



United States
Department of Energy
National Nuclear Security Administration
International Nuclear Security

M4: MTRF Facility Familiarization

Research Reactor Sabotage Protection Workshop



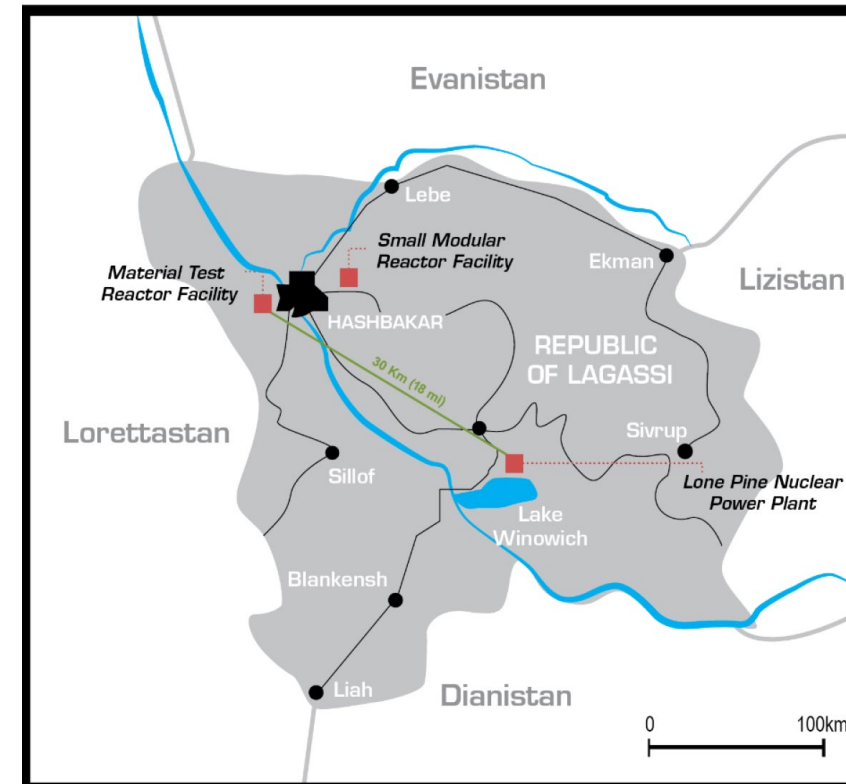
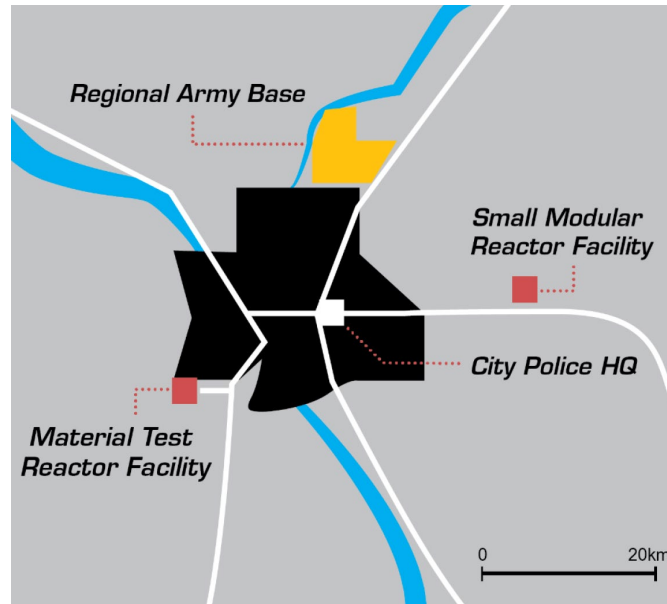
Learning Objectives

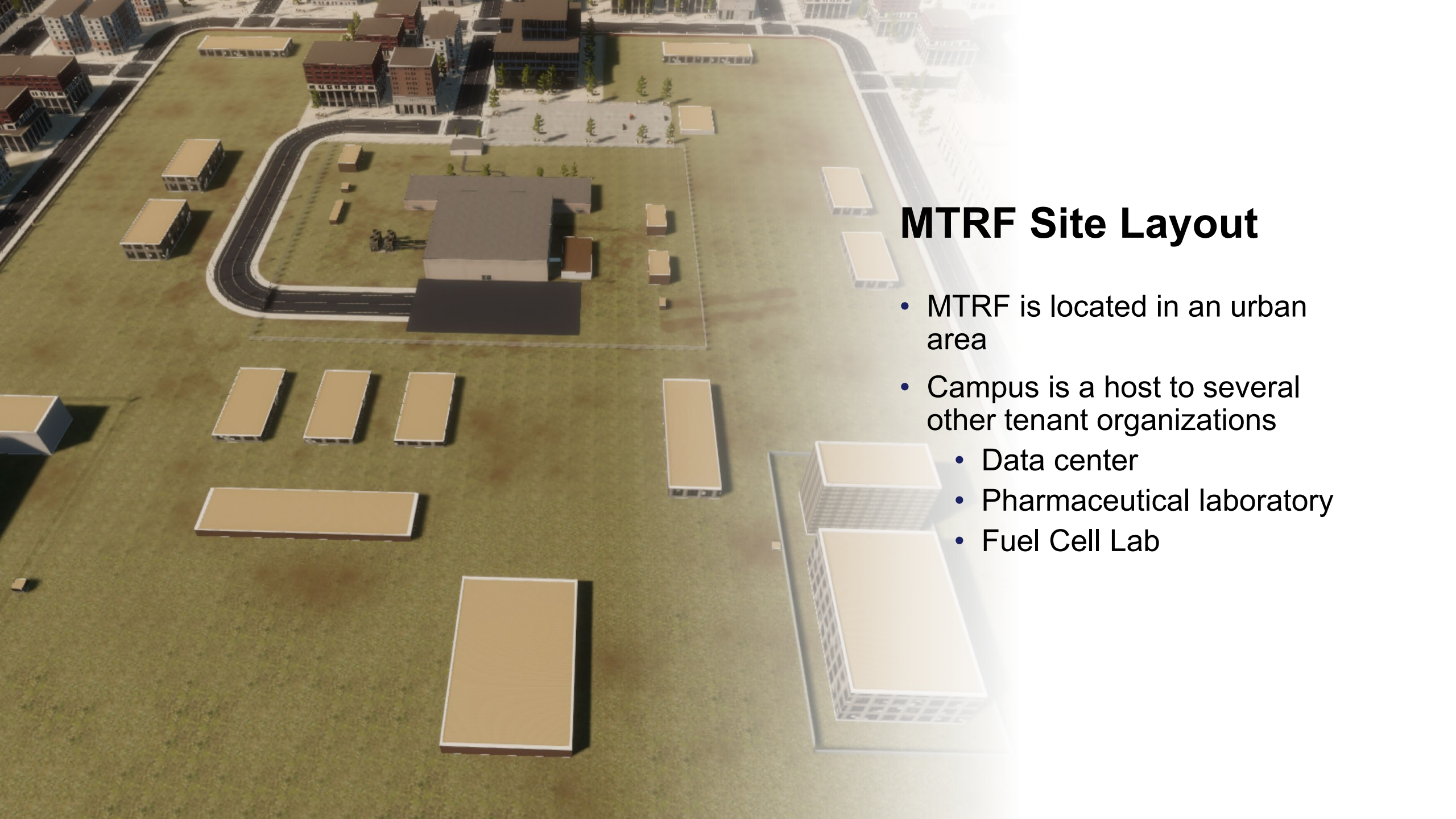
Objectives:

- Understand the physical characteristics and targets associated with the MTRF facility.

MTRF Site Location

- MTRF site is located in the Capital city of Hashbakar of a fictional country of Lagassi
- Lagassi has other nuclear facilities





MTRF Site Layout

- MTRF is located in an urban area
- Campus is a host to several other tenant organizations
 - Data center
 - Pharmaceutical laboratory
 - Fuel Cell Lab

Material Test Reactor Facility

10-MW multi-purpose, open-pool
type reactor

Uses

- Neutron transmutation doping of silicon
- Medical isotope production
- Neutron beam research
- Neutron activation analysis

Operations

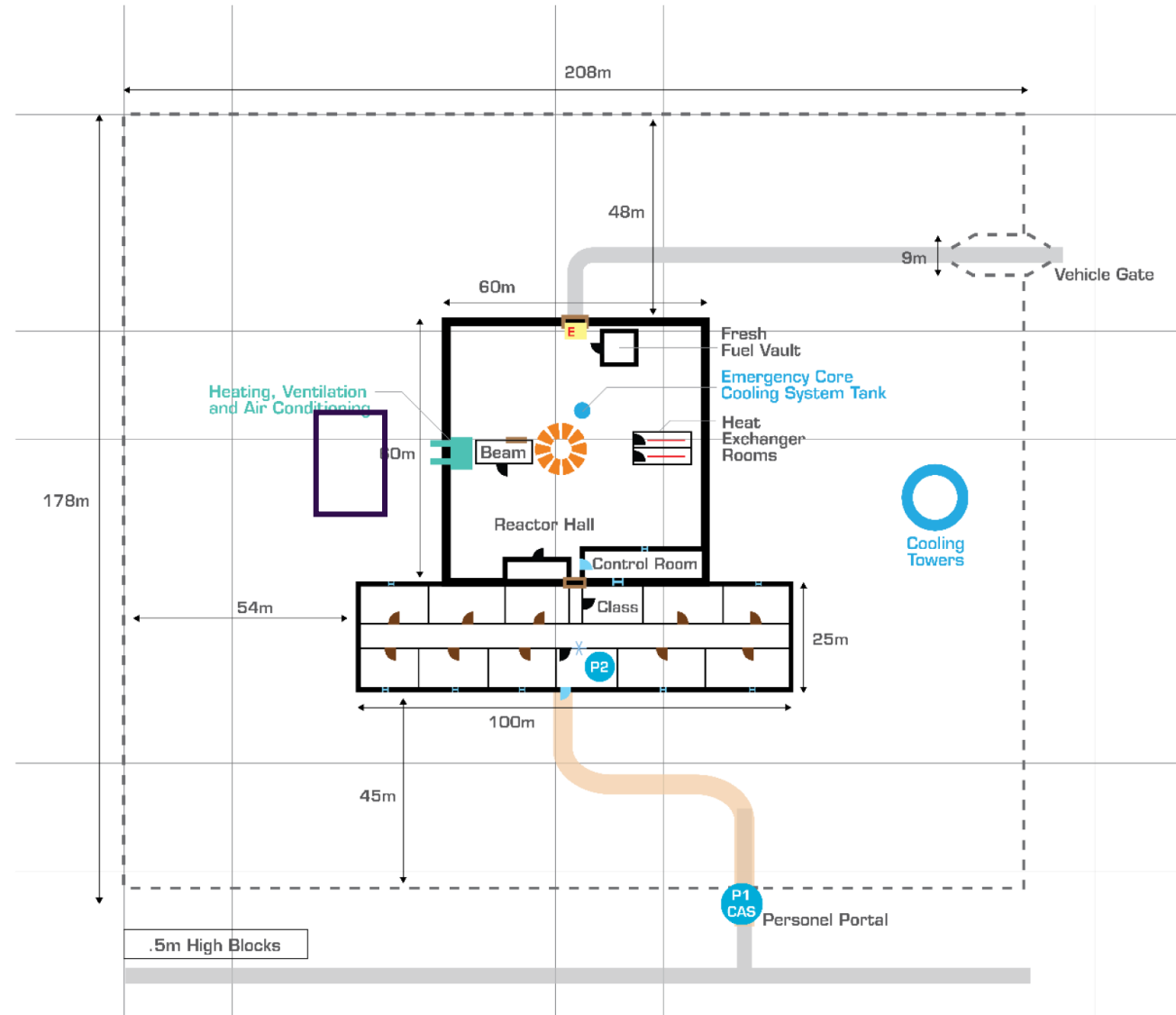
- 3 weeks on (24x7) / 1 week off + 1 month maintenance outage per year
- 2 Operators and 5 support during reactor operation
- Additional 10-15 research and maintenance personnel during day hours

MTRF Complex (1)

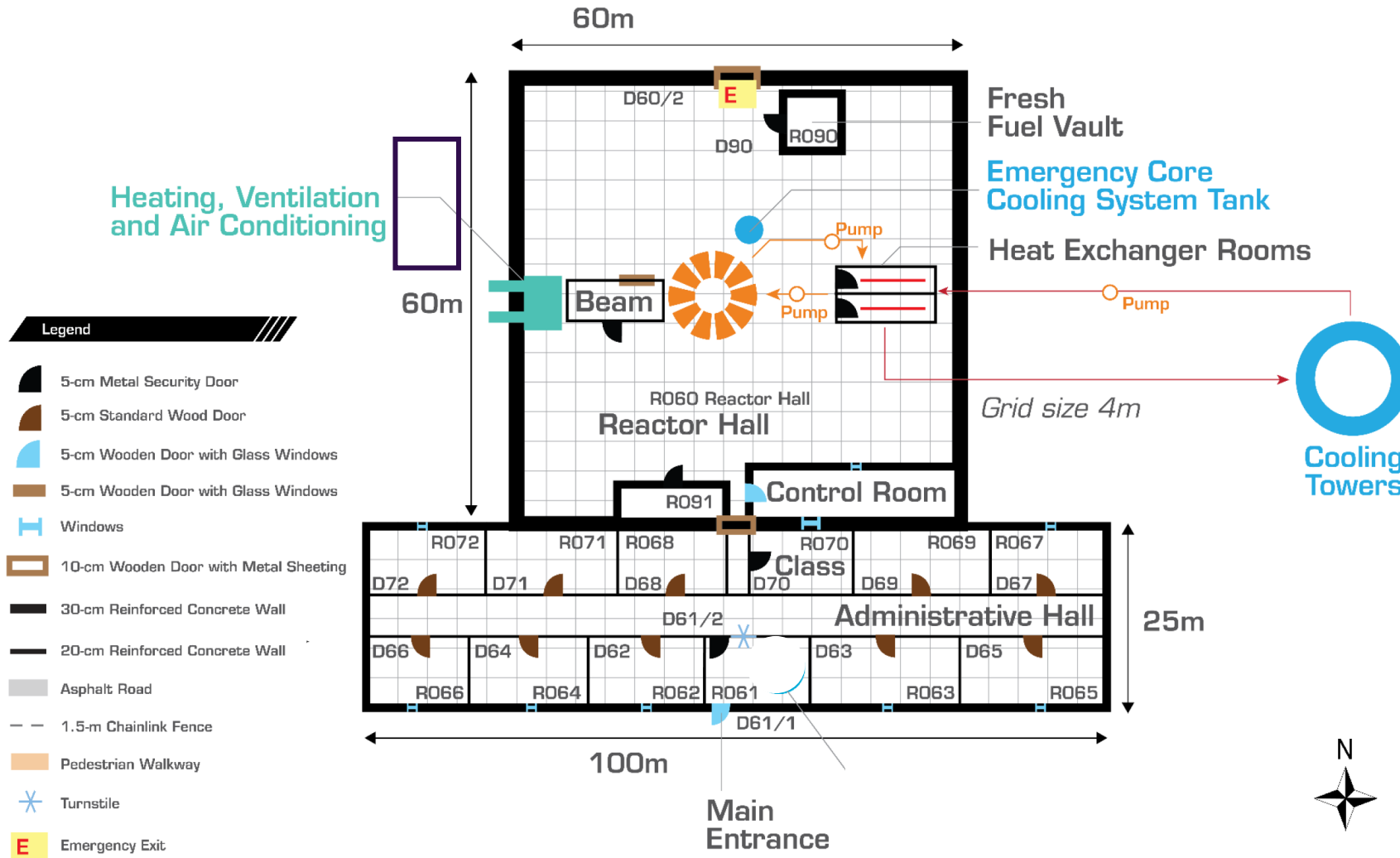
- Reactor hall
 - Reactor and support equipment
 - Equipment room
 - Fresh fuel storage
 - Control Room
- Spent Fuel Building
- Admin Building
 - BAS
 - Offices



MTRF Complex (2)

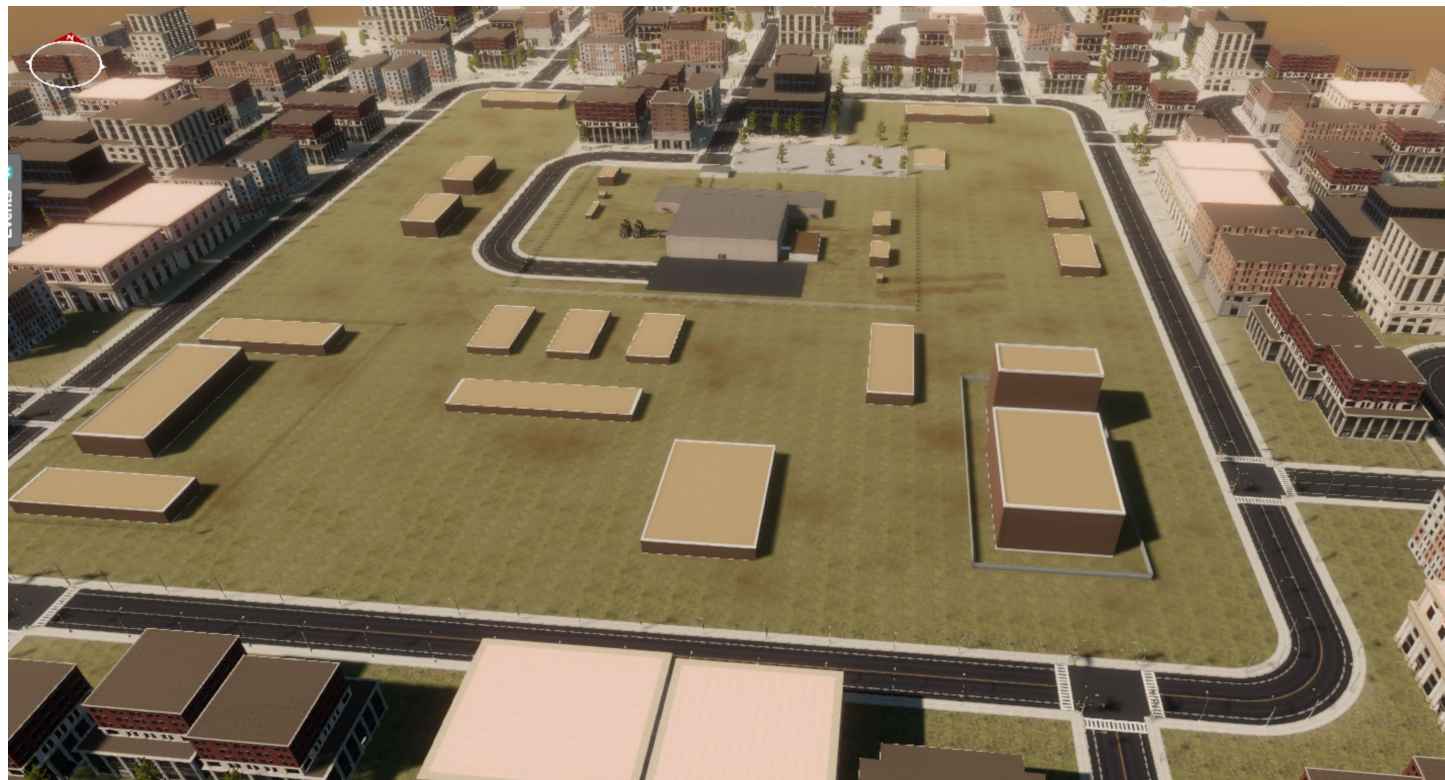


MTRF Complex (3)



MTRF complex (4) – Flyover

- Flyover movie



Nuclear Material Inventories

Fresh Fuel

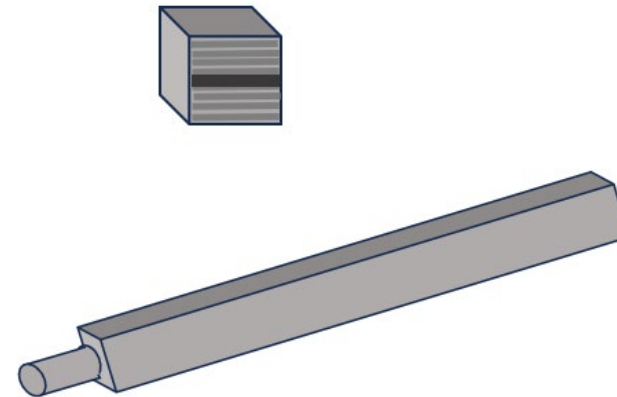
- 19.75% LEU as fuel assemblies
- 15-40 fuel assemblies stored in R090 strong room
- 12-15 fuel elements are consumed every year

Irradiated Fuel (dose rates of 300-1000 R/h @ 1 m)

- Reactor core – 20 fuel elements
- Reactor pool storage racks – 20 fuel elements
- Spent Fuel Building – 120 fuel elements

Nuclear Material Theft Targets

- Single fuel element (hypothetical)
 - 1 m x 10 cm x 10 cm / 15 kg in weight
 - contains 450 g U-235 in 19.75% LEU
- Fresh fuel is kept in storage cabinets in a strong room (R090)
- Theft of Cat II nuclear material (10 kg U-235) requires removal of 23 fuel elements with a total weight of 345 kg
- Irradiated fuel is not a theft target

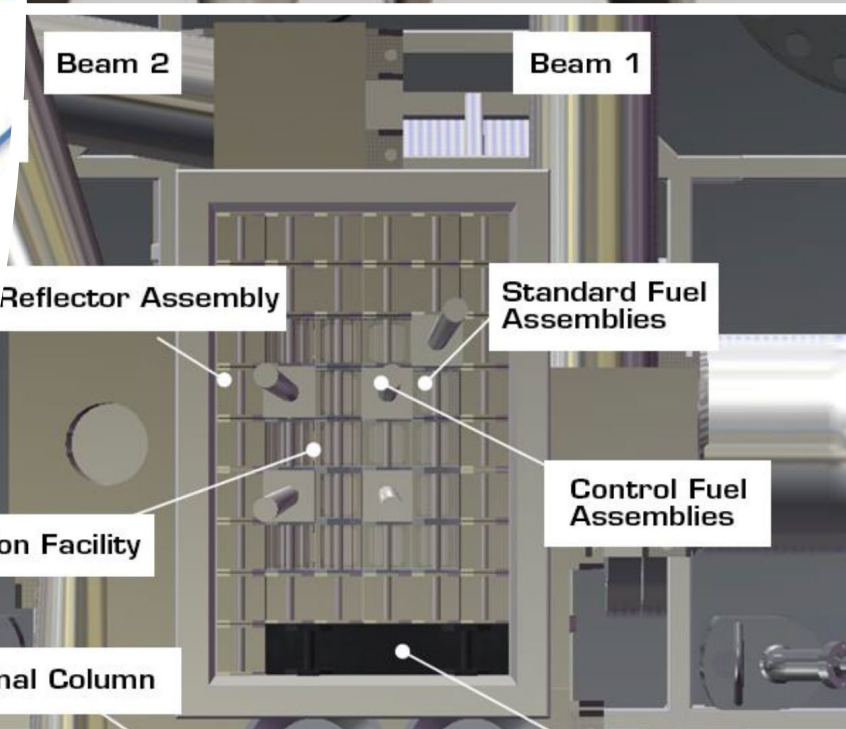
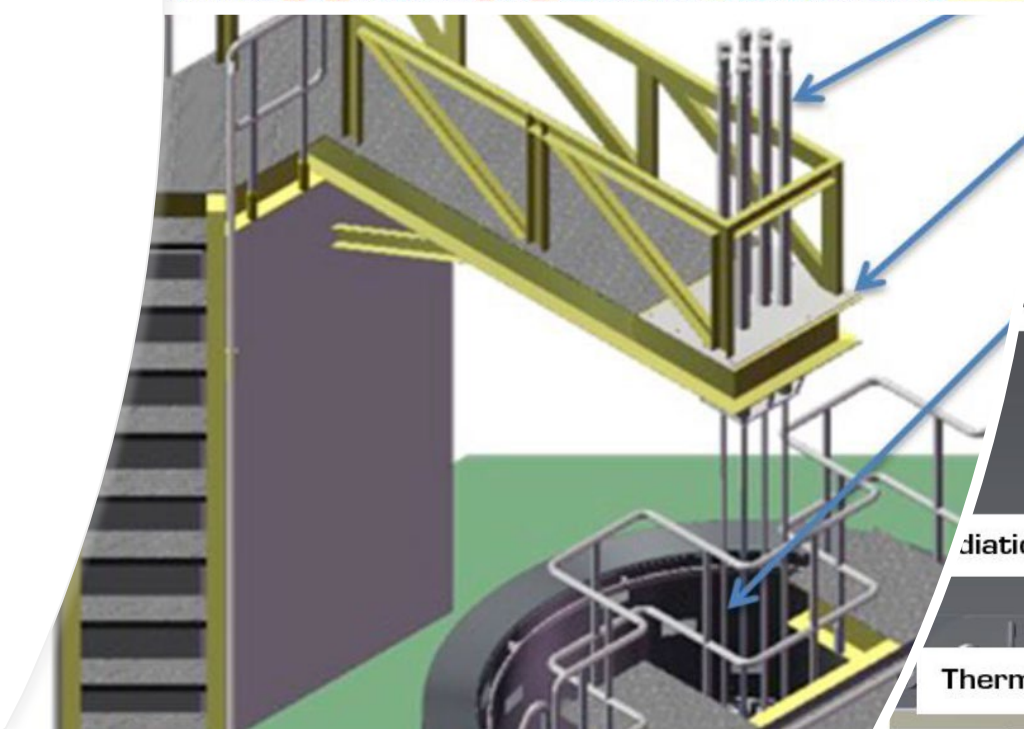
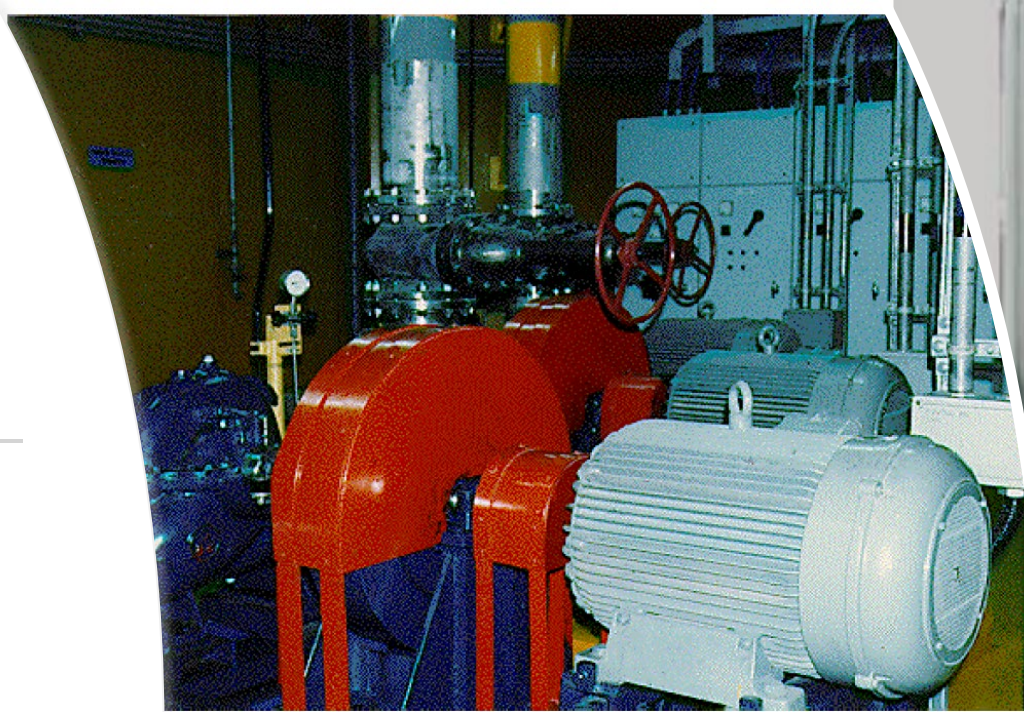


Source: SNL

Sabotage Targets (hypothetical)

Malicious Act (target)	Location	Rationale
SCRAM	Control room	SCRAM system controlled from controlled room
SCRAM	Reactor hall	Mechanical removal of control rods
Direct attack / core	Reactor hall	Reactor core is accessible
Direct attack / SFP	SFP building	Spent fuel pool (SFP) is accessible
LOCA – coolant piping and ECCS	Equipment room	Piping and pumps are accessible Why would adversaries go to Equipment Room when they are already in Reactor Hall?
LOCA – Neutron beams and ECCS	Reactor hall and Equipment room	Systems are accessible

Sabotage Targets (2)



Physical Protection Considerations

MTRF has both theft and sabotage targets

Regulations require MTRF to implement a PPS capable of protecting the nuclear material and facilities against a postulated threat (DBT)

Facility-level PPS arrangements will be discussed during practical exercises

MTRF security response plans must be coordinated with off-site security response plans and emergency response plans

Off-Site Security Response

Local police

- One vehicle with a two-man patrol within 15 min
- Second vehicle with a two-man patrol within 30 min
- Armed with 9mm pistols and shotguns

Hashbakar Special Response Unit from Regional Army Base

- arrival within 90 min
- 15-operator tactical response team (TRT)
 - 9mm pistols, rifles and submachine guns
 - sniper element with 7.62 mm precision rifle
 - explosive breaching capability
- EOD with specialized equipment (bomb disposal robot, K-9, x-ray, disruption equipment, etc.)

Off-Site Response - Other

Medical

- two ambulances with 4 emergency medical personnel
- Advanced medical support –Hashbakar General Hospital

Emergency response

- Fire brigade
- Army CBRN unit

National Crisis Response Center

- MTRF is a hypothetical facility
- MTRF is an URC target
- MTRF has Category II nuclear material theft target

In Conclusion

Questions, Comments, Concerns?