U.S. DEPARTMENT OF ENERGY

Savannah River Site

Identification and Prioritization of High Risk Deteriorating Support Infrastructure

ABSTRACT

Identification and prioritization for the recapitalization of deteriorating waste processing and storage support infrastructure and information technology (IT) is essential for a safe, cost effective, and sustainable waste management program. Funding restraints have limited programs to performing only maintenance on aging infrastructure support systems whose operational costs, technological obsolescence, and reliability risks continue to grow without a disciplined and balanced recapitalization program.

Savannah River Site (SRS) comprises both Department of Energy Environmental Management and NNSA missions, and includes a lab, Savannah River National Laboratory. SRS has developed a crosscutting identification and prioritization tool and process that provides integration of all Site mission support infrastructure recapitalization requirements and prioritizes into a single database that can be readily accessed for infrastructure investment decisions.

This database, referred to as the SRS Critical Infrastructure Integrated Priority List (CIIPL) captures risk data that includes impact toward safety, regulatory compliance, mission, and cost for inclusion in its prioritization process. Further, the CIIPL provides a status of each entered project's readiness for execution that includes funding source, reliability of current cost estimate, and an out year budget profile.

The SRS CIIPL, created in 2009, was initially comprised of recapitalization projects for the Site's common infrastructure (i.e. shared roads and utilities) that supported all Site missions and activities. As mission program funding became constrained, the value for a Site wide integrated prioritization tool became more apparent and the CIIPL grew to include all Site mission and tenant activities which included safeguards and security requirements.

The SRS CIIPL has become a highly effective tool for achieving senior management situational awareness of the Site's most pressing support infrastructure and IT needs. The mission programs have used the CIIPL to prioritize and fund high risk projects within their own program budgets. This past year, the CIIPL was used as a budgeting and decision making tool to allocate funding for two common infrastructures high risk projects for the FY16 Site budget submission and has received laudatory comments from DOE headquarters review teams.

The SRS CIIPL and its process can be a benefit to other waste management organizations by demonstrating a proven approach toward the integration of support infrastructure and IT recapitalization requirements across diverse mission and tenant boundaries. The SRS CIIPL can provide senior management with an objective decision making tool that delivers a balanced evaluation of project requirements in terms of multiple risk criteria; safety, regulatory, mission, and cost impacts.

SRS ISSUES

- 35% of DOE-EM total assets
- Multiple Site Contractors/Tenants
- Restricted Funding Sources
- Degrading Infrastructure (60+ Years Old)
- Previous Run to Failure Philosophy
- Extended EM Mission time frame (2065)
- Need for long term sustainable approach
- Lack of Integrated Project Prioritization

SOLUTION

Develop a Sitewide Critical Infrastructure Integrated Priority List with appropriate **risk ranking** process to be used as a planning tool for current and future budget decisions.

CRITERIA



Savannah River Nuclear Solutions • Savannah River National Laboratory • Savannah River Remediation • Parsons

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Total Project Risk = $(C_{SI} * P_{SI} * W_{SI}) + (C_{RI} * P_{RI} * W_{RI}) + (C_{MS} * P_{MS} * W_{MS}) + (C_{CI} * P_{CI} * W_{CI})^*$

m randow Code	Full Critical Infrastructure IPL Exec. IPT Rev. 10 (\$K) Final Updated 10/30/2014				
$\frac{1}{1000} \frac{1}{1000} \frac{1}{1000$	em Funds/ # Org Braiget Name Ri	Cost (\$K) Cost (\$K) Cost (\$K) Cost (\$K) Total Est. Phase Phase Phase Cost isk Class EV1.6 EV1.7 EV1.0 Total	Costs Are Unburdened \$	Commente / Mitigation	
$\frac{1}{10} \text{New M} \qquad \frac{1}{10} \text{New M} \qquad \frac{1}{10} \frac{1}{10} $	Org Project Name It 11C Replace X-Area Degraded	ISK Class FY15 FY16 FY17 FY18 Io Go CL2 \$1,732 \$550 \$2,147 \$1,147	60+ years old. Unplanned power outage like the one experienced in X Area	X-Area meets the FY2016 Budget Development Guidance for a Minimum Safe Facility in Hot Standby. Reference: Risk Assessment # XCA-080 & XCA-106	
$ \frac{1}{2} \frac{1}{88} \frac{1}{88} \frac{1}{88} \frac{1}{88} \frac{1}{18} \frac{1}{18} $	1 NMM Electrical Substation	FY11 E&P P&C P&C P&C \$5,5	on 8/23/2011 increases risk for personnel injury in X-Area facilities and surrounding buildings, due to the loss of normal lighting, ventilation, etc.	Design & Procurement Specs completed. Procurement/Installation of new switchgear awaiting funding. Engineering Path Forward being developed to provide details for responding to various power loss scenarios.	
$ \frac{1}{3} 1$	13 Replace Degrading Site Radio	CL5 \$3,480 \$2,320 \$0 \$0 FY13 E & P & C P & C None None	Loss of primary radio communication and employing the back-up radio system would adversely impact Emergency Services Fire and Emergency Response, Site Security Operations Protective Forces and Law Enforcement, Remote worker safety and accountability, This reduced radio communication could have a short term impact and potential delays to multiple site missions operations.	Considered a Min Safe system. Design build replacement system in FY15 & procure and install key critical equipment in FY16. Core system only not field handsets and base stations. A Sitewide drill is needed.	
$\frac{1}{3} \int_{\mathbb{R}^{3}} \left(\int_{\mathbb{R}^{3}}^{2} \left \int_{\mathbb{R}^{3}}^{2} \int_{\mathbb{R}^{3}$	SS System			Closely monitor the system condition increasing frequency. Optimize PMs to minimize interruptions Run drills to determine impacts & update site re-sponse plans based upon them & prioritize resources in an upset condition.	
SNN. Old Hard Winds to did Stat. If 1 None Low None	13 Cell Block B, D&R Old Control Panel, Fab/Install New Panel, Window #7 Procure and Convert	CL4 \$0 \$1,800 \$0 \$0 EV12 N E 6 0 N E 80 \$1,800	Conversion of window structure from hot-side load to cold-side load required for replace-ment of damaged window. Critical to Shielded Cell support of Tank Closure, Further window degradation (e.g., visibility) will make cell	Expanded scope to include control panel. Design Complete - Cost Estimate Based on previous window installation	
$ \frac{4}{8} + \frac{4}{88} + \frac{4}{88} + \frac{4}{88} + \frac{4}{88} + \frac{4}{88} + \frac{1}{88} $	SRNL Oil-Free Window to Cold Side Load & Install,	FY13 None E&C None None	unusable; potential impact to mission	SRNL will continue to use the vacuum system was established to apply a small vacuum to the window assembly to reduce the oil leakage rate past the deteriorated gaskets. The vacuum system is only a temp. measure to slow the leaking oil	
NR Life Control Control <t< td=""><td>4 Upgrade 50 Yrs Old Infrastructure Steam Piping (DTF-East Hill)</td><td colspan="2">14C Upgrade 50 Yrs Old Infrastructure CL3 \$2,100 \$1,500 \$0 \$0 Risk of Steam Piping failure is real. Steam Piping (DTE-East Hill) EX11 Ex1 \$2,00 \$1,500 \$0 \$3,600</td><td>5 mo design, 3 mo procurement, 4 mo construction</td></t<>	4 Upgrade 50 Yrs Old Infrastructure Steam Piping (DTF-East Hill)	14C Upgrade 50 Yrs Old Infrastructure CL3 \$2,100 \$1,500 \$0 \$0 Risk of Steam Piping failure is real. Steam Piping (DTE-East Hill) EX11 Ex1 \$2,00 \$1,500 \$0 \$3,600		5 mo design, 3 mo procurement, 4 mo construction	
5 UB Replace AD paraged & Degended Image and the second parage of the second par	SRR		Piece-wise repairs (via temporary modifications) are being converted to permanent modifications to mitigate impacts to processes.		
$\frac{1}{12} \int_{1}^{1} \int_{1}$	5 UBS Replace Damaged & Degraded Inter-Area Fiber Infrastructure	UBS Replace Damaged & Degraded Inter-Area Fiber Infrastructure CL4 \$1,000 \$1,000 \$2,500 \$0 EV14 F & P. F & P. F & P. F & P. C F & P. & C Ware \$4,500 which will adversely impact safe facility operations, and the office and data		Inventory of fiber cabling is required onsite to insure timely repair to damaged or degraded fiber that results in voice and data networks outages.	
13 Replace 737-4 (SRE1.) Facility Implify 5000 500 500 500 500 500 500 500 500 5			business system processes.	Migrate more critical data and voice data to other systems.	
Image: Final control Provide the second of the second	6 13 Replace 737-A (SREL) Facility Degraded Roof	Replace 737-A (SREL) Facility Degraded Roof BPH P&C E&P None None \$1,600 Ongoing operations could be impacted by inflow of water attributed to roof effected		FY16. 4 Months Procurement, 4 Months Construction.	
ILS Replace Obsolete Fire Alarm IPII STOD			"funnel". Relocate affected employees as needed.		
13 Replace Three Degraded Roofs Sile Structs Roofs (705-C, 703-40A, Structs Ro	7 LLS Replace Obsolete Fire Alarm Panels	LLS Replace Obsolete Fire Alarm SS BPH \$700 \$700 \$0 SS BPH \$2,100 The Site Fire Alarm System could experience increasing number of supervisory, trouble, and alarm signals upon failure. Eventually could lead a Life Safety Code Violation if significant impairments exist in multiple facilities.		facilities. Closely monitor the system condition. Optimize PM Program to minimize service	
8 13 Services costs (765-C, 703-46A, Site Services costs (765-C, 703-46A, Site Services costs (765-C, 703-46A, Site Site) 0 51,800 50 51,800 50 51,800 0				Roofing SME Cost, subcontract completing the roof membrane & insulation in	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	8 Replace Three Degraded Roofs Site Services Roofs (705-C, 703-46A, 151-2L)	13 Replace Three Degraded Roofs Site 0 \$1,800 \$		FY16. Expect 4 months Procurement, 4 months Construction. Closely monitor roof leaks via rounds. Provide temporary relief via ceiling leak	
9 Space Space System with Clean Agent Fire Suppression System BPH 30 3830 State	RTBF Replace 730-X Halon Fire	RTBF Replace 730-X Halon Fire		Delayed due to budget issues. Procurement Specification completed	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	9 NNSA-TP Replace 730-X Halon Fire Suppression System with Clean Agent Fire Suppression System W BPH None None None None S850		Life safety and specialized equipment risks associated with specialized support for Work for Others program activities.	SRNL will continue activities to protect the area and install equipment through fire watches, control of combustible materials and restriction on hot work.	
Estimate Class Phases Risk Level CL1 Class 1 E Engineering Figh CL2 Class 2 P Procurement Figh CL3 Class 3 C Construction Figh CL4 Class 4 E&P Eng. & Procurement Moderate L04 Class 5 P & Procurement Figh Moderate Low Time 1:05 PM	\$K \$9,812 \$10,470 \$6,197 \$1,147 \$27,626 Total Cost To Go Including Outyears				
CL1 <class 1<="" th=""> E Engineering High CL2 Class 2 P Procurement High CL3 Class 3 C Construction Moderate CL4 Class 4 E&P Eng. & Procurement & Const. Image CL5 Class 5 P&C Procurement & Const. Image BH Budget Place Holder E&P&C Eng. & Procurement & Const. Image Date 2/10/2015 Time 1:05 PM</class>	Estimate Class Phase	es Risk Level	Estimate Class Class 1 Class 2	Class 3 Class 4 Class 5	
CL4 Class 4 Ext Eng. & Hocurement CL5 Class 5 BPH Budget Place Holder ExP&C Eng.& Procurement & Const. Date 2/10/2015 Time 1:05 PM	CL1 Class 1E EngineeringCL2 Class 2P ProcurementCL3 Class 3C ConstructionCL4 Class 4E & Procure	High Moderate	Expected Accuracy Range L: -3% to -10% L: -5% to -15% H: +3% to +15% H: +5% to +20%	L: -10% to -20% L: -15% to -30% L: -20% to -50% H: +10% to +30% H: +20% to +50% H: +30% to +100%	
	CL5 Class 5 P&C Procurement & Const. Low BPH Budget Place Holder E&P&C Eng.& Procurement & Const. Date 2/10/2015 Time 1:05 PM				
enant organizations submit top					
ded projects					

PRO

- SRS unfu
- Each project pre-rated per established Criteria
- Working Team evaluate and approve ratings
- Projects integrated and ranked per overall risk score
- Executive IPT meet and approve CIIPL
- CIIPL updated quarterly or as needed for mission changes, emergent needs, or process changes
- CIIPL used in Budget Formulation development



(CIIPL Mgmt Guidelines

DATABASE

The Critical Infrastructure Integrated Priority List (CIIPL) Database is the single collection point for project listings and information as provided by the CIIPL Team members. Access control is governed by the Guideline for Management of the CIPL. The database is updated by Team members quarterly, or as needed. Once the updated CIIPL Database receives Executive Board approval, it is frozen, and the next revision cycle is started.

The CIIPL Database contains:

- CIIPL Tracking number (assigned by CIIPL Database) administrator)
- Descriptive Project Name
- Scope Description
- Project Number or other organizational tracking number
- Projected Project Cost per year
- Comment/Mitigation
- Identify Estimate Class **
- FY Project Cost developed
- Identify Project Phase
- Responsible Site Organization
- Site area that scope will be implemented
- Responsible DOE Assistant Manager
- Infrastructure Category (e.g., Common Infrastructure, Facility Specific Infrastructure, Production Process Infrastructure, IT Infrastructure")
- Required funding/PBS source (e.g., PBS 12)
- Planned/Estimated Start Date
- Estimated Duration of project in months
- Project Score

*C=Consequence, P=Probability, W=Weight, SI=Safety Impact, RI=Regulatory Impact, MS=Mission Support, CI=Cost Impact **Estimate Classes developed by the Association for Advancement of Engineering. All estimates are unburdened.

WIN Symposia 2015

CONCLUSIONS

✓ DOE Leadership can no longer assume Site maintenance funding, previously considered a program operations cost or Site overhead expense, will provide the safe and robust infrastructure necessary to achieve the EM mission.

EM Leadership is considering a more centralized approach toward allocating infrastructure recapitalization funding across the EM Complex to maintain facility mission capabilities and readiness.

Coupling risk prioritization and project affordability into an integrated project database has equipped SRS leadership with a necessary tool to make increasingly hard and complex funding decisions necessary to sustain Site infrastructure and facilities which will ensure mission capability and readiness well beyond 2030.

SRS decision makers have a three dimensional cost information tool that allows a measure of the projects' definition (measure of executability or "shovel ready"), a project cost accuracy range of 6 classes and up to a 4 year project budget profile against a proposed execution schedule.

 \checkmark SRS Leadership has recognized the CIIPL as a valuable budget formulation tool. Last Spring each SRS program was directed to separate recapitalization projects contained on the CIIPL and consider these separately from projected operations costs when formulating the FY16 budget request.

The CIIPL recently impacted the following:

- SRS highest priority project listing
- Ten Year Site Plan development
- Outyear budget formulation
- The April 2014 EM-Wide Extent of Condition Review on Deferred Maintenance
- The Federal Risk Management Plan and in Contract Performance Baseline Risk Register
- The June 2014 Defense Nuclear Facility Safety Board site review

