

# **CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION**

<b>Budget Authority (in \$ millions)</b>	<b>Actual</b>	<b>Estimate</b>	<b>FY 2013</b>	<b>FY 2014</b>	<b>Notional</b>		
	<b>FY 2011</b>	<b>FY 2012</b>			<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<b>FY 2013 President's Budget Request</b>	<b>432.9</b>	<b>486.0</b>	<b>619.2</b>	<b>450.4</b>	<b>450.4</b>	<b>450.4</b>	<b>450.4</b>
Construction of Facilities	373.3	441.2	<b>552.8</b>	359.5	362.9	360.0	360.0
Environmental Compliance and Restoration	59.6	44.8	<b>66.4</b>	90.9	87.5	90.4	90.4

## **CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE ..... CECR- 2 AND RESTORATION OVERVIEW**

### CONSTRUCTION OF FACILITIES

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# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION (CECR)

## FY 2013 BUDGET

Budget Authority (in \$ millions)	Actual	Estimate	FY 2013	Notional			
	FY 2011	FY 2012		FY 2014	FY 2015	FY 2016	FY 2017
<b>FY 2013 President's Budget Request</b>	<b>432.9</b>	<b>486.0</b>	<b>619.2</b>	<b>450.4</b>	<b>450.4</b>	<b>450.4</b>	<b>450.4</b>
Construction of Facilities	373.3	441.2	<b>552.8</b>	359.5	362.9	360.0	360.0
Environmental Compliance and Restoration	59.6	44.8	<b>66.4</b>	90.9	87.5	90.4	90.4
<b>Budget Change Explanation - CoF</b>							
Change From FY 2012 Estimate	--	--	<b>111.6</b>				
Percent Change From FY 2012 Estimate	--	--	<b>25.3%</b>				
<b>Budget Change Explanation - ECR</b>							
Change From FY 2012 Estimate	--	--	<b>21.6</b>				
Percent Change From FY 2012 Estimate	--	--	<b>48.2%</b>				



This 67-year old boiler was salvaged from a WWII ship and has been an experiment workhorse and national research asset for reentry vehicle thermal protection systems. The ArcJet Steam Vacuum Boiler at ARC, CA, generates superheated steam to create the vacuum in the arc jet. The condition of the boiler has reached the point where there is a high probability of failure during testing. The boiler does not meet current California emission standards, which limits the facility's available test time. The FY 2013 budget includes a project to replace this boiler with three high efficiency boilers.

CECR provides for design and execution of programmatic and non-programmatic discrete and minor revitalization construction of facilities projects, facility demolition projects, and environmental compliance and restoration activities.

### EXPLANATION OF MAJOR CHANGES FOR FY 2013

In FY 2013, funding for all Construction of Facilities (CoF) projects, including programmatic requirements, will be requested through the CECR account. For programmatic CoF requirements, projects in formulation have identified a cost estimate for the FY 2013 request. Funds associated with out-year estimates for programmatic construction will remain in programmatic accounts. Consistent with the FY 2013 changes, NASA has identified all Exploration and Space Operations programmatic construction requirements.

# **CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION (CECR)**

## **ACHIEVEMENTS IN FY 2011**

In FY 2011, NASA began construction of three high performance repair by replacement facilities including the Facilities Support Center at DFRC, the Integrated Services Building at LaRC, and a replacement Engineering Office Building 4220 at MSFC.

NASA began refurbishment of a key science facility, Building 26 at GSFC, and completed construction of NASA's first net zero energy building, Propellants North at KSC.

NASA also completed all field work related to decontamination and decommissioning of the Plum Brook Reactor Facility in Sandusky, OH.

## **KEY ACHIEVEMENTS PLANNED FOR FY 2013**

In FY 2013, NASA will continue essential infrastructure repair and revitalization activities as well as repair by replacement of facilities. Repair by replacement projects are those that provide sustainable and energy efficient infrastructure by replacing old, inefficient, deteriorated buildings with new, efficient, high-performance buildings.

NASA will continue to reduce infrastructure by disposing of unneeded facilities, and to demolish unneeded Shuttle infrastructure such as the mate/demate device at DFRC and infrastructure at White Sands Space Harbor. NASA will also demolish several facilities that it no longer uses at Plum Brook Station, Sandusky, OH.

NASA will pursue its strategy to recapitalize essential infrastructure through projects that include the replacement of essential electrical and mechanical systems at NASA's Space Power Facility at Plum Brook Station (in Sandusky, OH), which is NASA's largest space environmental test facility. NASA will also replace the Arc Jet Facility steam vacuum boiler system at ARC. The budget also completes interim soil cleanups and publication of an environmental impact statement for final soils cleanup at Santa Susana Field Laboratory in Los Angeles, CA.

## **Themes**

### **CONSTRUCTION OF FACILITIES**

The CoF program will make capital repairs to NASA's critical infrastructure to improve safety and security, protect NASA's infrastructure, and improve NASA's operating efficiency by reducing utility usage. The program will continue to "right size" the infrastructure by demolishing infrastructure that NASA no longer needs. Projects with initial cost estimates between \$1 and \$10 million are included in the program as minor revitalization and construction projects, and projects with initial cost estimates of \$10 million or greater are budgeted as discrete projects. Projects with initial cost estimates of \$1 million

## **CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION (CECR)**

or less are accomplished by routine day-to-day facility maintenance and repair activities provided for in program and Center operating budgets, which are funded within the Cross Agency Support account.

NASA will continue to invest in projects that protect the Agency's critical assets, improve mission assurance, reduce mission risk, and maintain mission essential capabilities. Investment in projects, such as replacing the steam vacuum boilers at the ARC Arc Jet Facility, supports an essential function for a national aerospace test asset. Utility system repairs and replacements will improve reliability throughout NASA's infrastructure and reduce the risk of utility-caused mission failures. Refurbishment of an engineering building at JSC and the start of construction of a high-efficiency administrative building at KSC will continue to support NASA's long term strategy of reducing operating costs, modernizing and consolidating key functions, and developing sustainable and energy efficient infrastructure by replacing old, inefficient, deteriorated buildings with new efficient high performance buildings.

### **BUDGET EXPLANATION**

The FY 2013 request is \$552.8 million. This represents a \$111.6 million increase from the FY 2012 estimate (\$441.2 million). The change reflects facility requirements identified to support 21st Century Launch Complex, Orion MPCV, and SLS. The FY 2013 request includes:

- \$384.0 million for Institutional CoF, which supports NASA's long term strategy of reducing operating costs, modernizing and consolidating key functions and developing sustainable and energy efficient infrastructure by replacing old, inefficient, deteriorated buildings with new efficient high performance buildings.
- \$143.7 million for Exploration CoF, which supports Exploration programs such as SLS and Orion MPCV.
- \$21.9 million for Space Operations CoF, which supports Space Operations programs including 21st Century Launch Complex, Space Communications and Networks (SCaN), and Launch Support Program (LSP).
- \$3.2 million for Science CoF, which will improve the efficiency of JPL's data management and meet the Administration direction to consolidate data centers.

### **KEY ACHIEVEMENT IN FY 2011**

Completion of the Facilities Support Center at DFRC eliminates a serious flight line safety issue by relocating a non-flightline function and personnel away from the flightline. The completed consolidated engineering building at MSFC consolidates the engineering workforce, that was previously dispersed throughout the Center. NASA also completed construction of the Consolidated Information Technology Center at DFRC and NASA's first net zero energy building, Propellants North, at KSC.

# **CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION (CECR)**

## **ENVIRONMENTAL COMPLIANCE AND RESTORATION**

NASA's ECR program cleans up pollutants released to the environment during past activities. NASA prioritizes cleanups, ensuring that the highest priority liabilities are those that protect human health and the environment, and preserve natural resources for future missions.

## **BUDGET EXPLANATION**

The FY 2013 request is \$66.4 million. This represents a \$21.6 million increase from the FY 2012 estimate (\$44.8 million). The largest projects in the FY 2013 request include:

- \$15.5 million for implementing investigation and cleanup of contaminated groundwater and soils at Santa Susana Field Laboratory in accordance with a new Consent Order with the State of California.
- \$13.9 million for continuing cleanup of ground water contamination and investigation of soil contamination at White Sands Test Facility, NM, to comply with the facility permit issued by the state.
- \$7.4 million for continuing investigation and cleanup of ground water and soil contamination at KSC.
- \$6.7 million for operating and maintaining systems to address contaminated groundwater emanating from JPL.

## **KEY ACHIEVEMENT IN FY 2011**

In FY 2011, NASA completed all field work related to decontamination and decommissioning of the Plum Brook Reactor Facility in Sandusky, OH. Completion of field work ends a decade-long effort and allows NASA to turn in its "Possess but do not Operate" license in accordance with Nuclear Regulatory Commission guidelines.

# **CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION (CECR)**

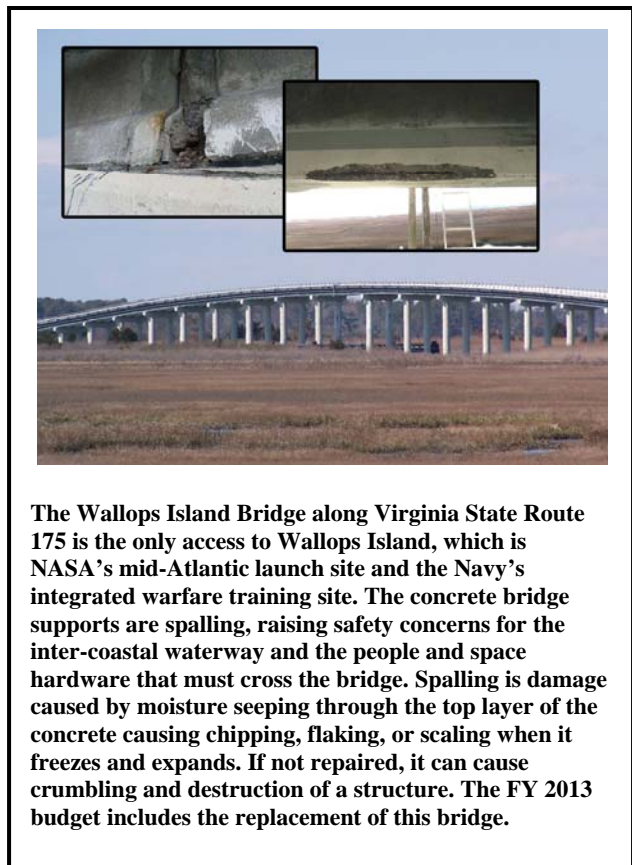
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# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

## INSTITUTIONAL CONSTRUCTION OF FACILITIES

### FY 2013 BUDGET

Budget Authority (in \$ millions)	Actual	Estimate	FY 2013	Notional			
	FY 2011	FY 2012		FY 2014	FY 2015	FY 2016	FY 2017
<b>FY 2013 President's Budget Request</b>	<b>265.1</b>	<b>310.6</b>	<b>384.0</b>	<b>359.5</b>	<b>362.9</b>	<b>360.0</b>	<b>360.0</b>
Change From FY 2012 Estimate		--	73.4				
Percent Change From FY 2012 Estimate	--	--	23.6%				



The Institutional CoF program will make capital repairs to NASA's critical infrastructure to improve safety and security, protect NASA's infrastructure, and improve NASA's operating efficiency by reducing utility usage. The program will continue to "right-size" the infrastructure by demolishing infrastructure that is no longer needed. Projects with initial cost estimates between \$1 and \$10 million are included in the program as minor revitalization and construction projects, and projects with initial cost estimates of \$10 million or greater are budgeted as discrete projects. Projects with initial cost estimates of \$1 million or less are accomplished by routine day-to-day facility maintenance and repair activities provided for in program and Center operating budgets.

NASA will invest in projects that protect the Agency's critical assets, improve mission assurance, reduce mission risk, and maintain mission essential capabilities. NASA will also revitalize critical national assets such as replacing the stem vacuum boilers at the ARC Arc Jet Complex. This is NASA's first investment in its strategy to consolidate arc jet capability at ARC

and modernize the capability to meet future research requirements. Utility system repairs and replacements will improve reliability throughout NASA's infrastructure and reduce the risk of utility-caused mission failures. Refurbishment of an engineering building at JSC and the start of construction of a high efficiency administrative building at KSC will continue to support NASA's long term strategy of reducing operating costs, modernizing and consolidating key functions and developing sustainable and energy efficient infrastructure by replacing old, inefficient, deteriorated buildings with new efficient high performance buildings.

NASA will continue to reduce infrastructure by disposing of unneeded facilities and demolish unneeded Shuttle infrastructure such as the mate/demate device at Dryden Facilities Support Center and infrastructure at White Sands Space Harbor. The demolition of the bridge at GRC has been deferred.

## CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

# **INSTITUTIONAL CONSTRUCTION OF FACILITIES**

North Campus has already been declared excess and NASA is working with General Service Administration for the disposal. The total acreage is 9.8 acres. NASA will also recapitalize essential infrastructure through projects that include the replacement of essential electrical and mechanical systems at NASA's Space Power Facility, NASA's largest space environmental test facility, and the replacement of NASA's Arc Jet Facility steam vacuum boiler system.

### **EXPLANATION OF PROGRAM CHANGES**

No significant program changes.

### **BUDGET EXPLANATION**

The FY 2013 request is \$384.0 million. This represents a \$73.4 million increase from the FY 2012 estimate (\$310.6 million). The FY 2013 request includes:

- Three repair by replacement projects, which support NASA's long term strategy of reducing operating costs, modernizing and consolidating key functions and developing sustainable and energy efficient infrastructure by replacing old, inefficient, deteriorated buildings with new efficient high performance buildings.
- Seventeen projects that restore, replace, and upgrade horizontal infrastructure at NASA Centers. This improves reliability throughout NASA's infrastructure and reduces the risk of utility-caused mission failures.



# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

## SCIENCE CONSTRUCTION OF FACILITIES

Budget Authority (in \$ millions)	Actual		Estimate	Notional			
	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
<b>FY 2013 President's Budget Request</b>	<b>52.5</b>	<b>11.5</b>	<b>3.2</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Change From FY 2012 Estimate	--	--	-8.3				
Percent Change From FY 2012 Estimate	--	--	-72.2%				



JPL is the key Center for managing deep space science research data, which includes data collection, processing, and distribution for researcher use. JPL's current data center is housed in a temporary modular building. Inadequate temperature and humidity control, as well as leaks, pose a risk to the data center servers, potentially causing loss of access to critical research data. The FY 2013 budget includes a project to replace this data center, consolidating it with servers across JPL and from off site locations into the new data center.

The Science CoF program includes construction funding required to support Science programs and projects. This request provides funds to replace the data center at JPL that will reduce the risk to science data, improve the efficiency of JPL's data management and meet the presidential directive to consolidate data centers.

### EXPLANATION OF MAJOR CHANGES FOR FY 2013

For programmatic CoF, projects in formulation have identified a cost estimate for the FY 2013 request. Funds associated with out-year estimates for programmatic construction remain in programmatic accounts. FY 2013 Science CoF budget request includes funding to replace the data center at JPL.

### BUDGET EXPLANATION

The FY 2013 request is \$3.2 million. This represents an \$8.3 million decrease from the FY 2012 estimate (\$11.5 million).

# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

## EXPLORATION CONSTRUCTION OF FACILITIES

### FY 2013 BUDGET

Budget Authority (in \$ millions)	Actual	Estimate	FY 2013	Notional			
	FY 2011	FY 2012		FY 2014	FY 2015	FY 2016	FY 2017
<b>FY 2013 President's Budget Request</b>	15.1	52.5	143.7	0.0	0.0	0.0	0.0
Change From FY 2012 Estimate	--	--	91.2				
Percent Change From FY 2012 Estimate	--	--	173.7%				



Exploration CoF provides construction funding required to support Exploration programs and projects.

### EXPLANATION OF MAJOR CHANGES FOR FY 2013

For programmatic CoF, projects in formulation have identified a cost estimate for the FY 2013 request. Funds associated with out-year estimates for programmatic construction remain in programmatic accounts. FY 2013 Exploration CoF includes funding for SLS and Orion MPCV construction requirements necessary to implement NASA's new direction, consistent with the NASA Authorization Act of 2010.

### BUDGET EXPLANATION

The FY 2013 request is \$143.7 million. This represents a \$91.2 million increase from the FY 2012 estimate (\$52.5 million). The FY 2013 request provides for CoF requirements in support of Exploration programs including SLS and MPCV.

NASA will begin modifying Launch Complex 39 at KSC to support the new SLS. NASA will begin with major repairs, code upgrades and safety improvements to the Launch Control Center, Vehicle Assembly Building (VAB) and the VAB Utility Annex. This initial work will be required to support any launch vehicle operated from Launch Complex 39 and will allow NASA to begin modernizing the facilities while vehicle specific requirements are being developed.

NASA will also begin work at the Michoud Assembly Facility, in New Orleans, LA, to prepare the facility for manufacturing tooling for the manufacture of SLS and MPCV systems.

# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

## SPACE OPERATIONS CONSTRUCTION OF FACILITIES

### FY 2013 BUDGET

Budget Authority (in \$ millions)	Actual	Estimate	FY 2013	Notional			
	FY 2011	FY 2012		FY 2014	FY 2015	FY 2016	FY 2017
<b>FY 2013 President's Budget Request</b>	<b>40.6</b>	<b>66.7</b>	<b>21.9</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Change From FY 2012 Estimate	--	--	-44.8				
Percent Change From FY 2012 Estimate	--	--	-67.2%				



Over the next 10-15 years the planets align in such a way that the Southern Hemisphere will have the best overall view of the existing spacecraft spread out across the Solar System. A 34-meter beam waveguide antenna, like the one pictured, is proposed for Canberra, Australia. The Canberra complex already supports over three-dozen individual robotic spacecraft, and the additional antenna will support these missions, plus the planned and expected growth in deep space missions over the next decade.

Space Operations CoF provides construction funding required to support Space Operations programs and projects, including 21st Century Launch Complex, SCan, and LSP.

### EXPLANATION OF MAJOR CHANGES FOR FY 2013

For programmatic CoF, projects in formulation have identified a cost estimate for the FY 2013 request. Funds associated with out-year estimates for programmatic construction remain in programmatic accounts. Space Operations CoF includes funding for 21st Century Launch Complex construction requirements necessary to implement NASA's new direction, consistent with the NASA Authorization Act of 2010.

### BUDGET EXPLANATION

The FY 2013 request is \$21.9 million. This represents a \$44.8 million decrease from the FY 2012 estimate (\$66.7 million).

The FY 2013 request provides for CoF requirements in support of 21<sup>st</sup> Century Launch Complex, SCan, and LSP.

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES

**SUMMARY OF FY 2013 CONSTRUCTION**

**SUMMARY OF CONSTRUCTION PROJECTS**

<b>In Millions of Dollars</b>	<b>Actual FY 2011</b>	<b>Estimate FY 2012</b>	<b>Request FY 2013</b>
Restore Building 26 (GSFC)	14.0	---	---
Modify Thermal Vacuum Chamber A (JSC)	38.5	11.5	---
Minor Revitalization of Facilities at Various Locations	---	---	3.2
<b>Science CoF</b>	<b>52.5</b>	<b>11.5</b>	<b>3.2</b>
Repair and Modify Launch Complex 39B for SLS, (KSC)	---	6.1	28.5
Repairs and Modifications to VAB, LCC and Utility Annex, (KSC)	---	---	15.7
Modifications to Vehicle Assembly Building (KSC)	---	2.4	---
Modifications to Test Stand 4572 for SLS Structural Testing of LH2 Tank (MSFC)	---	---	24.5
Modifications for SLS Component Fabrication, Bldg, 103, MAF (MSFC)	---	---	11.5
Modifications for SLS Manufacturing, Bldg, 110, MAF (MSFC)	---	---	12.0
Modifications for SLS Manufacturing, Bldg, 420, MAF (MSFC)	---	---	27.5
Modifications to Hazardous Processing Facilities, (KSC)	---	3.0	---
Revitalize High Pressure Industrial Water System (SSC)	---	6.0	---
Modifications to Accommodate SLS Core Stages, MAF (MSFC)	---	5.5	---
Modify Space Power Facility, Plum Brook Station (GRC)	1.2	---	---
Construct A-3 Propulsion Test Facility (SSC)	13.5	---	---
Minor Revitalization of Facilities at Various Locations	---	29.5	24.0
Facilities Planning and Design (Various Locations)	0.4	---	---
<b>Exploration CoF</b>	<b>15.1</b>	<b>52.5</b>	<b>143.7</b>
Construct 34-Meter Beam Waveguide Antennas, Canberra, Australia (JPL)	7.3	14.5	10.9
Modifications to Launch Complex 39 Pad B (KSC)	14.7	---	---
Modifications to Hazardous Processing Facilities (KSC)	---	13.0	---
Modifications to Vehicle Assembly Building (KSC)	---	10.9	---
Revitalize High Pressure Industrial Water System (SSC)	---	10.0	---
Upgrades to Wallops Range Assets (GSFC)	0.9	---	---
Minor Revitalization of Facilities at Various Locations	14.7	18.3	11.0
Facility Planning and Design (Various Locations)	3.0	---	---
<b>Space Operations CoF</b>	<b>40.6</b>	<b>66.7</b>	<b>21.9</b>
Replace Steam Vacuum System Boiler, Arc Jet Complex (ARC)	---	---	31.2
Replace Support Systems in Space Power Facility Test Building No. 1411, Phase 2 (GRC)	---	---	22.0
Repair Domestic Water System Main Piping, Phase 1 (GRC)	---	---	11.0
Upgrade Logistics Facility (GSFC)	---	---	10.2
Refurbish North Wing, Project Engineering Building 45 (JSC)	---	---	10.0

**CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES**

**SUMMARY OF FY 2013 CONSTRUCTION**

Repair Chilled Water System, Emergency Power Plant (48) (JSC)	---	---	11.9
Construct Replacement Shared Services and Office Building, Phase 1 (KSC)	---	---	45.0
Revitalize High Pressure Industrial Water System (SSC)	---	---	24.0
Construct Flight Project Center (GSFC)	---	36.9	---
Launch Facilities Protection, WFF (GSFC)	18.9	17.0	---
Construct West Arroyo Parking Structure (JPL)	---	18.0	---
Revitalize Water and Waste Water Systems, Various Locations (KSC)	---	27.6	---
Construct Integrated Services Building (LaRC)	20.4	30.0	---
Renovate East Test Area Industrial Water Distribution System (MSFC)	---	15.0	---
Replace Potable Water System (SSC)	---	10.0	---
Construct Replacement Facilities Support Center (DFRC)	12.5	---	---
Construct Replacement Engineering Office Building 4220 (MSFC)	40.0	---	---
Minor Revitalization of Facilities at Various Locations	136.0	95.6	164.9
Demolition of Facilities	15.5	22.9	20.0
Facility Planning and Design	21.8	37.6	33.8
<b>Institutional CoF</b>	<b>265.1</b>	<b>310.6</b>	<b>384.0</b>

**DISCRETE PROJECTS**

**Exploration CoF**

**Project Title: Repair and Modify LC-39B Complex for SLS**

**Location: KSC, FL**

**FY 2013 Construction Estimate: \$28.5 million**

Scope/Description

This project repairs and modifies selected facility systems at Launch Complex (LC) 39B to SLS processing and launch operations. This is the second phase of a five-phase project currently budgeted at \$89.2 million (\$6.1 million in FY 2012, \$28.5 million in FY 2013, \$9.4 million in FY 2014 and \$45.2 million in the outyears).

This phase consists primarily of modifications to the ground cooling system; repairs and modifications to the potable water and fire-suppression piping systems; modifications to the ignition overpressure and sound suppression system; modifications on the launch pad side of the mobile launcher/launch pad interfaces; upgrade of the pneumatics system; installation of a liquid oxygen vaporizer; and miscellaneous demolition activities. This phase of work will be a complete and usable segment of the overall five-year plan.

As SLS technical requirements mature, NASA may need to add, delete, or substitute, individual work elements within the project. NASA will update the scope/description of the project in the President's Budget Request for each subsequent year, if any such adjustments are made.

# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION: CONSTRUCTION OF FACILITIES

## SUMMARY OF FY 2013 CONSTRUCTION

### Basis of Need

The family of facilities and facility systems collectively referred to as LC-39B includes a launch pad; supporting horizontal infrastructure such as potable and fire suppression water piping; liquid hydrogen and liquid oxygen storage facilities; a fire water storage tank; low voltage electrical power substations; security fencing and guard gates; two operations support buildings; and a variety of smaller facility elements mostly found within the confines of the perimeter fence surrounding the pad, or within walking distance of it.

LC-39B is over 40 years old and is still primarily configured for Shuttle launch operations. Many of the facility systems within the 39B launch complex are in varying states of disrepair and need to be refreshed and sometimes reconfigured to support the new SLS program. Specific to this phase, the project restores the functionality and reliability of the deteriorated facility systems and infrastructure identified in the preceding scope/description, and corrects their inadequate configuration for use in support of SLS.

The repairs and modifications provided for by this project must be completed in time to support future SLS launches because there are no other launch facilities that have the size or capabilities necessary to otherwise support SLS launch operations. Failure to implement this project will seriously impact NASA's ability to transition and sustain the use of this launch complex to support SLS.

Other Related Costs	Amount (\$M)
Studies/Design	3.1
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	02/2012	Dec-12
Construction	03/2013	Jun-15
Activation	07/2015	Sep-15

**Project Title: Repairs and Modifications to VAB, Launch Control Center (LCC), and Utility Annex (UA)**

**Location: KSC, FL**

**FY 2013 Construction Estimate: \$15.7 million**

### Scope/Description

This project repairs and modifies selected facility systems in the VAB, LCC, and VAB UA to enable SLS processing and launch operations. This is the second phase of a five-phase project currently budgeted at \$137.5million (\$13.3 million in FY 2012, \$15.7 million in FY 2013, \$68.9 million in FY 2014 and \$39.6 million in the outyears).

This phase consists primarily of repairs and modifications to the fire suppression water supply distribution system supporting the VAB and LCC. Work includes replacement of fire-water pumps housed in the UA and booster pumps in the upper levels of the VAB that pressurize the fire-water supply system for the VAB; repair and reconfiguration of the current interconnects from the UA to the VAB and LCC to decouple the LCC from the VAB high pressure, high volume fire water system; addition of new fire-water pumps dedicated to the LCC to pressurize the existing fire-water system for the LCC; repair, replacement, and reconfiguration, as required, of the fire-water risers from ground level to the roof level in the VAB to valves that serve as redistribution points to the individual high bays and common areas of the VAB. This phase of the project also provides, although to a lesser extent, for safety and security

**CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES**

**SUMMARY OF FY 2013 CONSTRUCTION**

upgrades to other facility systems throughout the VAB/LCC/UA complex. This phase of work will be a complete and usable segment of the overall five-year plan.

As SLS technical requirements mature, NASA may need to add, delete, or substitute, individual work elements within the project. NASA will update the scope/description of the project in the President’s Budget Request for each subsequent year, if any such adjustments are made.

Basis of Need

The VAB is a 50-story building with multi-level access platforms and associated support infrastructure. It is uniquely designed to receive, assemble, integrate, process, and service very large and complex launch vehicles. No other facility in the U.S. has this basic capability. Facility systems such as overhead cranes, power, water, compressed gases, communications, and fire suppression, are located inside the building. The UA supplies the VAB and the LCC with hot water, chilled water, compressed air, and fire suppression water. Launch operations are controlled within the LCC, which is physically attached to the VAB and thus shares common infrastructure.

The VAB must be reconfigured from the current Shuttle-support configuration to a configuration that can reliably support the SLS. This includes the supporting utility systems as well as the facility itself. Most of the utility services for the VAB originate within the UA and are common to both the VAB and the LCC. Many of the facility systems within the VAB/LCC/UA complex are in varying states of disrepair and need to be refreshed, and sometimes reconfigured, to support the new program. Specific to this phase, the fire suppression system in the VAB is about 50 years old and the piping has experienced significant internal corrosion, affecting the flow-capacity and causing leaks that cumulatively amount to about 5,000 gallons per week. The system is no longer serviceable in its current state and will be restored to meet National Fire Protection Association life-safety code standards. In its current configuration, the fire suppression pumping system in the UA feeds the VAB and the LCC. This may cause the LCC system to experience overpressure situations that can lead to major water damage to the LCC. The damages from one such incident in 2010 required repair costs in excess of \$1 million.

The repairs and modifications provided for by this project must be completed in time to support future SLS launches because there are no other facilities that have the size or capabilities necessary to otherwise support SLS vehicle assembly operations.

Other Related Costs	Amount (\$M)
Studies/Design	0.9
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	Aug-11	Sep-12
Construction	Jan-13	Jan-14
Activation	Jan-15	Mar-15

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES

**SUMMARY OF FY 2013 CONSTRUCTION**

**Project Title: Modifications to Test Stand 4572 for SLS Structural Testing of Liquid Hydrogen Tank**

**Location: MSFC, Huntsville, AL**

**FY 2013 Construction Estimate: \$24.5 million**

Scope/Description

This project includes facility modifications of the existing test stand 4572 to accommodate development and qualification of SLS Stages components at the MSFC. The components to be developed and qualified are based on the near term convergence of the SLS Stages Element Point of Departure design and the prime contractors design solution. There are multiple trade studies in process that will determine the final component configuration and requirements that will be verified through testing at this location. This project will be funded in two phases (FY 2012 to FY2013). The first phase (FY 2012, \$5.5 million) includes demolition of existing steel external to the concrete tower. The external steel is unsuitable with respect to physical condition and form to support the component tests. Stabilization of the existing concrete foundation will be developed in the first phase as well. This second phase (FY 2013, \$24.5 million) will include the fabrication and installation of new concrete foundation to support the special test equipment, work platforms, failure recovery system and pneumatic systems. This project is not functional until both phases have been constructed.

Basis of Need

Provides qualification data required to validate the SLS Stages Element. Directly mitigates technical and schedule risk of the SLS program.

Other Related Costs	Amount (\$M)
Studies/Design	2.2
Related Equipment	9.5
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	FY 2012	FY2012
Construction	Jan-13	Jan-14
Activation		Jul-14

**Project Title: Modifications for SLS Component Fabrication, Building. 103**

**Location: Michoud Assembly Facility (MAF), New Orleans, LA**

**FY 2013 Construction Estimate: \$11.5 million**

Scope/Description

This project includes facility modifications to Building 103 at MAF to accommodate multiple SLS core stage manufacturing steps. The primary manufacturing processes include slosh baffle assembly, structural mechanical assembly for forward skirt/instrument unit assembly, avionics installation for forward skirt, intertank assembly, core thrust structure for mechanical assembly and main propulsion system/avionics installation, miscellaneous thermal protection system application, and wire harness installation. The modifications for each area will be specific/ unique to that process but in general will include modifications or new foundations, floor trenches, electrical service, compressed air, missile grade air, process water, chilled water, lighting, grounding and other miscellaneous modifications necessary to meet individual processing requirements.



**CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES**

**SUMMARY OF FY 2013 CONSTRUCTION**

Basis of Need

These facility modifications are necessary to accommodate SLS core stage production operations in Building 103. The work includes the necessary facility modifications required to accommodate the installation of new as well as the modification to existing tooling in Building 103 in support of the SLS production process. The liquid hydrogen and liquid oxygen tanks for SLS differ in length and configuration than the tanks associated with the external tank project. These changes as well as revised manufacturing techniques/ processes necessitate facility modifications.

Other Related Costs	Amount (\$M)
Studies/Design	0.5
Related Equipment	25
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	May-12	Jul-13
Construction	Jan-13	Apr-14
Activation	N/A	May-14

**Project Title: Modifications for SLS Manufacturing, Building. 110**

**Location: Michoud Assembly Facility, New Orleans, LA**

**FY 2013 Construction Estimate: \$12 million**

Scope/Description

This project includes the facilities modifications to Building 110 at MAF to accommodate several SLS production processes. The major processes addressed by this project are the internal cleaning of the liquid hydrogen and liquid oxygen tanks in Cell E, the hydrostatic proof-loading of the liquid oxygen tank in Cell F, and the stacking of tank components in Cell A. These modifications include foundations, cell walls and doors, elevators, cell lid, access platforms and stairs, personnel doors, HVAC, common solution wash system, control systems, numerous utilities such as steam condensate, chilled water, plant air, process water, power etc, lighting and grounding. The work will include all related activities necessary to meet the SLS requirements for tank washing, stacking and proof loading in Building 110.

Basis of Need:

These facility modifications are necessary to accommodate SLS core stage production operations in Building 110. The work includes the necessary facility modifications required to accommodate the installation of new as well as the modification to existing tooling in Building 110 in support of the SLS production process. The liquid hydrogen and liquid oxygen tanks for SLS differ in length and configuration than the tanks associated with the external tank project. These differences require modifications to tank processing supporting structures, facility utilities both in quantities and configuration and control system components upgrades. These changes as well as revised manufacturing techniques/ processes necessitate facility modifications to support SLS processing requirements.

Other Related Costs	Amount (\$M)
Studies/Design	0.7
Related Equipment	3.5
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	FY2012	FY2012
Construction	Apr-13	Sep-14
Activation		Oct-14

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES

**SUMMARY OF FY 2013 CONSTRUCTION**

**Project Title: Modifications for SLS Manufacturing, Building. 420**

**Location: Michoud Assembly Facility, New Orleans, LA**

**FY 2013 Construction Estimate: \$27.5 million**

Scope/Description:

This project includes the facility modifications for MAF Building 420 Cells 3 and 4 to accommodate the horizontal mating and final integration of the core stage for SLS. The cells for this building will be extended to accommodate the horizontal integration of the core stage. The major modifications/additions required to complete this work are foundations and piling, paving, structural addition, siding, roofing, cranes, HVAC, mechanical equipment, compressed air, lighting, power and grounding. The work will include all related activities necessary to meet the SLS requirements for core stage mating and final integration in Building 420.

Basis of Need:

These facility modifications are necessary to accommodate SLS core stage production operations in Building 420. The work includes the necessary facility modifications required to accommodate the installation of new tooling in Building 420 in support of the SLS production process. The liquid hydrogen and liquid oxygen tanks for SLS differ in length and configuration than the tanks associated with the external tank project. The overall length of the core stage necessitates horizontal mating of the tank assemblies in this facility rather than vertical mating performed for the external tank project in a different facility. These differences require modifications to the building length and additional utilities, foundations and cranes. These tank size changes as well as revised manufacturing techniques/ processes necessitate facility modifications to support SLS processing requirements.

Other Related Costs	Amount (\$M)
Studies/Design	2.5
Related Equipment	3.5
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	FY2012	FY2012
Construction	Jul-13	Oct-14
Activation		Nov-14

**Space Operations CoF**

**Project Title: Construct 34-Meter Beam Waveguide Antennas**

**Location: Canberra, Australia**

**Program Supported: SCAN**

**FY 2013 Construction Estimate: \$10.9 million**

Scope/Description

This project includes fabrication and installation of the foundations and pedestals, panels, gearboxes, bearings, electric drives, encoders, beam waveguide mirrors, sub-reflector and sub-reflector positioner for Deep Space Network antennas. It includes design and construction facilities in and around the Canberra Deep Space Communication Complex. These include paved access roads, trenches, drainage, flood

**CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES**

**SUMMARY OF FY 2013 CONSTRUCTION**

control devices, water main and distribution system, antenna apron, security fence, heating, ventilation, and air conditioning, electrical power distribution, fire detection and suppression system, and surveillance system assembly. The first antenna estimated construction cost is \$24.0 million and expected to be completed in FY 2015. NASA is anticipating that subsequent antennas will be impacted by an increase in cost for high demand materials and by the foreign exchange rate. These factors were included in estimates for the second and third antenna. The second antenna just started and estimated construction cost is \$25.2 million. Construction of the third antenna is anticipated to begin in FY 2014 with an estimated construction cost of \$26.5 million. The total estimated construction cost for all three antennas is \$75.7 million (\$6.8 million in FY 2010, \$7.3 million in FY 2011, \$14.5 million in FY 2012, \$10.9 million in FY 2013 and \$36.2 million in outyears FY 2014 to FY 2016).

Basis of Need

Beam waveguide antennas are needed to add resilience in the southern hemisphere for the Deep Space Network. This will support additional mission loading from projects currently under development and scheduled for launch sometime during or after 2015. The 70 meter antennas at each complex are reaching the end of their service life. These projects will enhance the capability of the 70 meter antenna at Canberra.

Other Related Costs	Amount (\$M)
Studies/Design	0.4
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	Oct-09	Mar-10
Construction	Sep-10	Dec-17
Activation	N/A	N/A

**Institutional CoF**

**Project Title: Replace Steam Vacuum System Boiler, Arc Jet Complex**

**Location: ARC, Moffett Field, CA**

**FY 2013 Construction Estimate: \$31.2 million**

Scope/Description

This project will replace the 67 year old boiler with three new boilers each capable of providing 50 percent of the capacity of the existing boiler but also allowing for maintenance without disruption. Installation will include a canopy structure to protect the new boilers and the ancillary HVAC, fire suppression, electrical, controls interface, and plumbing systems. This project will include demolition and disposal of existing boiler, building, and supporting infrastructure.

Basis of Need

The Arc Jet Complex is a critical mission support facility for the Agency, providing a vital component in thermal protection system development for all programs as it is required for any re-entry vehicle. Currently the facility steam vacuum system relies on a single 65 year old, World War II ship boiler and is limited to operate at 10 percent of its maximum capacity in order to meet current nitrogen oxide and carbon monoxide emissions. The existing boiler cannot be further modified to enhance its emission level.

**CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES**

**SUMMARY OF FY 2013 CONSTRUCTION**

Permission to operate under this limitation is a specific exemption in the 2012 regulations. It is extremely likely that this exemption will not be included in future updates of the regulations. Future updates to the air emission regulations poses unacceptable risk to continue boiler operations. Furthermore, the age and constant maintenance requirements pose very high probability of failure. The consequences of failure are severe. Without the boiler, facility test operations in all three test legs; Interaction Heating Facility, the Aerodynamic Heating Facility, and the Panel Test Facility, would cease immediately, impacting missions across the Agency. Repair or replacement would require anywhere from two to 18 months depending on its severity. An unscheduled interruption of this duration would impact vital programs across all science and engineering mission directorates.

Other Related Costs	Amount (\$M)
Studies/Design	2.6
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	Jun-11	Jul-12
Construction	Apr-13	Mar-14
Activation	Mar-14	Jul-14

**Project Title: Replace Support Systems in Space Power Facility (SPF) Test Building 1411, Phase 2**  
**Location: GRC (Plum Brook Station), Sandusky, OH**  
**FY 2013 Construction Estimate: \$22.0 million**

Scope/Description

This project is the second of two phases of institutional repairs to the SPF Test Building 1411 at GRC/Plum Brook Station. The SPF at Plum Brook Station is a mission critical facility for the Agency that provides testing services for multiple programs. The scope of work for this phase includes the repair/replacement of existing roofing on the disassembly area, the electrical/mechanical room, the pump room, the shop area, and the cryogenic room. In addition, the project will include the refurbishment of the assembly area and vacuum chamber HVAC systems, the disassembly area HVAC systems, and other miscellaneous HVAC systems around the SPF Test Building. The facility electrical systems (high, medium, and low voltage) will be refurbished and arc flash protection will be implemented. Existing high bay crane controls will be replaced with new equipment and the test chamber door controls and lift/translate mechanisms will be upgraded. Other facility systems that will be refurbished include the control room, the intercom system, and various facility plumbing and sump pump systems. Lastly, the vacuum chamber vibration isolation system will be refurbished, and a mission essential infrastructure facility security system will be installed.

Basis of Need

SPF at Plum Brook Station is a mission critical facility for the Agency that provides testing services for multiple programs. Currently, the disassembly area of SPF is being outfitted with vibration and acoustic facilities to support environmental testing of the Orion MPCV. In addition, SPF is being considered for future testing needs to support human rated space systems. SPF is a highly sought-after facility for reimbursable testing activities such as parachute testing for the U.S. Army and for payload fairing testing of nearly all the large expendable launch vehicles throughout the world including the Boeing Delta IV and Lockheed Martin Atlas V launch vehicle (vehicles used for many NASA missions). SPF Building 1411 was constructed in 1968, and most of the building systems are original equipment and are beyond their useful life. These institutional repairs will ensure that a clean, safe, temperature/humidity-controlled,

## CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION: CONSTRUCTION OF FACILITIES

### SUMMARY OF FY 2013 CONSTRUCTION

weather-tight atmosphere is available for handling expensive test and flight hardware. In addition, the project will significantly reduce the deferred maintenance for the facility.

Other Related Costs	Amount (\$M)
Studies/Design	1.7
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	Apr-10	Apr-12
Construction	May-13	Nov-14
Activation	N/A	N/A

#### **Project Title: Repair Domestic Water System Main Piping, Phase 1**

**Location: GRC, Cleveland, OH**

**FY 2013 Construction Estimate: \$11.0 million**

#### Scope/Description

This project is the first of two planned phases for repairing the domestic water distribution system at GRC/Lewis Field. The domestic water main is over 60 years old and has had numerous major failures in the past five years. Included in the scope of work for this project is the replacement of the 12 inches diameter Walcott Road main from Taylor Road to Moffett Road, the replacement of the 6 inches diameter service supply line to Building 102, and the relocation of the service supply line to Building 49 (relocate the supply line away from the front entrance). In addition, this project will replace the currently non-functional 24 inches, diameter main isolation valve north of Building 101 and abandon the leaking service supply line to Building 140 (which is scheduled for demolition in the future). Lastly, this project will install water meters to multiple buildings at Lewis Field. This project will provide necessary repairs that will eliminate costly emergency repairs and avoid building closures which require personnel to be evacuated. The reduction of leaks will also help GRC to meet water reduction goals. Phase 2 is currently estimated at \$13 million for a total of \$24 million.

#### Basis of Need

The GRC/Lewis Field city water piping mains and fire hydrants are 60 years old and there have been numerous system failures in the past five years. Since many of the existing main isolation valves are nonfunctional, piping failures require shutdown of large sections of the mains resulting in loss of water service to many buildings. The locations of many of the mains and branch lines to the building are inaccessible (i.e., under sidewalks, roads, and drives) making leaks expensive to repair. Relocation of the mains and branch lines into the tree lawns will allow for better access for repair and maintenance.

In the recent Energy and Water Functional Review and Environmental Functional Review conducted at GRC/Lewis Field in July 2010, several deficiencies were identified with the city water distribution system. The environmental review identified excessive chlorine in wastewater discharge as a top Center challenge, which is symptomatic of city water system leaks. Also the Energy and Water Functional Review cited significant leaks in the distribution system requiring repairs as a top risk to mission. Further, in order to comply with Energy and Independence Security Act of 2007 annual water intensity reduction mandates, eliminating system leaks is a first order priority. This project addresses all the cited deficiencies.

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
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**SUMMARY OF FY 2013 CONSTRUCTION**

Other Related Costs	Amount (\$M)
Studies/Design	8.8
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design/PER	Sep-12	Sep-12
Construction	May-13	Oct-14
Activation	N/A	N/A

**Project Title: Upgrade Logistics Facility**  
**Location: GSFC, Greenbelt, MD**  
**FY 2013 Construction Estimate: \$10.2 million**

Scope/Description

This project is to upgrade 93,000 square feet of space in the Logistics Building in order to gain efficiencies in the logistics operations at GSFC. It will co-locate eight remaining logistics functions currently housed in Building 16 with five logistics functions already in this building. The work includes walls, mechanical, electrical, plumbing and all other necessary upgrades to accommodate the following logistics functions: packing and crating, traffic management, projects parts storage, Headquarters publications and furniture, business, management and procurement, micro-electronics fabrication, HAZMAT management and disposal. The project will provide GSFC with one consolidated logistics facility for the GSFC Greenbelt campus. Consolidating the logistics function, along with the construction of the Flight Projects Building in 2012, will allow the Building 16 complex to be demolished as a part of the demolition program in accordance with the Center master plan.

Basis of Need

This project is a linked critical component of the GSFC master plan. An independent study conducted in the summer of 2009, determined that the logistics operations at the Center would be adversely impacted if all core logistics functions were not co-located in one facility. The information and Logistics Management Division provides critical logistical services that support every line of business at GSFC. This consolidation will improve operational efficiencies. This project is the last component necessary prior to demolishing the Building 16 Complex. Building 16 has numerous deficiencies and a \$2.3 million deferred maintenance backlog. The consolidated logistics facility will allow GSFC to reduce current replacement value by approximately 20 percent. The project is addressed in the 2002 Master Plan Environment Assessment.

Other Related Costs	Amount (\$M)
Studies/Design	0
Related Equipment	0.9
Activation	N/A
Other	0.2

Estimated Schedule	Start	Complete
Design	Nov-11	Mar-12
Construction	Dec-12	Dec-13
Activation	N/A	N/A

**CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES**

**SUMMARY OF FY 2013 CONSTRUCTION**

**Project Title: Refurbish North Wing, Project Engineering Building 45**

**Location: JSC, Houston, TX**

**FY 2013 Construction Estimate: \$10.0 million**

Scope/Description

The project will continue the JSC Central Campus Refurbishment program to address renewal of substandard and deteriorated precast panel buildings that provide housing for ongoing program commitments. This project will provide for a total refurbishment of the north wing of Building 45 Project Engineering Office (13,500 square feet). It will be reconfigured and converted to a center medical clinic that will accommodate both flight medicine and occupational health to serve the astronauts and JSC workers on-site. This consolidation of the current clinic functions now performed in Building 8 and off-site facilities will improve operational efficiencies. The refurbishment of north wing of Building 45 will include asbestos abatement, improved indoor air quality by replacement of HVAC systems, correction of accessibility issues and life-safety violations, replacement of sprinkler and alarm systems and increased energy efficiency as a result of upgrading the building envelope. Fire sprinkler and alarm systems will be replaced. The electrical equipment in the north wing will be replaced. The building envelope will be upgraded including replacement of the roof and window wall system. The electrical system will be upgraded, including replacement of the electrical equipment and addition of emergency power to allow the new clinic to remain functional after power loss/ hurricane. Site improvements included in the project address the functional change of the facility with the addition of parking, revised traffic circulation and ambulance access. Also included in the project will be civil upgrades to provide parking and ambulance access to the facility. The electrical system will be revised to accommodate emergency power via a portable generator to allow the facility to remain functional after power loss/hurricane.

Basis of Need

The JSC Central Campus Revitalization Plan and master plan identify Building 45 as the second major refurbishment scheduled after the completion of construction of the new office building that was designed as transition space. Building 45 was constructed in 1965 as the Project Engineering Building and Technical Library. The library has been outsourced, and the space is currently used as flex space. Building 8 was built as a photographic laboratory. The site clinic, that serves both astronauts and the on-site workers, is currently located on the east portion of Building 8 on both the first and second floors. The clinic function in this space is marginal, and the strategic housing plan has identified building 45 north wing as a suitable space to relocate the clinic. The HVAC systems are over 45 years old and have marginal fresh air to meet indoor air quality standards. There are numerous deficiencies and no ambulance receiving area in Building 8. The presence of asbestos throughout the Building 8, make facility modifications and improvements not economically feasible in an occupied clinic. The facility has experienced high failure rates of equipment and critical components are obsolete. Repairs for Building 45 (north and south wings) have escalated over 200 percent since 2006. Similarly, the clinic work orders for repair have almost tripled since 2006. Mechanical and electrical equipment rooms are combined and equipment cannot be replaced without cutting the equipment into pieces.

Other Related Costs	Amount (\$M)
Studies/Design/PER	0.6
Related Equipment	0.3
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design (Design/Build)	May-13	N/A
Construction	May-13	May-15
Activation	May-15	May-15

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
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**SUMMARY OF FY 2013 CONSTRUCTION**

**Project Title: Repair Chilled Water System, Emergency Power Plant 48**

**Location: JSC, Houston, TX**

**FY 2013 Construction Estimate: \$11.9 million**

Scope/Description

This project is to upgrade the chilled water system in the Emergency Power Building 48. It will replace the current mechanical system with a new system comprised of four 500 ton electric centrifugal chillers that would satisfy both the summer and winter peak cooling loads while attaining an N+2 redundant capability of the chiller modules. This capacity will serve Building 30 Mission Control Center Complex as primary service and provide back-up cooling to Building 46 Central Computing Facility. The chillers will be part of a variable flow chilled water system. Four new pumps designed in a parallel configuration will support the chillers. The plant underwent major modification in the mid-1980s and capacity addition in the early 1990s, but much of the original mid-60s equipment is still in use. Frequent component failures result in major downtime. This project will provide the reliability of the chilled water supply essential for mission and equipment support.

Basis of Need

The Building 48 chilled water plant was originally installed in the mid-1960s to support Mission Control Building 30. The Building 48 chilled water plant also now serves as a backup chilled water source for the Central Computing Facility Bldg 46. Much of the original equipment is still in use. The chilled water plant underwent major modification in the mid-1980s to add Chillers 3 and 4 and again in the early 1990s to increase the size of Chillers 1 and 2 based on the heat loads existing at that time. The economic lifespan of chillers and industrial pumps is typically 15 to 20 years. While Chiller 1 is over 20 years old and Chiller 2 is 15 years old, both units are now oversized due to advances in computer technology over the entire center that has reduced the system heat load since the units were installed. Because of the reduced load both units now operate at or near the surge region causing damage to the chillers and reducing efficiency. Over the past two years Chiller 1 has been out of service ten times (two major downtimes), and Chiller 2 has been out of service seven times (one major downtime) due to component failure. Chillers 3 and 4 are obsolete units past their useful life. Inspections show significant wear in the evaporator tubes and condenser tubes. The heads (part of the pressure boundary) are in poor shape. Over the past two years Chiller 3 has been out of service three times (one major downtime), and Chiller 4 has been out of service seven times (one major downtime) due to component failure. Chiller 4 has recently failed catastrophically and may not be economically repairable. The pumps are generally in deteriorated condition while the pipe thickness is in many places below minimal allowable code requirements.

Other Related Costs	Amount (\$M)
Studies/Design	1.1
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	Jan-11	Aug-12
Construction	Mar-13	Mar-15
Activation	Mar-15	Mar-15



CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
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**SUMMARY OF FY 2013 CONSTRUCTION**

**Project Title: Construct Replacement Shared Services and Office Building, Phase 1**

**Location: KSC, FL**

**FY 2013 Construction Estimate: \$45.0 million**

Scope/Description

Central Campus Phase 1 provides for the design, construction, and outfitting of an administrative office building and a shared services facility. It is estimated to cost \$85 million and is budgeted in two phases (\$45 million in FY 2013 and \$40 million in FY 2014). The project will be implemented using a design/build acquisition strategy. The new administrative building will be designed and built with features that will enable additional space to be added to it in future phases with minimal disruptions to occupants or facility construction interfaces. Site improvements include upgrades to the utilities infrastructure and existing pedestrian walkways, and limited modifications to the surrounding roads and parking lots. All central campus facilities will strive to achieve platinum certification requirements of the United States Green Building Council Leadership in Energy and Environmental Design, or LEED. This project is in alignment with the approved Agency master plan.

Basis of Need

The Central Campus is a ten-year approximately \$300 million project to replace, consolidate and right-size administrative, laboratory, and shared services facilities currently scattered across the industrial area of KSC. The project will enable deconstruction of approximately 900,000 square feet of physical plant that will be between 50 to 60 years old by the time it is deactivated and deconstructed. These facilities have obsolete, unreliable, and inefficient facility systems that frequently break down and disrupt operations. Most of these facilities do not have sprinkler systems and many of the fire alarms, smoke detection systems, and fire exits are not code compliant. These buildings typically have hazardous materials such as asbestos, polychlorinated biphenyls ballasts, mercury thermostats, and lead, chromium, and cadmium based paints. These hazardous materials make major renovations and routine maintenance activities very costly. Most of the buildings are not Americans with Disabilities Act code compliant.

The Central Campus will have modern, energy efficient and environmentally responsible facilities in a pedestrian friendly campus environment. When completed, it will reduce the existing Headquarters Building footprint by approximately fifty percent. The life cycle analysis of the overall project shows \$400 million in operations, maintenance, and energy savings over 40 years. The plan is purposely formulated to provide very flexible options for the future. Future phases will only be pursued in response to firm housing and technical requirements, and the plan can be easily modified to react to future funding availability.

Other Related Costs	Amount (\$M)
Studies/Design	2.3
Related Equipment	1.4
Activation	1.7
Other	0.7

Estimated Schedule	Start	Complete
Design	Apr-13	N/A
Construction	Apr-13	Sep-15
Activation	Sep-15	Dec-15

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES

**SUMMARY OF FY 2013 CONSTRUCTION**

**Project Title: Revitalize High Pressure Industrial Water (HPIW) System**

**Location: SSC, MS**

**FY 2013 Construction Estimate: \$24.0 million**

Scope/Description

This project is to construct the final stage of a two phase construction project of a new HPIW distribution piping system. Total project cost is \$40 million: \$16 million in FY 2012 and \$24 million in FY 2013. The project will replace the nearly 50 year old piping system with a new, similar system. The HPIW directly supports rocket engine testing in the A and B Test Complexes at the SSC by supplying water for test stand deflector coolant, fire protection (deluge system), and diffuser operation. It also furnishes water for fire protection of the liquid hydrogen and liquid oxygen barges located at the test stand docks.

Replacement of the HPIW is necessary due to age-related poor condition (i.e., excessive leakage caused by corrosion). Continuous use of the facilities supported by this project is consistent with the SSC master plan and Agency goals to reduce deferred maintenance and upgrade basic institutional infrastructure. This project will provide a complete and useable portion of the distribution system with the FY 2013 phase.

Basis of Need

The current system built in the early sixties has reliability provided fire protection and deflector cooling for the A and B Test Stands. The system is fast approaching the end of its useful life as evidenced by the numerous outages over the last several years to repair leaks within the system. The costs of the project would be phased over a two-year period beginning in FY 2012.

Other Related Costs	Amount (\$M)
Studies/Design	3.0
Related Equipment	N/A
Activation	N/A
Other	N/A

Estimated Schedule	Start	Complete
Design	Jun-10	Dec-11
Construction	Oct-12	Jan-15
Activation	N/A	N/A

CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES

**SUMMARY OF FY 2013 CONSTRUCTION**

**Minor Revitalization & Construction of Facilities (projects less than \$10.0 million each)**

This request includes facility revitalization and construction needs with initial cost estimate greater than \$1.0 million but less than \$10.0 million per project. Projects with initial cost estimates of \$1.0 million or less are normally accomplished by routine day-to-day facility maintenance and repair activities provided for in direct program and Center operating budgets. Proposed FY 2013 institutional minor revitalization and construction projects total \$164.9 million for components of the basic infrastructure and institutional facilities, and programmatic projects total \$38.2 million. These resources provide for revitalization and construction of facilities at NASA facility installations and government-owned industrial plants supporting NASA activities. Revitalization and modernization projects provide for the repair, modernization, and/or upgrade of facilities and collateral equipment. Repair projects restore facilities and components to a condition substantially equivalent to the originally intended and designed capability. Repair and modernization work includes the substantially equivalent replacement of utility systems and collateral equipment necessitated by incipient or actual breakdown. It also includes major preventive measures that are normally accomplished on a cyclic schedule and those quickly needed out-of-cycle, based on adverse condition information revealed during predictive testing and inspection efforts. Modernization and upgrade projects include both restoration of current functional capability and enhancement of the condition of a facility so that it can more effectively accomplish its designated purpose, increase its functional capability, or so that it can meet new building, fire, and accessibility codes.

The minor revitalization and construction projects that comprise this request are of the highest priority, based on relative urgency, and expected return on investment. During the year, some rearrangement of priorities may be necessary, which may cause a change in some of the items to be accomplished.

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**MINOR REVITALIZATION CENTER DISTRIBUTION**

**Science**

- A. Jet Propulsion Laboratory, \$3.2 million
  - 1. Restore Data Center, Phase 3

**Exploration**

- A. Kennedy Space Center, \$10.2 million
  - 1. Modification Canister Rotation Facility
  - 2. Repairs to Various Buildings (BMAR Reduction)
- B. Marshall Space Flight Center, \$13.8 million
  - 1. Modifications to Bldg 220 for Shipping and Receiving and Support, MAF
  - 2. Modifications to Test Stand 4699 for SLS Structural Tank Testing, MSFC
  - 3. Replace West Master Substation, Phase 3, MAF
  - 4. Replace Substation 21, MAF
  - 5. Replace Main Sanitary Sewer System, MAF

**CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION:  
CONSTRUCTION OF FACILITIES**

**SUMMARY OF FY 2013 CONSTRUCTION**

**Space Operations**

- A. Jet Propulsion Laboratory, \$5.1 million
  - 1. Replace Beam Waveguide Azimuth Tracks, 34 meter Subnet, Goldstone, CA
  - 2. Upgrade Fire Protection, Canberra, Australia
  - 3. Construct Facilities for 80 kilowatt Transmitter DSS-26, Goldstone, CA
  - 4. Demolish Space Launch Complex (SLC) 17, Vandenberg, CA
  
- B. Kennedy Space Center, \$5.9 million
  - 1. Crawlerway Road Transitions
  - 2. Repairs to Crawlerway
  - 3. Upgrade Lighting
  - 4. Upgrade Mechanical Systems
  - 5. Waste Management Facility

**Institutional**

- A. Ames Research Center, \$5.8 million
  - 1. Replace Substation 115 kilovolt High Voltage Cables
- B. Dryden Flight Research Center, \$17.7 million
  - 1. Revitalize Mission Control Infrastructure
  - 2. Repair Primary Electrical Distribution, Phase 8 of 8
- C. Glenn Research Center, \$25.0 million
  - 1. Repair Steam Distribution System, Phase 1
  - 2. Repair Electrical Distribution and Control Systems, Phase 1
  - 3. Horizontal Communications Infrastructure
- D. Goddard Space Flight Center, \$11.5 million
  - 1. Construct Mission Launch Command Center
  - 2. Repair Causeway Bridge, WFF
  - 3. Replace Fire Detection System, WFF
- E. Jet Propulsion Laboratory, \$6.3 million
  - 1. Restore Data Center, Phase 2
- F. Johnson Space Center, \$12.7 million
  - 1. Upgrade Central Heating and Cooling Plant 24
  - 2. Upgrade Fire Alarm Network, Phase 2
- G. Kennedy Space Center, \$21.0 million
  - 1. Repair and Repave Roads
  - 2. Repair Centerwide Fire Monitoring, Detection, and Alarm System, Phase 3
  - 3. Revitalize Medium Voltage Electrical Distribution System, Industrial and Payload Processing Areas
- H. Langley Research Center, \$16.5 million
  - 1. Repair and Upgrade Potable Water Supply and Metering
  - 2. Upgrade Sanitary Sewer System
  - 3. Upgrade Fire Station and Emergency Operations Center

## CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION: CONSTRUCTION OF FACILITIES

### **SUMMARY OF FY 2013 CONSTRUCTION**

- I. Marshall Space Flight Center, \$35.2 million
  - 1. Repair by Replacement Building 43YY
  - 2. Revitalize Building 4666
  - 3. Revitalize Central Chilled Water System 4473
  - 4. Replace Building Control Systems
  - 5. Repair and Replace Fire and Gas Detection Systems
- J. Stennis Space Center, \$13.2 million
  - 1. Revitalize Utility Systems
  - 2. Install Environmental Compliance Hardware
  - 3. Refurbish and Replace Helium Compressors

### **Demolition of Facilities**

Cognizant Office: Office of Strategic Infrastructure  
FY 2013 Estimate: \$20.0 million

The funds requested will be used to eliminate inactive and obsolete facilities that are no longer required for NASA's mission. Abandoned facilities pose a potential safety and environmental liabilities as well as being eyesores at the Centers. These facilities must still be maintained at minimal levels to prevent increasing safety and environmental hazards and these recurring maintenance costs impose a drain on the limited maintenance dollars available at the Centers. Demolishing these abandoned facilities will allow the Agency to avoid non-productive operating costs required to keep abandoned facilities safe and secure. Furthermore, demolition is the most cost effective way to reduce the Agency deferred maintenance.

NASA identifies potential facilities for the demolition program through special studies to determine if the facility is required for a current of future missions. Facilities that are no longer needed are included in a five-year demolition plan that sets project schedules based on last need, annual costs avoided, potential liability, and project execution factors. Individual project schedules are sometimes adjusted in response to factors such as consultation with states on historic properties, changes in operational schedules, environmental remediation, funding profiles, local market forces, and value of recycled materials.

### **Facility Planning and Design**

Cognizant Office: Office of Strategic Infrastructure  
FY 2013 Estimate: \$33.8 million

These funds are required for: advance planning and design activities; special engineering studies; facility engineering research; preliminary engineering efforts required to initiate design-build projects; preparation of final designs, construction plans, specifications, and associated cost estimates; and participation in facilities-related professional engineering associations and organizations. These resources

## CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION: CONSTRUCTION OF FACILITIES

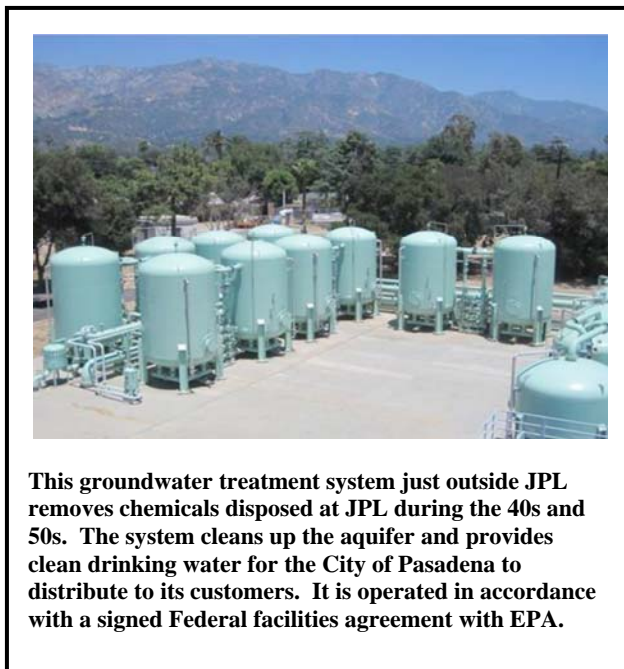
### **SUMMARY OF FY 2013 CONSTRUCTION**

provide for project planning and design activities associated with non-programmatic construction projects. Project planning and design activities for construction projects required to conduct specific programs or projects are included in the appropriate budget line item. Other activities funded include: master planning; value engineering studies; design and construction management studies; facility operation and maintenance studies; facilities utilization analyses; engineering support for facilities management systems; and capital leveraging research activities. The increase in facilities planning and design is crucial in implementation of the NASA recapitalization. These recapitalization projects are necessary to make progress toward required sustainability, energy and stewardship goals.

# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION ENVIRONMENTAL COMPLIANCE & RESTORATION (ECR)

## FY 2013 BUDGET

Budget Authority (in \$ millions)	Actual	Estimate	FY 2013	Notional			
	FY 2011	FY 2012		FY 2014	FY 2015	FY 2016	FY 2017
<b>FY 2013 President's Budget Request</b>	<b>59.6</b>	<b>44.8</b>	<b>66.4</b>	<b>90.9</b>	<b>87.5</b>	<b>90.4</b>	<b>90.4</b>
Change From FY 2012 Estimate	--	--	<b>21.6</b>				
Percent Change From FY 2012 Estimate	--	--	<b>48.2%</b>				



**This groundwater treatment system just outside JPL removes chemicals disposed at JPL during the 40s and 50s. The system cleans up the aquifer and provides clean drinking water for the City of Pasadena to distribute to its customers. It is operated in accordance with a signed Federal facilities agreement with EPA.**

NASA's ECR program cleans up hazardous materials and wastes that have been released to the surface or groundwater at NASA installations, NASA-owned industrial plants supporting NASA activities, current or former sites where NASA operations have contributed to environmental problems, and other sites where the Agency is legally obligated to address hazardous pollutants. The current 122 cleanup projects are estimated to cost more than \$1 billion and are located across all NASA Centers. NASA prioritizes these cleanups to address the highest liabilities first, protect human health and the environment, and preserve natural resources. ECR program activities include projects, studies, assessments, investigations, sampling, plans, designs, construction, related engineering, program support, monitoring, and regulatory agency oversight costs. Funding also covers land acquisitions necessary to ensure operation of remedial treatment processes and sites as part of the remediation and cleanup measures.

Consistent with recent Executive Orders and regulatory requirements, the ECR program also provides for strategic investment in environmental methods and practices that ensure NASA may continue to carry out its scientific and engineering missions. Included are investments in methodologies for reducing energy intensity and greenhouse gas emissions and support for operational activities, by ensuring that advances in materials and chemical risk management are incorporated early in mission design phases.

Additional information concerning NASA's ECR program can be found at:  
<http://www.nasa.gov/offices/emd/home/ecr.html>.

## EXPLANATION OF MAJOR CHANGES FOR FY 2013

NASA is restructuring structuring priorities to best accommodate environmental cleanup requirements at numerous sites and facilities within a controlled fiscal environment.

# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

## **ENVIRONMENTAL COMPLIANCE & RESTORATION (ECR)**

### **ACHIEVEMENTS IN FY 2011**

In FY 2011, NASA negotiated and signed a consent order with the State of California covering cleanup of contaminated soils at the Santa Susana Field Laboratory near Los Angeles.

### **KEY ACHIEVEMENTS PLANNED FOR FY 2013**

In FY 2013, NASA will continue to support cleanups at all NASA Centers, with priority given to protecting human health and the environment in balance with EPA and state regulatory agreements and requirements. Major program achievements planned for FY 2013 include:

- Completion of interim soil cleanups and publication of Environmental Impact Statement for final soils cleanup at Santa Susana Field Laboratory; and
- Completion of source area investigations at White Sands Test Facility.

### **BUDGET EXPLANATION**

The FY 2013 funding request represents a prioritized, risk-based approach for incrementally addressing its cleanup portfolio and is based upon the relative urgency and the potential health and safety hazards related to each individual cleanup. As studies, assessments, investigations, plans, regulatory approvals, and designs progress and as new discoveries or regulatory requirements change, NASA expects that program priorities may change, requiring revisions to planned activities.

The FY 2013 request is \$66.4 million. This represents a \$21.6 million increase from the FY 2012 estimate (\$ 44.8 million). The largest projects in the FY 2013 request include:

- \$15.5 million for implementing investigation and cleanup of contaminated groundwater and soils at Santa Susana Field Laboratory in accordance with a new Consent Order with the State of California;
- \$13.9 million for continuing cleanup of ground water contamination and investigation of soil contamination at White Sands Test Facility, New Mexico to comply with the facility permit issued by the state;
- \$7.4 million for continuing investigation and cleanup of ground water and soil contamination at KSC; and
- \$6.7 million for operating and maintaining systems to address contaminated groundwater emanating from JPL.



# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION

## **ENVIRONMENTAL COMPLIANCE & RESTORATION (ECR)**

### **Projects**

#### **RESTORATION**

This project addresses cleanup liabilities at all NASA Centers and component facilities. As of the start of FY 2012, known liabilities totaled \$1.023 billion with many of the individual cleanups estimated to take more than 15 years to complete. NASA policy is to address these liabilities using a “worst first” approach to ensure human health and the environment are protected and to facilitate mission readiness.

In FY 2011, NASA completed all field work related to decontamination and decommissioning of the Plum Brook Reactor Facility in Sandusky, OH. NASA also completed construction of a groundwater treatment system that addresses off-site contamination and provides the City of Pasadena with clean drinking water. Additionally, NASA negotiated and signed a consent order with the State of California covering cleanup of contaminated soils at the Santa Susana Field Laboratory near Los Angeles.

In 2013, NASA will continue to support cleanups at all NASA Centers with priority given to protecting human health and the environment in balance with EPA and State regulatory agreements and requirements. Major restoration project achievements planned for FY 2013 include:

- Completion of interim soil cleanups and publication of the environmental impact statement for final soils cleanup at Santa Susana Field Laboratory;
- Implementation of soil and groundwater cleanup actions at MSFC; and
- Completion of source area investigations at White Sands Test Facility.

#### **ENVIRONMENTAL COMPLIANCE & FUNCTIONAL LEADERSHIP**

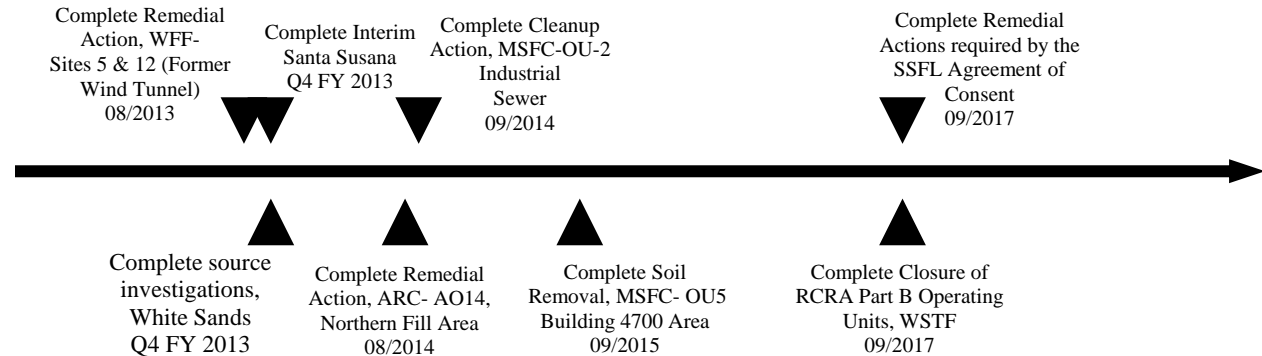
This project invests in environmental methods and risk reduction practices that ensure NASA may continue to carry out its scientific and engineering missions. Included are investments in methodologies for sustainably reducing energy intensity and greenhouse gas emissions, and supporting operational activities by ensuring that advances in chemical risk management are incorporated early in mission design phases.

In FY 2011, NASA formally executed an international agreement with ESA to work together on testing of chromium-free coatings. NASA also put into place an international agreement with Portugal to cooperate on sustainable building techniques, lead-free solder research, environmental cleanup technologies, hazardous waste minimization, innovative fuel cell applications, and solar-thermal air conditioning systems.

In 2013, NASA will continue to reduce mission risk by forming international and domestic joint projects to effectively leverage NASA resources into increased value.

# CONSTRUCTION AND ENVIRONMENTAL COMPLIANCE AND RESTORATION ENVIRONMENTAL COMPLIANCE & RESTORATION (ECR)

## Program Schedule



## Program Management & Commitments

Project/Element	Provider
Restoration	Provider: All NASA Centers Project Management: NASA Headquarters NASA Center: All Cost Share: Not applicable
Environmental Compliance and Functional Leadership	Provider: Selected NASA Centers Project Management: NASA Headquarters NASA Center: GRC, KSC, MSFC, SSC Cost Share: USAF, Centro Para Prevenção da Poluição (Portugal), ESA

## Acquisition Strategy

NASA Centers typically acquire cleanup services through a variety of contract mechanisms including fixed price as well as time and materials contracts for more complicated efforts.