



U.S. DEPARTMENT OF  
**ENERGY**



# AGING INFRASTRUCTURE AT NNSA SITES

Jim McConnell

Associate Administrator for

Safety, Infrastructure, and Operations

National Nuclear Security Administration

November 20, 2019

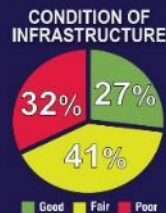
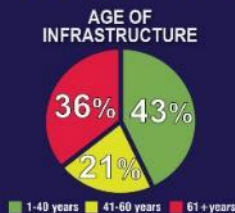


## NNSA SAFETY, INFRASTRUCTURE & OPERATIONS

### MAKING THE RIGHT THINGS HAPPEN



### A VAST AND COMPLEX ENTERPRISE



**Vision**  
We contribute to national security now and in the future by managing the complex NNSA risks of safety, infrastructure, materials, and the environment.

**Mission**  
Enable safe operations, ensure effective infrastructure, and provide enterprise services to meet National Nuclear Security Administration needs.

**41,000**

LABORATORY, PLANT & SITE EMPLOYEES

**2,000**  
miles of roads

NEARLY THE DRIVING DISTANCE FROM DC TO LOS ALAMOS



TRACK **400,000** METRIC TONS OF NUCLEAR MATERIAL TRANSACTIONS



safety for **400** nuclear and hazardous facilities

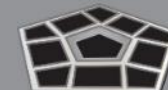


**2,100** square miles of land area



ABOUT THE LAND AREA OF DELAWARE

**36 MILLION** SQUARE FEET OF ACTIVE FACILITY SPACE



(~ six Pentagons worth)

NNSA packages ship over **500,000 miles per year**



Enough to travel to the moon and back



**8.4 Trillion BTUs** ANNUAL ENERGY CONSUMPTION



enough to power ~237,000 homes for one year

A **science-based infrastructure stewardship** approach using risk-based, data-driven metrics to prioritize investments in order to enable the mission.

**Tools**

- BUILDER
- Mission Dependency Index (MDI)
- Enterprise Risk Management
- Excess-Facility Risk Index
- G2 Program Management System
- Prioritization Methodologies

**Planning**

- Strategic Integrated Roadmap (SIR)
- SSMP Chapter 4
- Master Asset Plan (MAP)
- Deep Dives
- Area Plans
- Disposition Strategic Plan

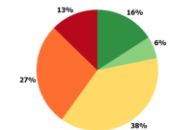
**Pilots**

- \$50M Minor Construction
- Standard Acquisition (STAR)

**Master Asset Plan**

**Gaps and Risks**

Asset Condition by RPM Percentage  
R2 for all operating facilities, Values to TOP and Bottom LDR scores for non-operational assets




**40%** of assets are **at-risk** or **at-worst** condition

**Reversing Enterprise Condition Trends**  
NNSA assets are worth more than \$10 billion. Approximately \$10 billion (22 percent) of assets are good to very good at serving mission needs, but nearly twice as many—\$18.1 billion (46 percent)—are in fair-to-poor condition. The remaining \$17.6 billion (38 percent) are in poor condition and must be regularly maintained to avoid degradation. A balanced investment portfolio must fund regular preventative maintenance, major corrective replacements, and operational replacements and improvements to meet mission needs.


Site	Total Value	Very Good	Good	Fair	Poor	Worst
MC	\$204	\$204	\$0	\$0	\$0	\$0
LBN	\$1,204	\$1,124	\$24	\$80	\$0	\$0
LBNL	\$1,204	\$1,124	\$80	\$0	\$0	\$0
MNSR	\$1,494	\$0	\$124	\$874	\$500	\$0
PK	\$1,204	\$0	\$774	\$70	\$360	\$0
SNL	\$6,494	\$894	\$714	\$2,704	\$1,974	\$270
ORR	\$1,004	\$0	\$604	\$194	\$206	\$0
Y-12	\$1,024	\$1,024	\$0	\$0	\$0	\$0
AC	\$44	\$0	\$0	\$0	\$0	\$44
OST	\$914	\$24	\$104	\$124	\$174	\$546
<b>TOTAL</b>	<b>\$16.1B</b>	<b>\$7.8B</b>	<b>\$3.8B</b>	<b>\$4.2B</b>	<b>\$1.9B</b>	<b>\$8.6B</b>

**Uranium: Sprinkler Head Replacement**  
Y-12 NATIONAL SECURITY COMPLEX



Replace more than 7,500 sprinkler heads in five watched uranium facilities to maintain reliable fire protections.

**Sprinkler Head Replacements**



Top risks include aged water and electrical distribution systems that uranium facilities rely upon and the abundance and proximity of excess facilities to key facilities.


**Deep Dives**

**Site-wide Overview**

**Pantex Infrastructure and People Snapshot**

**Infrastructure**

- 725 NNSA assets in FIMS, including land
  - 572 operational buildings totaling 3.1 million sq. ft.
  - 27 excess buildings totaling 40 thousand sq. ft.
- 11,703 owned acres, 5,757 leased acres of land
- Assets > 60 years old account for 25% of the buildings, and 50% are over 40 years old



Y18 MCHA	Ownership	Assets	Number of Buildings	Covered Square Footage	Replacement Plant Value	Deferred Maintenance
<b>Buildings</b>	DOE Owned	545	3,084,741	\$ 3,084,090,440	\$ 155,834,937	
	Leased/Permitted	10	426,396	\$ 209,959,615		
<b>OSFs</b>	DOE Owned	304	NA	\$75,662,264	\$ 274,270,872	
	Leased/Permitted	1	NA	\$ 850,644		
<b>Trailers</b>	DOE Owned	54	11,871	\$ 7,302,854	\$ 937,823	
	Leased/Permitted	3	1,138	\$ 233,141	\$ 0	
<b>Subtotal</b>	DOE Owned	709	3,096,612	\$ 3,174,455,728	\$ 430,148,072	
	Leased/Permitted	14	427,554	\$ 210,539,173	\$ 0	
<b>Grand Total</b>	All	723	3,524,166	\$ 3,384,994,901	\$ 430,148,072	

**People**

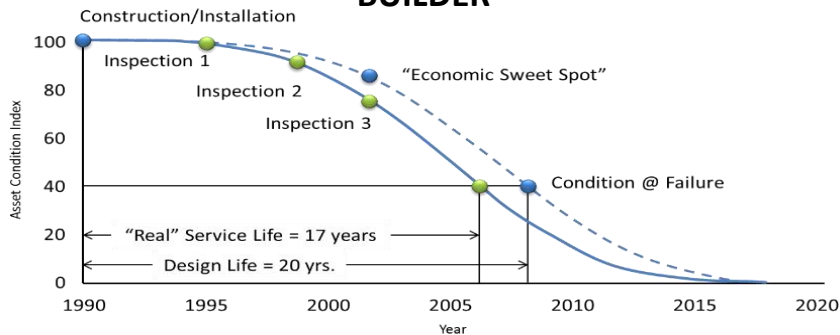
- 3200+ employees
- average years of service: 15
- 43% of employees to be retired in the next 5 years
- 30% currently eligible for retirement

**Skilled workforce demand growing**

- Supports increased infrastructure scope for transformation
- Retirement eligible employee count rises to 43% over FYNSP period
- Q and L clearances required

A **science-based infrastructure stewardship** approach using risk-based, data-driven metrics to prioritize investments in order to enable the mission.

## BUILDER



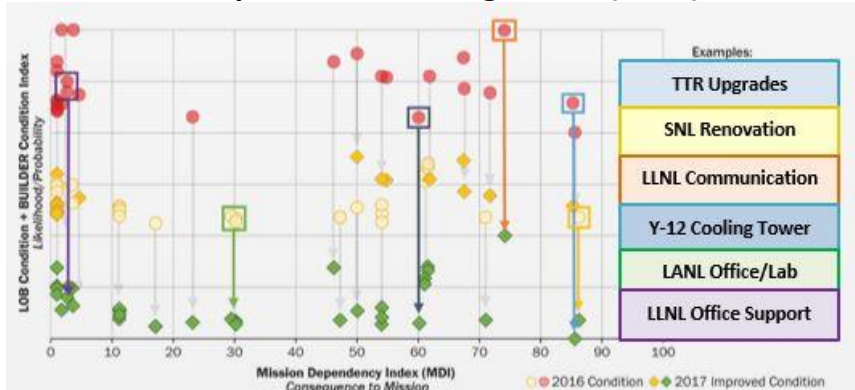
Measures likelihood of losing a facility

## Mission Dependency Index

MDI	Site	Asset Name	Condition	Haz	RPV	GSF	Age
100	Y-12	Production	62	2	\$973.3M	442.3k	74
82	Y-12	Alpha 5 West	86	R	\$97.6M	70.0k	52
62	Y-12	Production	84	2	\$212.1M	152.1k	65
34	Y-12	DU Binary	88	2	\$41.7M	42.2k	69
14	Y-12	Change Houses	85	2	\$49.3M	75.6k	36

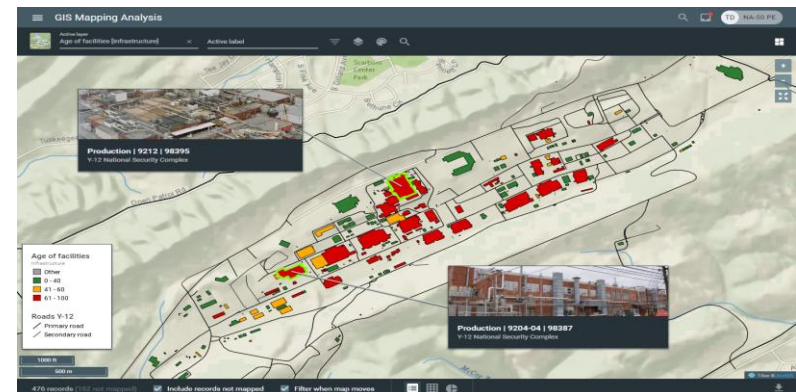
Measures mission impact if a facility is lost

## Enterprise Risk Management (ERM)



Highlights the risk posed by each asset and risk trending across the enterprise

## G2



Award-winning program management system and Program Management Plan (PMP)

NNSA is using our **new tools to develop strategic and area plans** in order to drive prioritized, integrated infrastructure investments across the enterprise.

- **Prioritizing investments** with the greatest impact on mission via new tools
- Conducting **Deep Dives** at each site to better understand the long-term, requirements-based needs
- Publishing an annual **Master Asset Plan (MAP)** which is the integrated, NNSA-wide infrastructure strategic plan
- Developing detailed **Area Plans** to synchronize Maintenance, Recapitalization, Line-Item, and Leasing investments
- Increasing emphasis on timely **Disposition** of excess facilities to reduce mission risk, unencumber valuable site real estate, and save cost
- Emphasizing greater **project-level** planning prior to submission on funding

A science-based infrastructure stewardship approach using risk-based, data-driven metrics to **prioritize investments in order to enable the mission.**

## Mission Dependency Index (MDI)

LANL Facilities



EOC  
MDI 47



DARHT  
MDI 99



Otowi Building (Office Space)  
MDI 13

## Maintenance Prioritization MDI & BUILDER Standards & Policies

Standard		Policy	
Level	CI	MDI	Building System
Very High	90	40-100	Fire Protection
		1-39	Fire Protection
High	80	75-100	Conveying
		75-100	Roof
Medium	70	1-74	Roof
		40-74	Conveying
Low/Default	60	1-39	Conveying
No repair/End of Life	0	1-100	Basement Construction

## Recapitalization Prioritization



Infrastructure Planning Scenario Modeling

FY19 Recapitalization

Priority: [Dropdown] Funding Scenario: [3 - \$200M/year]

Chart

Priority	Site	Project	Earliest Start FY	Ext. End FY	Funding Year	2018	2019	2020	2021	2022
1	Y-12	Y-12 - Bldg. 9204-2 Kathabar #1 Sump Replacement	2019	2019	2019	\$2,000.00K				
2	NBSS	U1a Lightning Protection Upgrades	2018	2019	2019	\$2,000.00K				
3	PX	PX - Building 12-37 Secondary Electrical Feed Installation	2017	2021	2019	\$18,000.00K				
4	Y-12	Y-12 - Bldg. 9995 Supply Fan #13 Refurbishment	2018	2019	2019	\$400.00K				
5	SNL	NM Tech Area 1, Roads, K Ave Extension from Gate 17 to 9th St, Installation	2019	2019	2019	\$680.00K				
6	SRNS	SRNS 234-H 480 Volt cable replacement	2019	2020	2019	\$5,000.00K				
7	KC	Bldgs 2 & 3 Rubber and Plastics Manufacturing and Applications Equipment Upgrades	2015	2020	2019	\$2,585.00K				
8	LLNL	B235 Chemistry Laboratories and Facility Refurbishment	2019	2020	2019	\$11,400.00K				
9	Y-12	Y-12 - Bldg. 9201-SW A3-91 HVAC Refurbishment	2019	2019	2019	\$4,700.00K				
10	KC	Bldgs 2 & 3 Specialty Fabrication and Assembly Applications Equipment Upgrades	2015	2020	2019	\$2,475.00K				
11	NBSS	Mercury Utility Upgrades - Campus	2019	2020	2019	\$7,000.00K				
12	SNL	SNL/CA Data Center Replacement Facility	2018	2019	2019	\$5,700.00K				
13	KC	Bldg 2 & 3 Non-destructive Testing Equipment Replacement and Upgrades	2017	2017	2019	\$2,499.83K				
14	KC	Building and Infrastructure Alterations for Rubber and Plastics Equipment Upgrade Efforts	2015	2020	2019	\$1,777.71K				
15	Y-12	Y-12 - Bldg. 9204-Q2 50 Year Sprinkler Head Replacement (Wet Pipe System 003)	2018	2019	2019	\$3,000.00K				
16	PX	PX - Building 12-31 HVAC and DH Replacement	2017	2021	2019	\$7,000.00K				

- **2001 – 2013: Facilities and Infrastructure Recapitalization Program (FIRP) was NNSA’s method for funding disposition**
  - FIRP’s focus on footprint and deferred maintenance reduction meant higher risk excess assets were not addressed
- **In FY 2014, NNSA reinvigorated direct funded disposition**
  - 2014: \$1.04M to disposition Y-12’s 9744
  - 2015: \$2.5M to disposition Y-12’s 9808
  - 2015: \$3M to disposition LANL’s CASAs 2 and 3
  - Annual funding of ~\$50M starting in 2017
  - NNSA has disposed of 5.7M GSF since 2014



9808 BEFORE AND AFTER

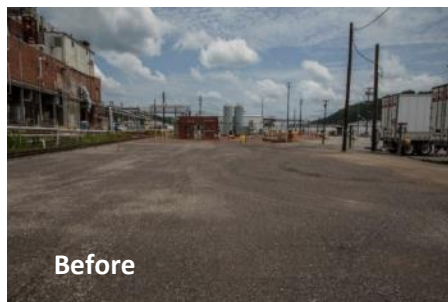
- **NNSA is deploying new data-driven, risk-informed tools to create a science-based infrastructure stewardship model, which is being applied to facility disposition**
- **The tools include:**
  - **Excess-facility Risk Index** – 1-100 score for excess facilities calculating the risk posed by structural and safety conditions; potential impact of contaminants; and proximity of the excess asset to workers, public, environmental receptors, and high importance facilities
  - **Disposition Strategic Plan** – annual plan laying out an integrated, enterprise-wide approach to address NNSA’s aging Excess infrastructure reflecting the priorities documented in NNSA’s Master Asset Plan

An ERI score of 70 – 100  
indicates a High-Risk Facility

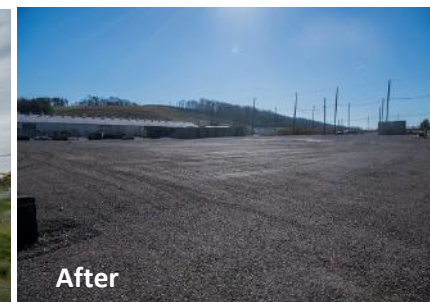




## PROCESS-CONTAMINATED DISPOSITION



Y-12 Building 9404-20



Y-12 9720-24 Demolition



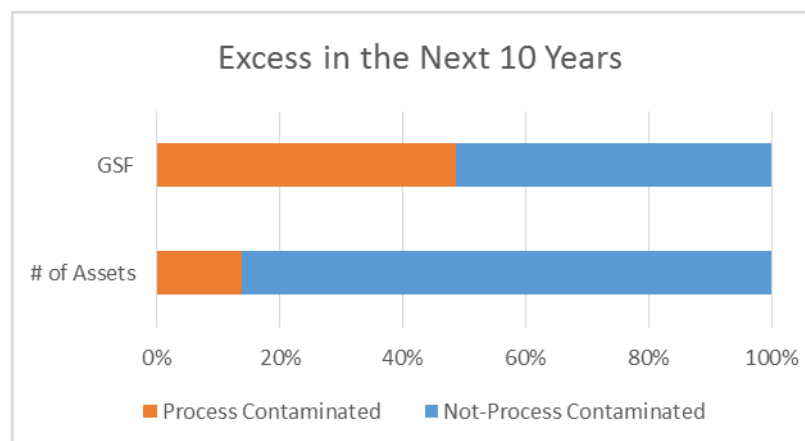
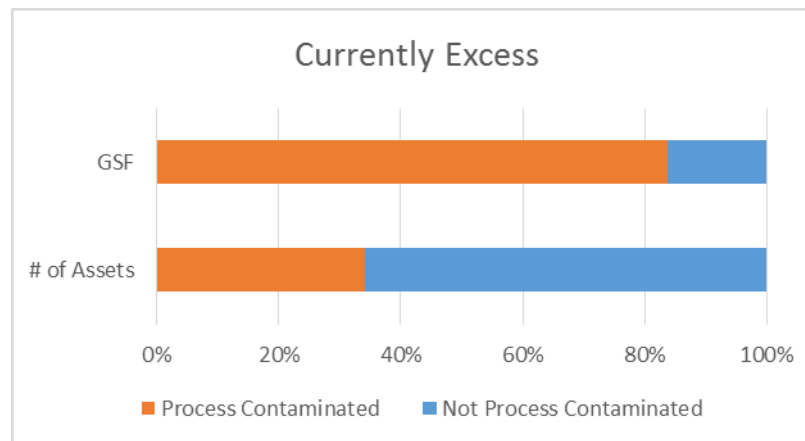
LANL TA-16-0280



LANL TA-46-0001

- In FY 2018, NNSA received authority to disposition process-contaminated facilities under \$50M to help:
  - Reduce risk to mission by disposing of small excess facilities near mission work
  - Freeing up prime real estate for NNSA to build new facilities on
- Most of these disposition projects are in the \$2M to \$3M range

- **Continue to stabilize and reduce risk at process-contaminated facilities until EM can address them**
  
- **Current excess on NNSA Sites**
  - 3.5M GSF
  - 384 assets
  - 84% GSF process-contaminated
  
- **Excess in the next 10 Years will add**
  - 2.3M GSF
  - 413 facilities
  - >50% GSF process-contaminated



- **Data-Driven, Risk-informed Planning**
  - **Real World Changes**
- **Increase in Resources, Support, and Authority**
  - **Continuous Improvement**
    - **Still More to Do**

We did not get into the situation overnight  
And we will not get out of it overnight.