

US Army Corps  
of Engineers®  
Buffalo District

# Niagara Falls Storage Site Safety Measures During Remediation

## On-Site Worker Protection



Fully enclosed Retrieval Facility



Remote excavation and  
handling of residues



Safety, security and  
emergency response training

## Community and Environmental Protection



Regular environmental  
surveillance continues



Monitoring during remediation



Radon Control System

## Transportation and Disposal Safety



Secure transport



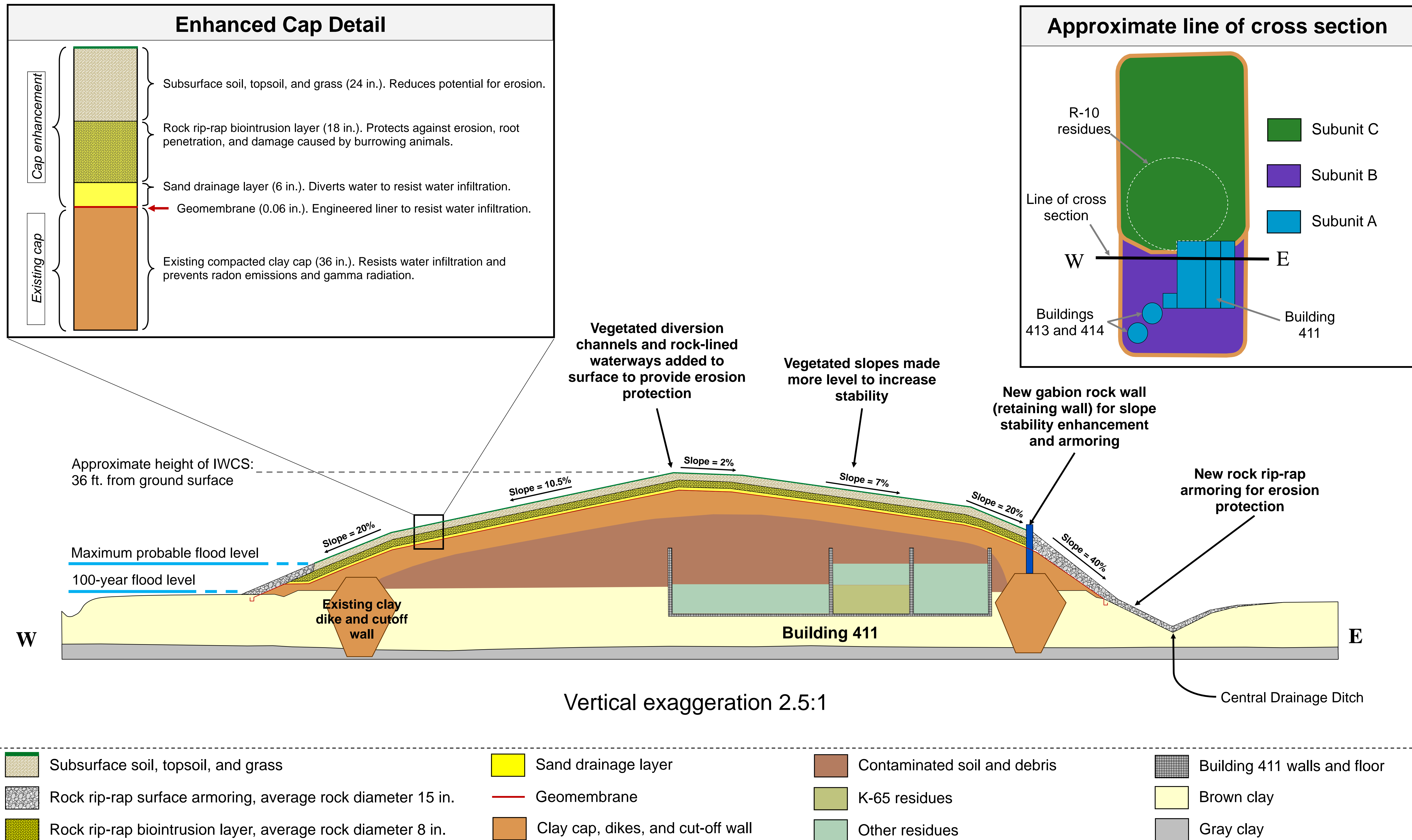
Waste will be in sealed, stabilized and  
radiologically scanned containers  
to ensure safe rail transport



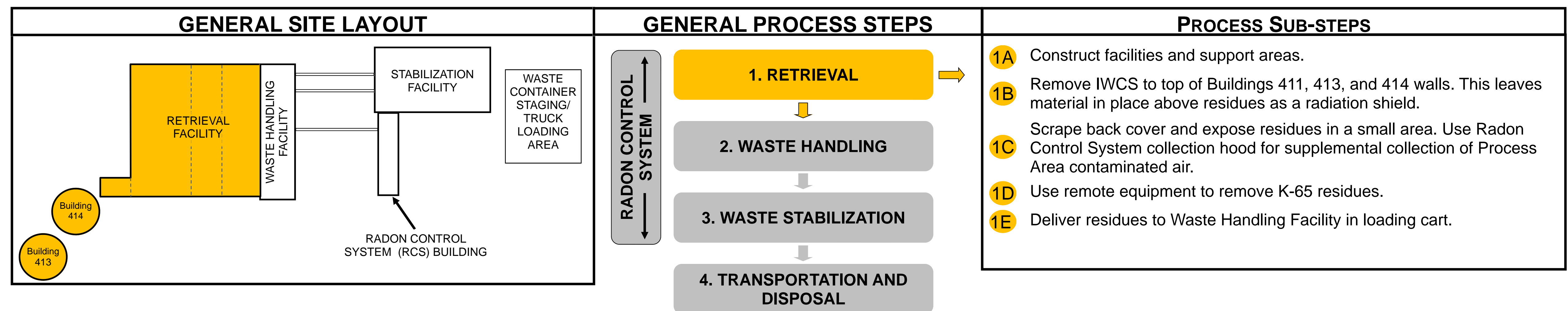
Disposal at authorized  
off-site facility

BUILDING STRONG®





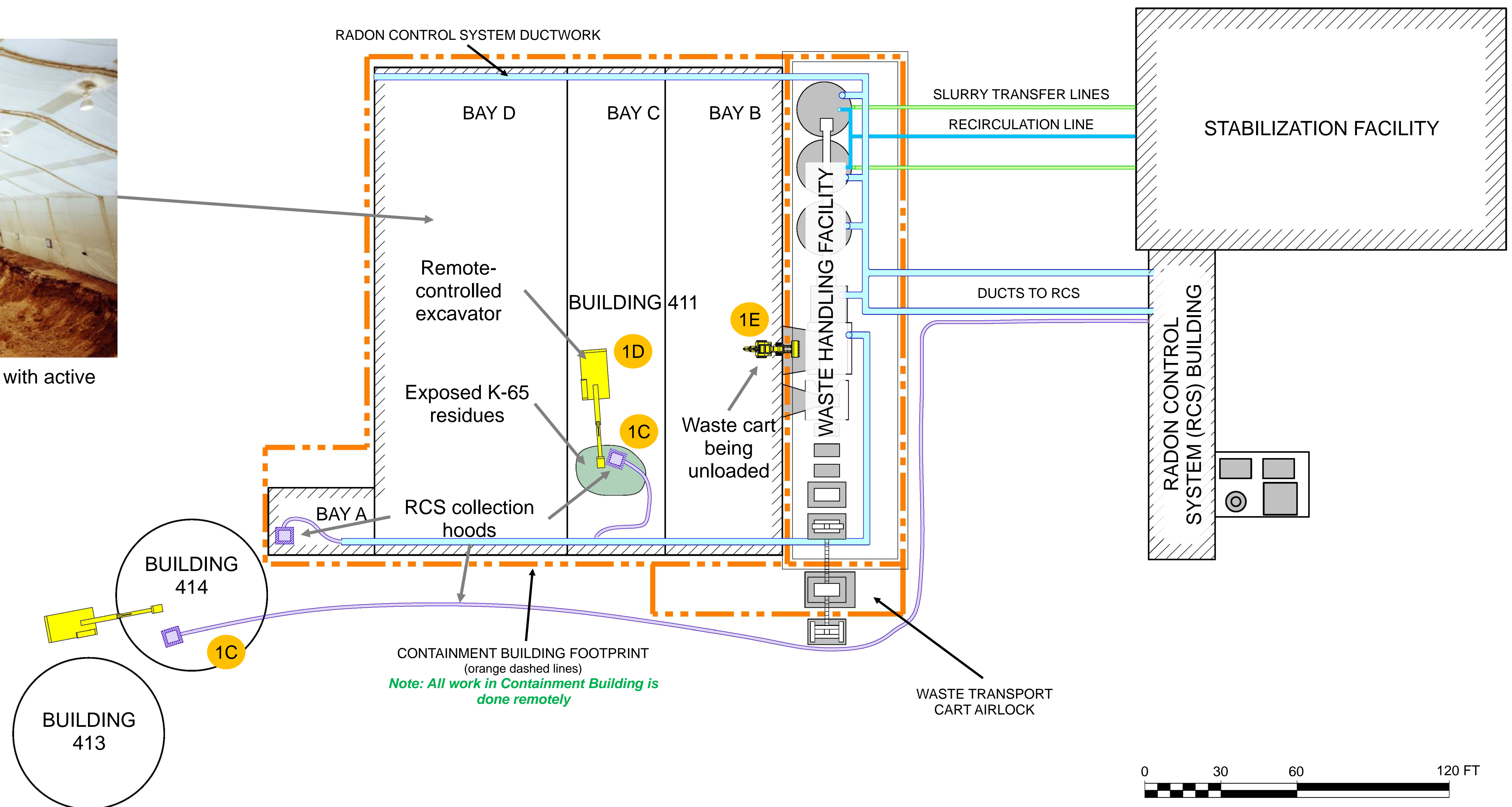




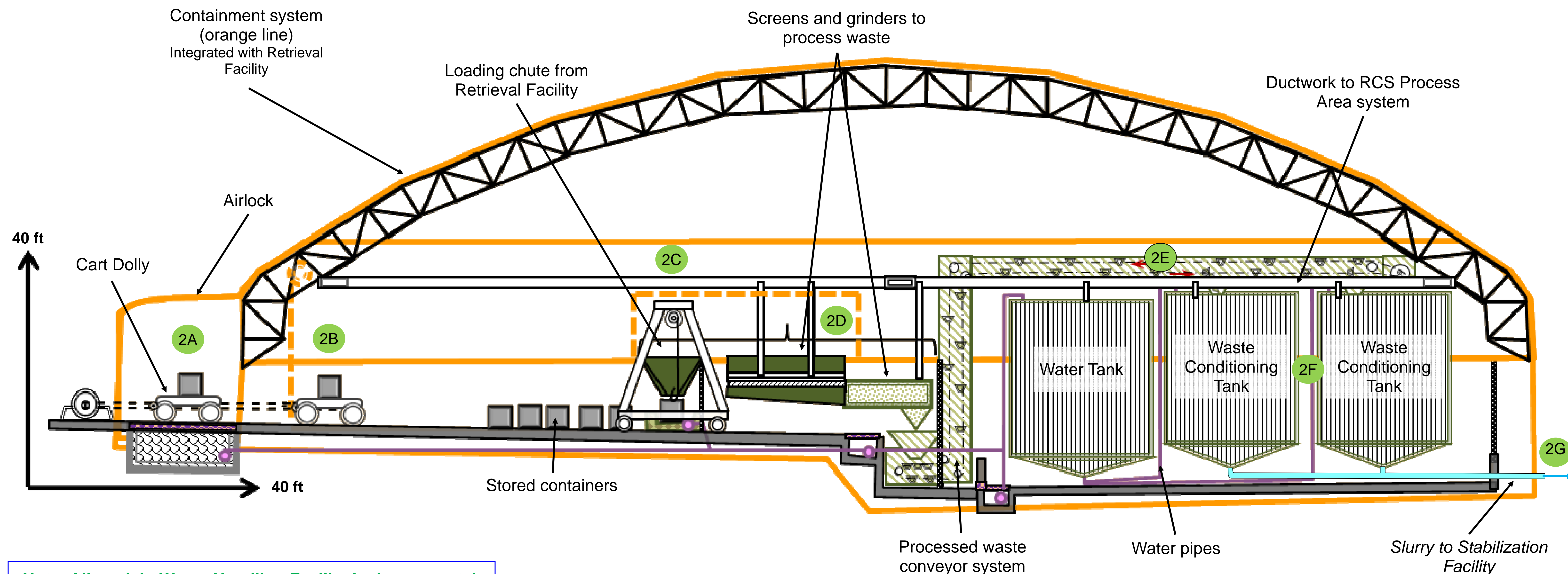
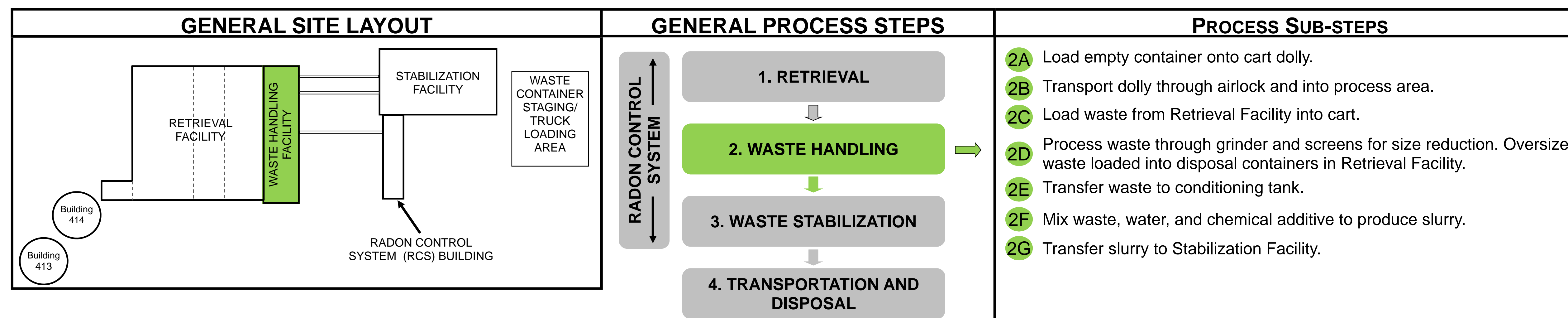
Retrieval Facility containment building with active excavation.



Remotely operated excavator.

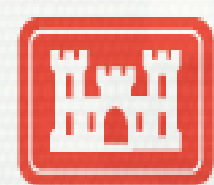






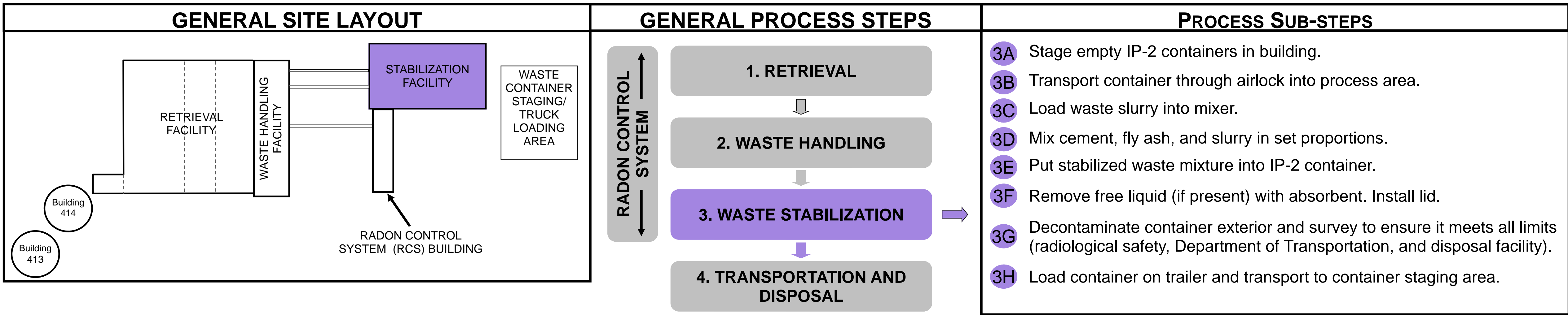
**Note: All work in Waste Handling Facility is done remotely**





WASTE STABILIZATION OF K-65 RESIDUES

CONCEPTUAL MODEL FOR EXCAVATION AND PROCESSING OF SUBUNIT A (REMEDIAL ALTERNATIVES 3A, 3B, AND 4)



Note: all photos are from the Fernald K-65 project



IP-2 container being transported through airlock



Crane carrying IP-2 container



Dry additive silos



Additive controlling motors above mixing room

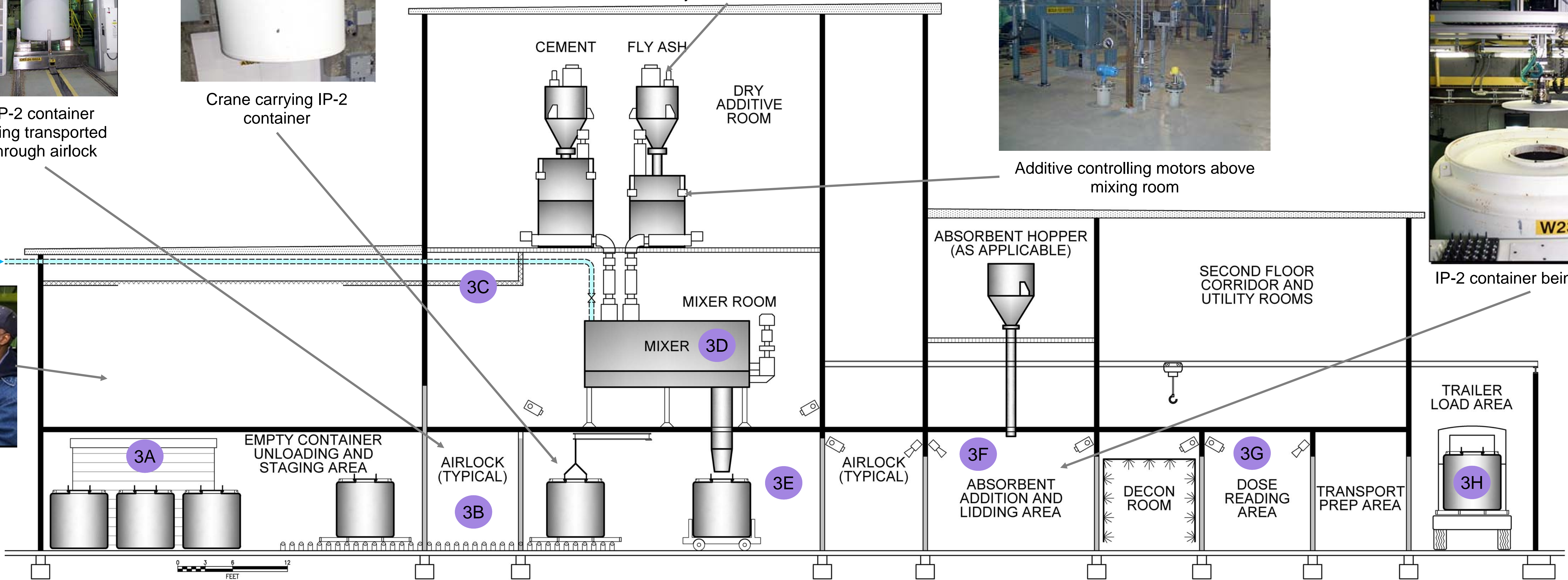


IP-2 container being lidded

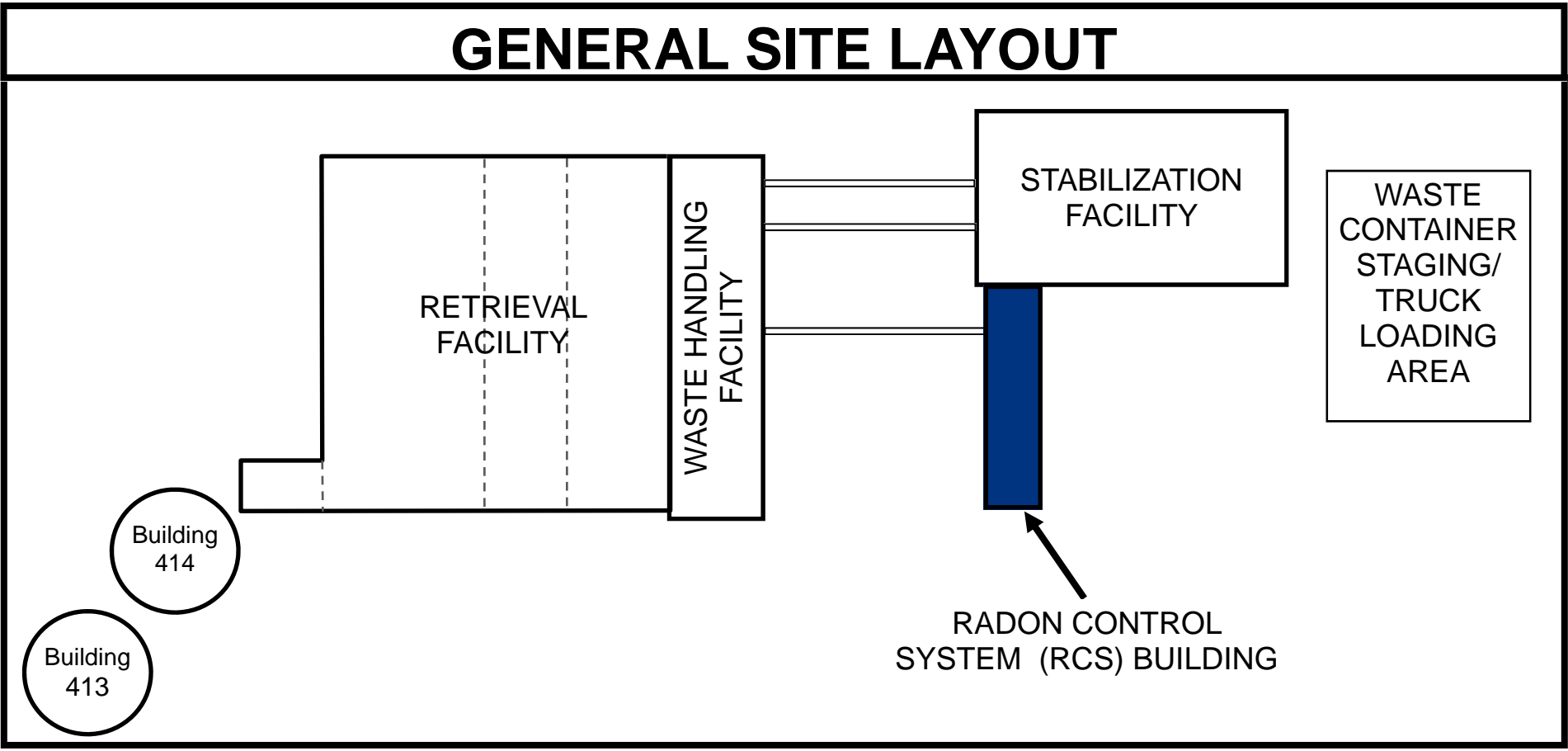


Operations controlled from Work Areas (occupied) separated from Process Areas

Slurry from Waste Handling Facility



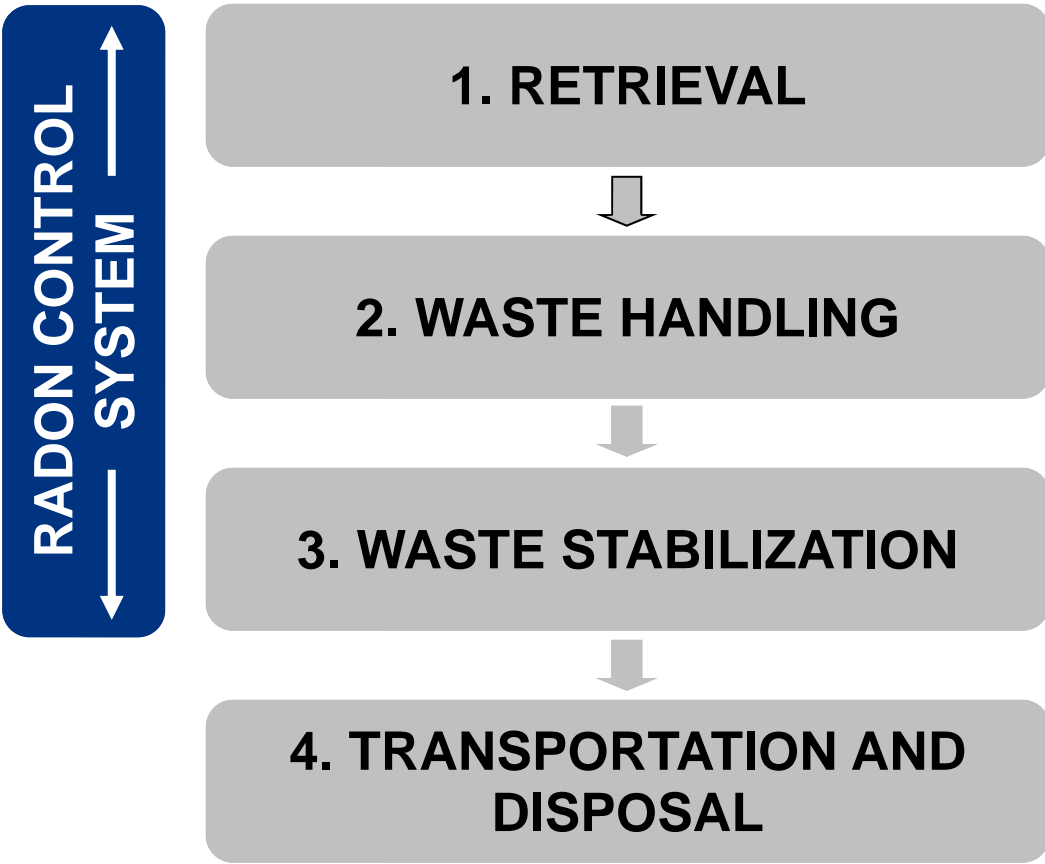




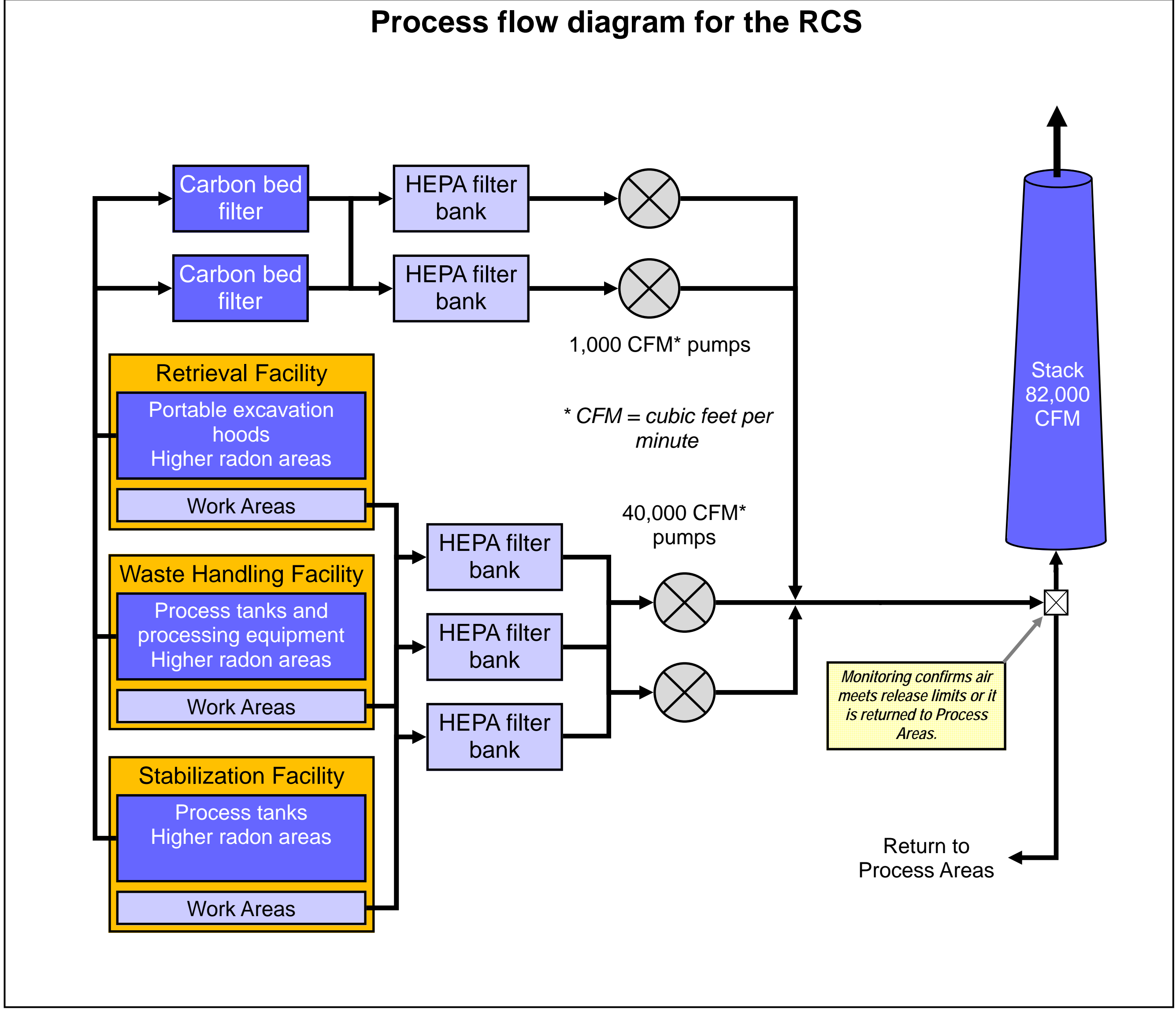
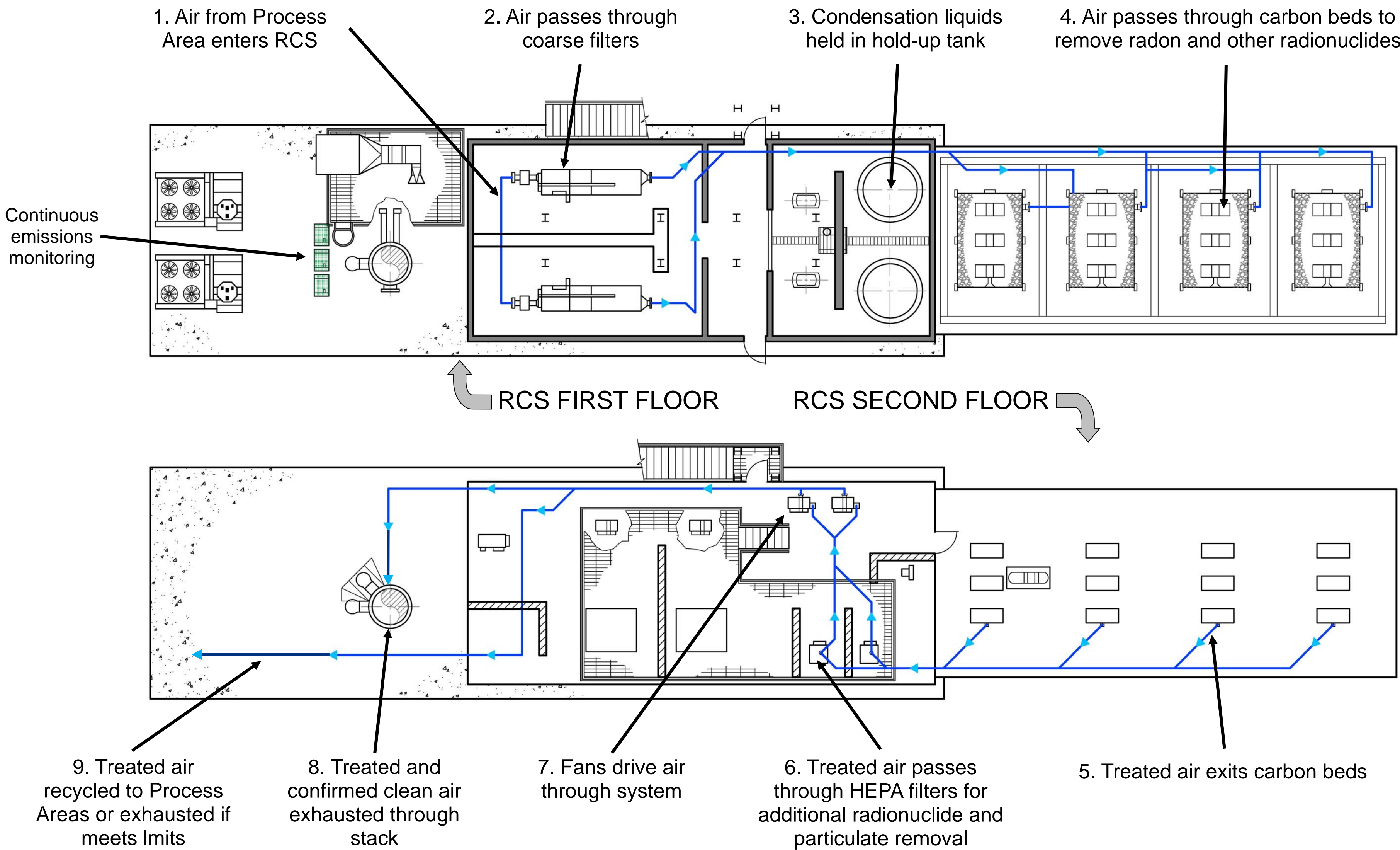
**RADON CONTROL SYSTEM OPERATION**

- Construct Radon Control System (RCS) prior to exposing residues in excavation.
- Operate RCS continuously throughout residue retrieval, waste handling, and stabilization.
- Maintain negative pressure in facilities to prevent radon release.
- Filter air from Process Areas (unoccupied, higher radioactivity areas in the Retrieval Facility, Waste Handling Facility, Stabilization Facility, and at radon collection hoods) through carbon filters and then high efficiency particulate air (HEPA) filters.
- Filter air from Work Areas (occupied, lower radioactivity or clean control rooms, staging areas, and sealed container processing) through HEPA filters. Less filtering is needed in Work Areas because radon levels are lower by design.

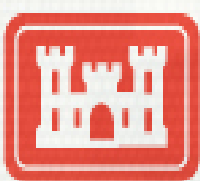
**GENERAL PROCESS STEPS**



**RCS flow and treatment/filtering detail for Process Area air**

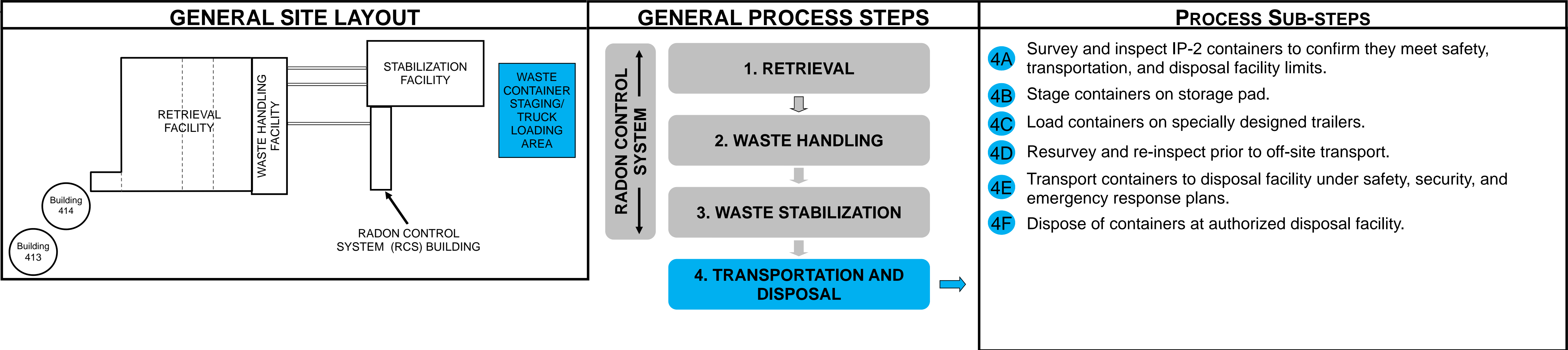




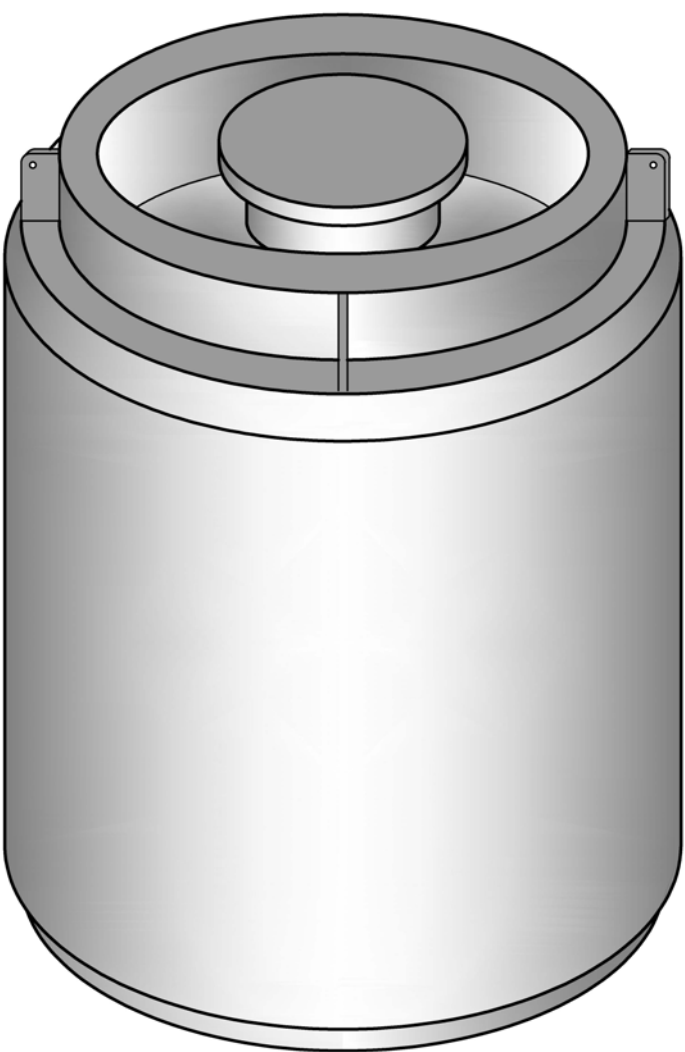


TRANSPORTATION AND DISPOSAL OF STABILIZED K-65 RESIDUES

CONCEPTUAL MODEL FOR EXCAVATION AND PROCESSING OF SUBUNIT A (REMEDIAL ALTERNATIVES 3A, 3B, AND 4)



4A



**IP-2 container filled with stabilized waste**

- Containers 76 in. wide by 80 in. high, 1/2-inch thick carbon steel.
- Filled containers weigh approximately 2,200 lbs.
- Radiological dose from containers will be below DOT and human health risk limits for workers, the truck driver, and the public along the transportation route.

**Note: unless otherwise stated, photographs are from the Fernald K-65 project**

4B



**IP-2 container staged for transport**

- Spacing on concrete pad minimizes radiological dose during inspections.

4C



**IP-2 containers loaded onto a trailer**

- Two containers per trailer on specialized trailers designed to carry IWCS stabilized waste.
- Container tie-down system is state of the art for radiological transport.

4C,D



**IP-2 containers prepared for transport**

- Containers loaded on trailers designed for IWCS stabilized waste.
- Final radiological survey conducted to clear shipment for off-site transport and disposal.

Type of Waste	Volume Removed (yd <sup>3</sup> )	Waste and Container Type	Number of Truck Shipments	Truck Shipments Duration
K-65 residues and commingled L-30 and F-32 residues	6,030	Stabilized waste in IP-2 containers	3,800	2 years
Other Subunit A wastes	22,410	Soil-like waste in supersacks and debris in B-25 boxes	4,000	

**Truck shipments**

- Time to complete shipments (2 years) depends on project funding of \$70 million per project year. Reduced funding may extend the project but would not change the number of shipments.
- Conceptual design assumes shipments occur from March to November each year.

4E



**Transportation to disposal facility**

- Assumed disposal facility for the Proposed Plan is Waste Control Specialists, Andrews, Texas. A different (fully licensed) facility may be selected in the IWCS Remedial Design.
- The actual route will be determined based on public health protection, security, and feasibility.
- Approximate length of route: 1,800 miles.

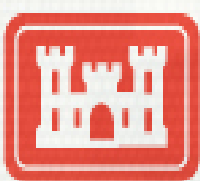
4F



**Disposal at a licensed facility**

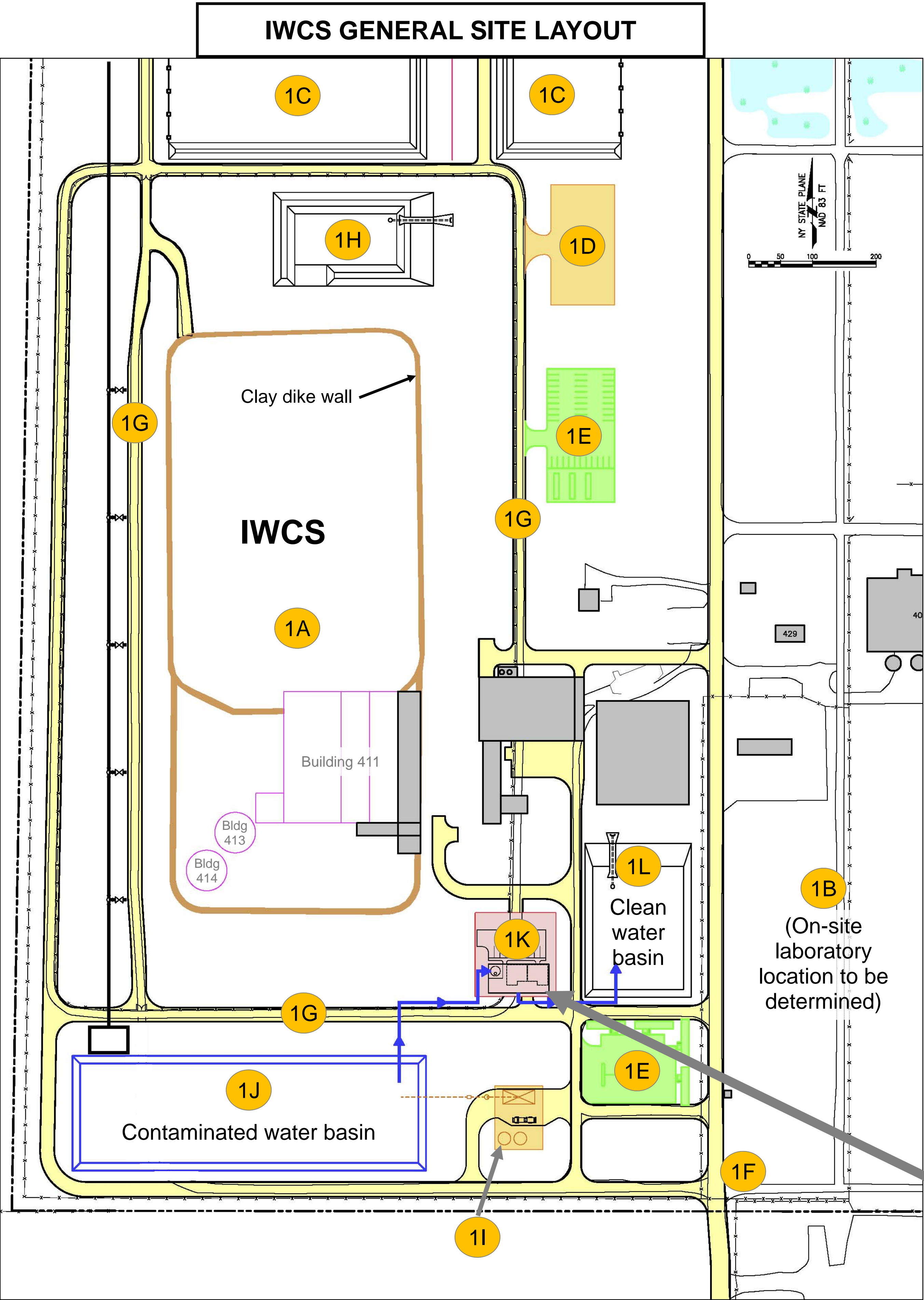
- Containers will be surveyed and inspected prior to acceptance for disposal.
- Disposal will be in lined, below-ground pits with monitoring.
- This photograph shows disposal of Fernald stabilized K-65 waste in IP-2 containers at Waste Control Specialists, Texas.





SITE PREPARATION AND PLANNING FOR REMOVAL ACTIVITIES

CONCEPTUAL MODEL FOR EXCAVATION AND PROCESSING OF SUBUNITS B AND C (REMEDIAL ALTERNATIVES 3A, 3B, AND 4)

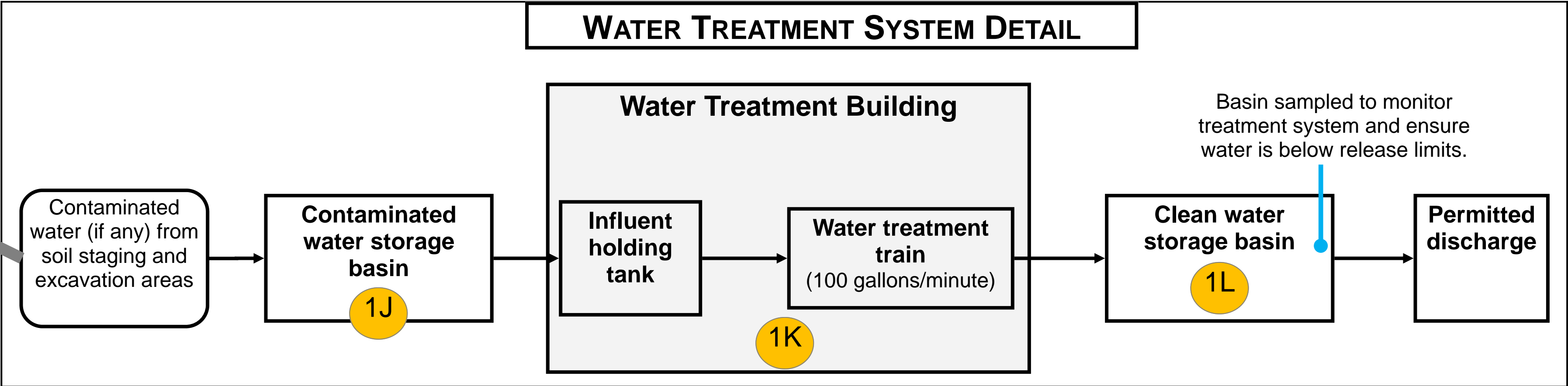


GENERAL PROCESS STEPS	PROCESS SUB-STEPS
1. SITE PREPARATION AND PLANNING	1A Conduct walk-over surveys to identify areas for additional health and safety measures. 1B Begin radiological monitoring program using real-time data from field instruments and on-site laboratory. 1C Construct soil staging areas for temporary stockpiling of soil. 1D Construct vehicle maintenance area. 1E Construct parking lots for construction trailers. 1F Install new fence and gate entrances to control access. 1G Construct new haul and access roads across the site. 1H Construct sediment basin to collect rainwater and sediment (if any) from staging and excavation areas. 1I Construct dust control and vehicle wash down area to prevent releases. 1J Construct lined contaminated water basin for water storage before treatment. 1K Install Water Treatment Building. 1L Construct clean water basin for water storage prior to permitted discharge.
2. WASTE REMOVAL AND PACKAGING AND SITE RESTORATION	
3. TRANSPORTATION AND DISPOSAL	

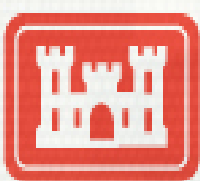
Note: these activities will support removal of Subunit A as well as Subunits B and C

PROJECT SCHEDULE, REMEDIAL ALTERNATIVE 4								
(Excavation, treatment, and off-site disposal of Subunit A; excavation and off-site disposal of Subunits B and C)								
Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Design and Planning								
Construction of Infrastructure								
Subunits B/C Removal to Access Subunit A								
Subunit A Retrieval/Stabilization/Disposal								
Subunit C Excavation/Disposal								
Subunit B Excavation/Disposal								
Facility Demolition and Decommissioning								
Site Restoration								

• Schedule is based on project funding of \$70 million per project year. Reduced funding may extend the schedule.  
• Schedule assumes active remediation occurs from March to November each year.

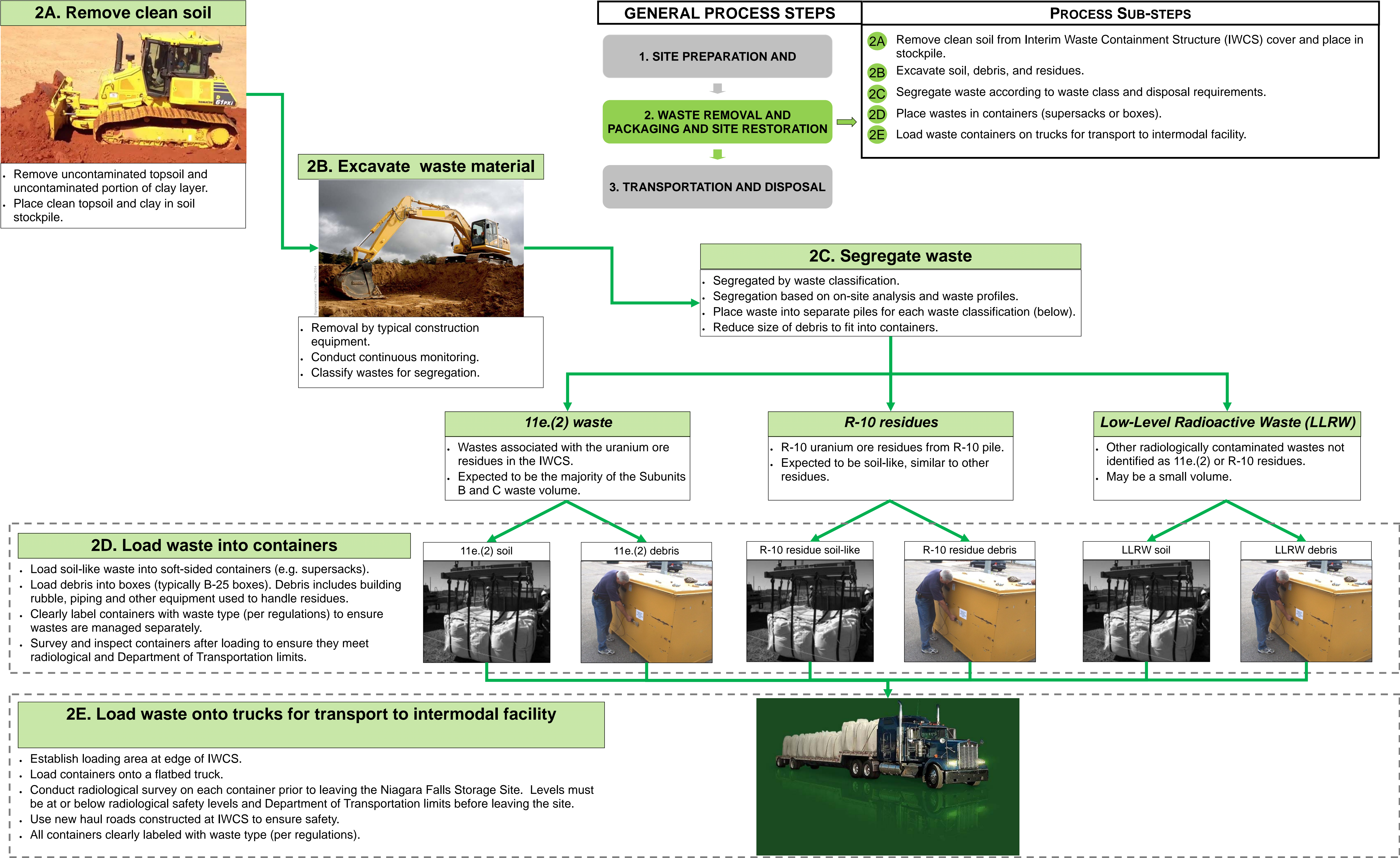




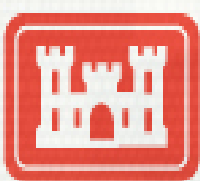


ON-SITE WASTE REMOVAL, SEGREGATION, AND PACKAGING

CONCEPTUAL MODEL FOR EXCAVATION AND PROCESSING OF SUBUNITS B AND C (REMEDIAL ALTERNATIVES 3A, 3B, AND 4)

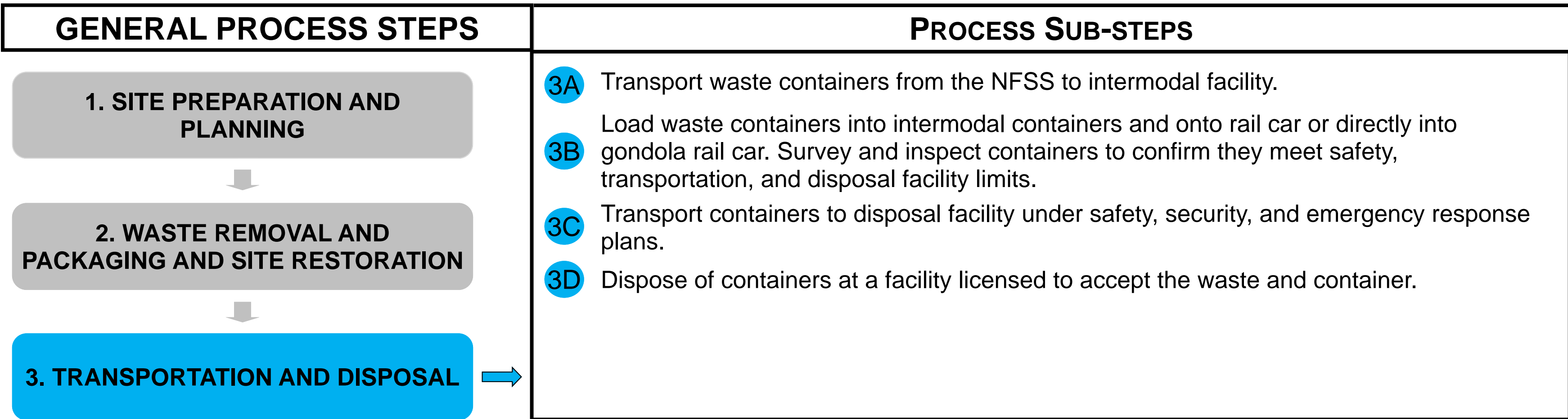
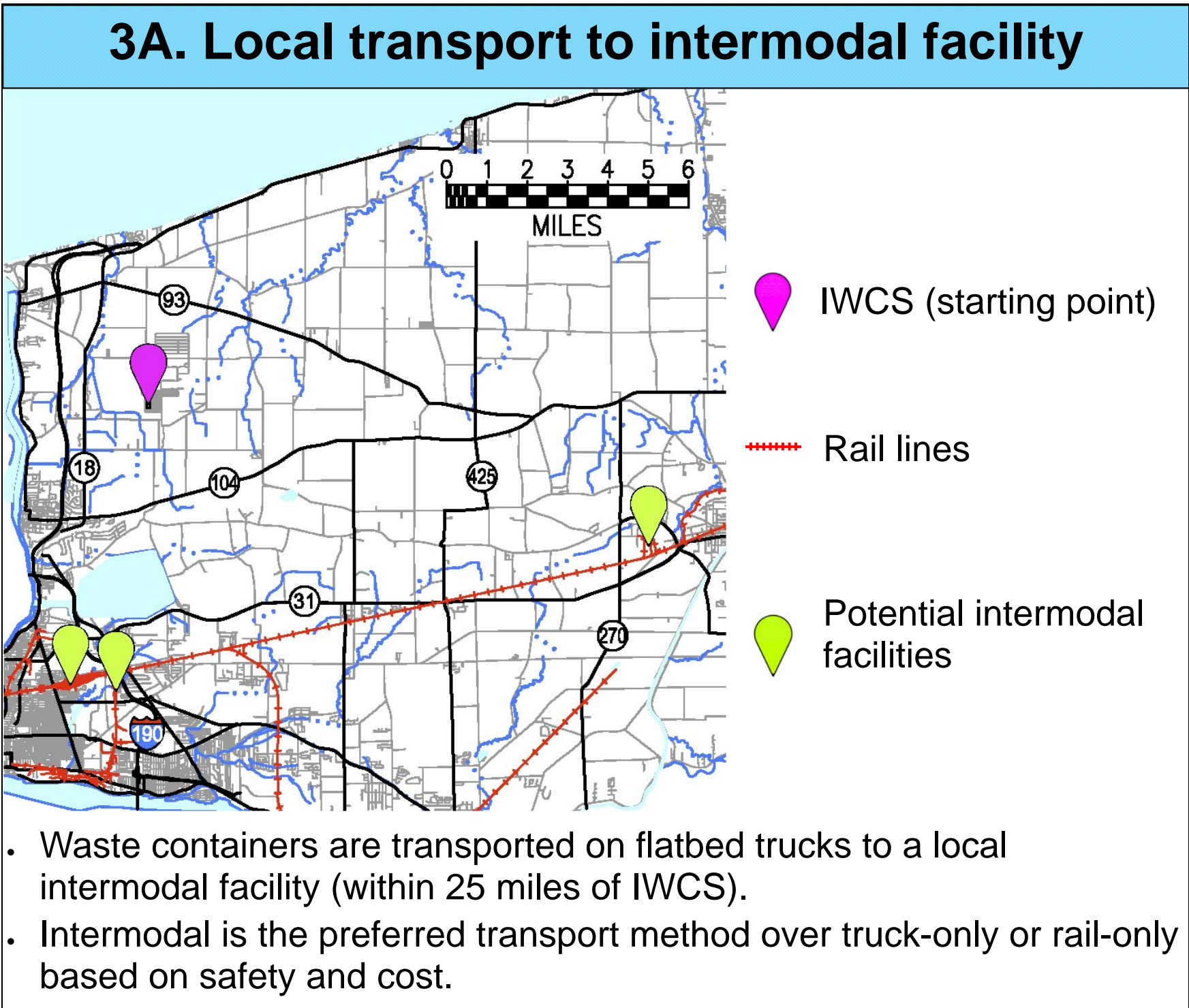






INTERMODAL TRANSPORT AND OFF-SITE DISPOSAL OF WASTE

CONCEPTUAL MODEL FOR EXCAVATION AND PROCESSING OF SUBUNITS B AND C (REMEDIAL ALTERNATIVES 3A, 3B, AND 4)



Approximate truck shipments by remedial alternative

Alternative	Approximate number of truck shipments			Truck shipment duration
	To IWCS for construction	Off-site for disposal	Total	
2. Enhanced Containment of Subunits A, B, and C	7,800 (cap construction)	0	7,800	2 years
3A. Removal, Treatment, and Off-Site Disposal of Subunit A with Enhanced Containment of Subunits B and C	10,100 cap and backfill	3,800 (IP-2) 4,000 (intermodal)	17,900	3.5 years
3B. Removal, Treatment, and Off-Site Disposal of Subunits A and B Enhanced Containment of Subunit C	5,700 cap and backfill	3,800 (IP-2) 6,300 (intermodal)	18,700	4.5 years
4. Removal, Treatment, and Off-Site Disposal of Subunits A, B, and C	0 (see note)	3,800 (IP-2) 18,200 (intermodal)	22,000	4.5 years

*Note: Staged clean soil from excavation provides material for site restoration (backfill and grading)*

- Shipments are estimated to occur from March to November each year.
- Time estimate is based on project funding of \$70 million per project year. Reduced funding may extend the project but should not affect the number of shipments.

