power

- 90% of Jasper Newton Electric Coop Transmission Lines Taken Out of Service
- Generating Plants Were Knocked Off Line
- Power Needed to Bring Plants and Lines Back Into Service
- Next Day, 25 September Jasper Newton Requested Sam Rayburn Be Used To Initially Power Their Lines
- "Black Start" Was Not Permitted by SWD Policy

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Team of Experts Sought for Advice

- An impromptu team was formed by contacting the chain of command and subsequent inclusion of experts in the Power Industry, and the Power Customers.
- Plans were formed by using the specific system restoration steps that were requested by the Coops and making determinations as to what the Corps could safely do while providing reasonable protection to the generators during attempts at system restoration.

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Restoration Of Power

- SWPA Began Coordination With Customers and Other Power Suppliers
- Gary Hinkle of Omaha District and SWPA Provided Invaluable Insights and a Roadmap to Success
- Obstacles That Were Overcome
  - Legal
  - Technical
  - Coordination
  - Poor Living Conditions

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Restoration Of Power

- Jasper Newton Began Clearing and Restoring Lines along with hundreds of other line crews
- Sam Rayburn Employees studied process to be used and then trained all Operating and Maintenance personnel
- Prior to starting unit for system restoration, all other plant equipment was isolated to prevent damage and preserve the other generator

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Restoration Of Power

- Primary Restoration Goals
  - Jasper WalMart, Lowes,
  - Jasper Water and Sewage Plants
  - Jasper Hospital, Police, Fire
  - Kirbyville and JNEC Control Center
  - Kirbyville Police, Fire, etc

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Restoration Of Power

- On 1 October, 5 Days After Request, Sam Rayburn Began Bringing Units Online
- Within 30 Minutes of Go Ahead Switching Sequencing Was Initiated
- Within 1 Hour the first substation was charged, line crews then moved to the next substation
- Power Was Restored to Jasper that incrementally powered up the Water Plant and the Sewage Plants, Hospital, Police Department, WalMart and Lowes stores

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Restoration Of Power

- Power was later Restored to Kirbyville
  - JNEC Offices and Control Center
  - Other Key Sites
- Sam Rayburn Stayed Connected Until the island was further supported by TXU providing a stabilizing connection from Pineland to our switchyard on the night of October 2nd
- About 10 days later, TXU and Entergy acted to tie into our islanded system and grid was restored

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Restoration Of Power

- Keys to Success
  - Dedicated Team
  - Experienced Personnel
  - Good Communications
  - Incremental Charging Of Lines
  - Sam Rayburn Has two 25MW Units
  - Incrementally Charge Lines to Carry 2MW initially and gradually ramped up to 7MW by the end of day two

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Success Story Lessons Learned

- Interagency Teamwork is a Must
- Careful Planning and Execution Essential to Avoid Damage to System Infrastructure
- Incremental Charging of Lines a Must
- Islanded generator monitoring essential to Voltage and Frequency Stability
- Shared Skills, Experience, and Team Dedication Produce Success
- Over-riding Concern of Team Was Needs of the Community

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General Lessons Learned

- During Severe Emergencies Projects are on Their Own for first 48-72 Hours
- Adequate Emergency Generators are Needed
- Above Ground Fuel Storage Tanks Needed
- Adequate Food, Water, Fuel Supply Ahead of Time
- Satellite Phones For Communication
- Manage Employee Stress
  - Work Related
  - Family Related
- Provide For Living at the Power Plant, Group Effort on food, water and transportation

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Black Start Interest

- Power Customers are very interested now in establishing a procedure with the Corps for use of Sam Rayburn as Black Start in future emergency conditions
- Public perception is that the Corps wasn't helping
- We need to be pro-active in working with the Power Customers on emergency planning or it may not get done