

**U.S. Department of Energy
Office of Civilian Radioactive Waste
Management**

**Interim Storage Facility (Phase I)
Topical Safety Analysis Report
Development & Status**

Prepared For
**Nuclear Waste Technical Review Board Meeting
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**PRESENTED BY
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PURPOSE

- The Interim Storage Facility (ISF) Phase I Topical Safety Analysis Report (TSAR) is being developed to reach regulatory resolution on generic technical issues prior to submittal of a site-specific license application. Similar to TSAR's used for Part 50 (Power plants) and other Part 72 (Storage) applications.

Interim Storage Facility TSAR Phase I Rationale

- Resolves generic technical issues associated with facility design prior to license application.
- Based in part on proposed legislation.
- Establishes DOE and NRC interface.
- Integrates storage facility issues with market-driven transportation initiative.
- Consistent with current program approach.

ISF Phase I Design Requirements

- Minimize startup time and cost of facilities.
- Canistered spent fuel receipt only.
- Utilize existing transport and storage cask/canister systems.
- Assume bounding site characteristics.
- 1200 MTU per year receipt rate in first two years, ramping up to 3000 MTU maximum.
- Total storage capacity 40,000 MTU, about 6500 storage casks.

Commercial Technologies

- Submitted or Approved Safety Analysis Reports as of 6/1/96:
 - VECTRA MP-187
 - NAC - STC
 - Holtec HI-STAR 100
 - Sierra Nuclear TranStor

Generic Site Criteria

- Provide a basis for ISF design
- Values are intended to reasonably bound 48 continental United States
- Based on NRC accepted codes and standards
- Shared with industry and cask designers

Approach

- Established a list of source criteria from:
 - ISF Design Requirements Document
 - 10 CFR Part 72
 - Site to be determined
 - Nuclear Regulatory Commission (NRC) Regulatory Guide 3.48 [Format & Content for Independent Spent Fuel Storage Installation (ISFSI) SAR]
 - NUREG-1567 (draft) [Standard Review Plan (SRP) for Spent Fuel Dry Storage Facilities]
 - NUREG-0800 [Standard Review Plan for Nuclear Power Plants]

Approach (continued)

- Established a list of source criteria from:
 - Advanced Light Water Reactor certification documents
 - ISFSI site, cask/canister vendor, and dry transfer system SARs
 - ANSI/ANS-57.9-1992 (Design criteria for ISFSIs)
 - Industry experience designing nuclear facilities

Generic Site Criteria

- Ambient Temperature
- Wind Loads (non tornado)
- Tornado (wind loads)
- Tornado (missile spectrum)
- Precipitation
- Lightning
- Snow and ice loads
- Meteorology
- Seismic (ground motion)
- Explosions
- Air Quality (corrosion)
- Aircraft impact
- Proximity to other uranium fuel cycle facilities
- Floods
- Seismic surface faulting
- Foundation design
- Site grade
- Volcanic eruption

Tornado Wind Load

- Criteria
 - Maximum translational speed: 70 mph
 - Maximum rotational speed: 290 mph
 - Maximum wind speed: 360 mph
 - Radius of maximum rotational speed: 150 ft
 - Pressure drop: 2.0 psi at 1.2 psi/sec
 - Gust factor: 1.0

Tornado Wind Load

- Basis
 - Regulatory Guide 1.76 criteria for nuclear power plants

Tornado (Missile Spectrum)

- Criteria
 - NUREG-0800 Missile Spectrum I - Three missiles
 - Massive Missile (automobile)
 - Penetrating Missile (8" diameter artillery shell)
 - Small Missile (1" diameter steel sphere)
- Basis
 - SRP for nuclear plants (NUREG-0800)

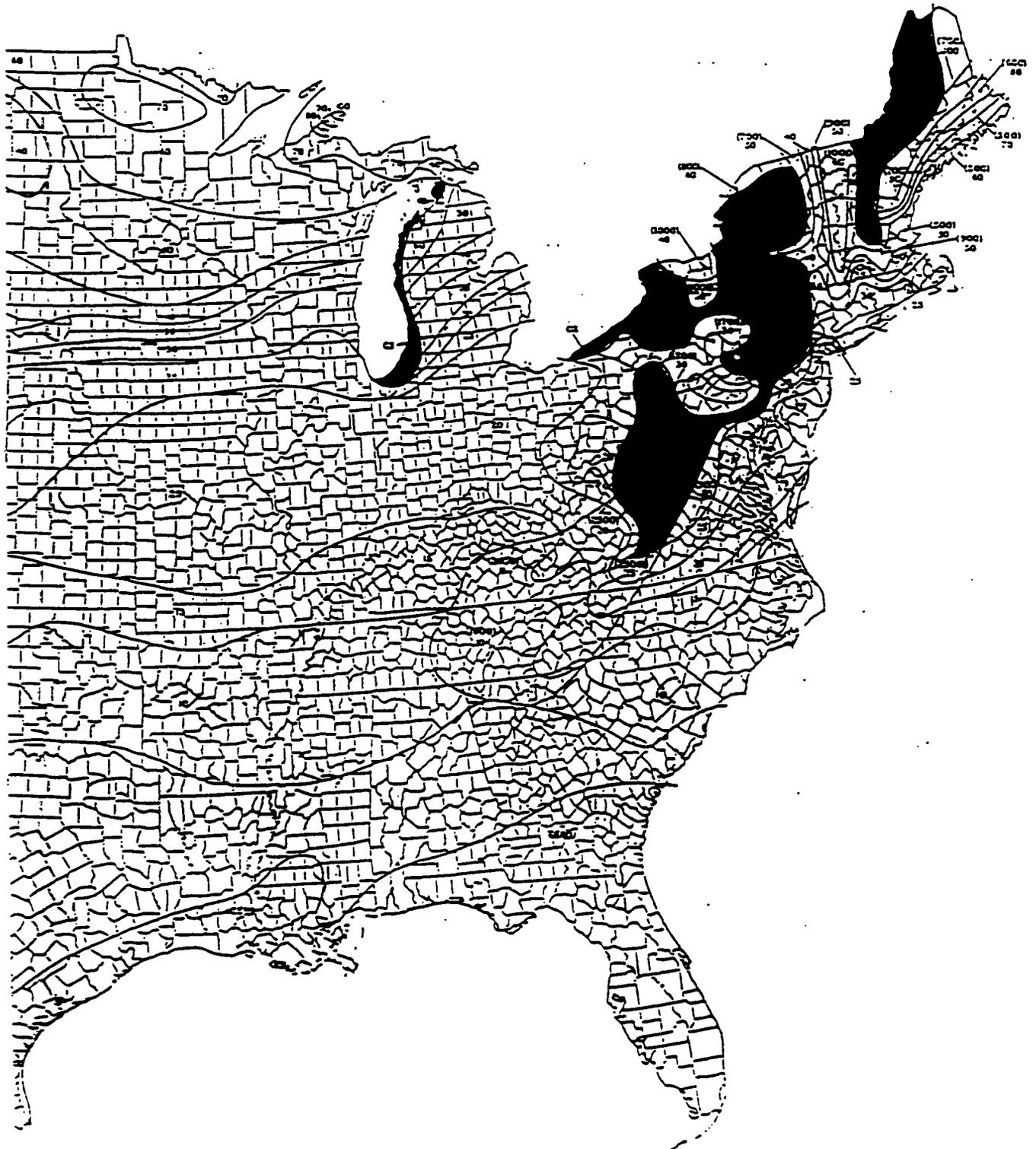
Seismic - Ground Motion

- **Criteria**
 - Design Earthquake described by NRC Regulatory Guide 1.60 design response spectra anchored at a horizontal acceleration of 0.75 g
- **Basis**
 - NRC Regulatory Guide 1.60 (Design Response Spectra for Seismic Design of Nuclear Power Plants)
 - Various seismic hazard assessments for nuclear power plants and DOE sites



Generic Site Criteria Maps

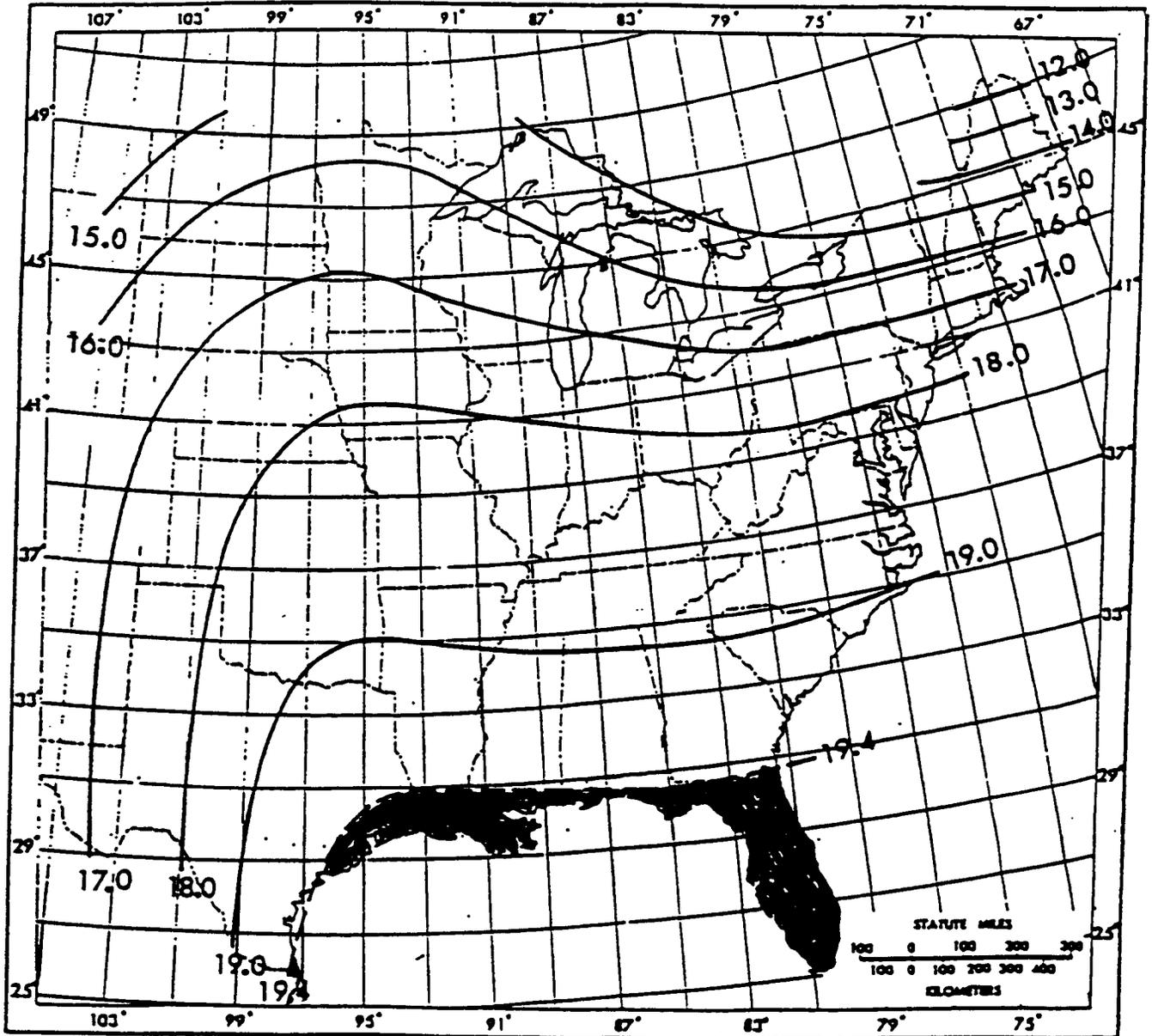
Snowloading (Eastern U.S.)



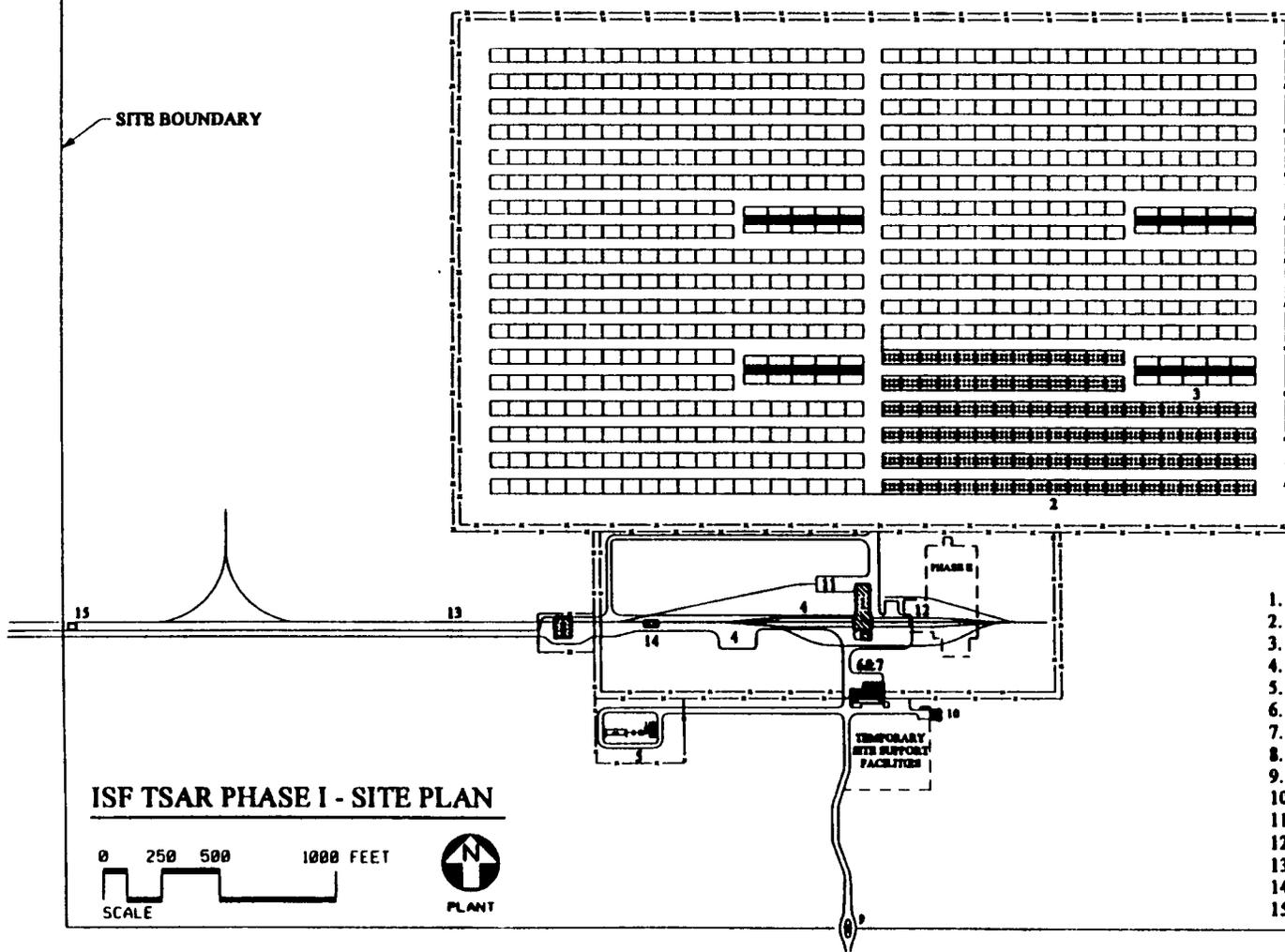
Snowloading (Western U.S.)



1-hr 1-mi² Probable Maximum Precipitation Analysis U.S. East of 105th Meridian



SITE LAYOUT



KEY TO PLAN:

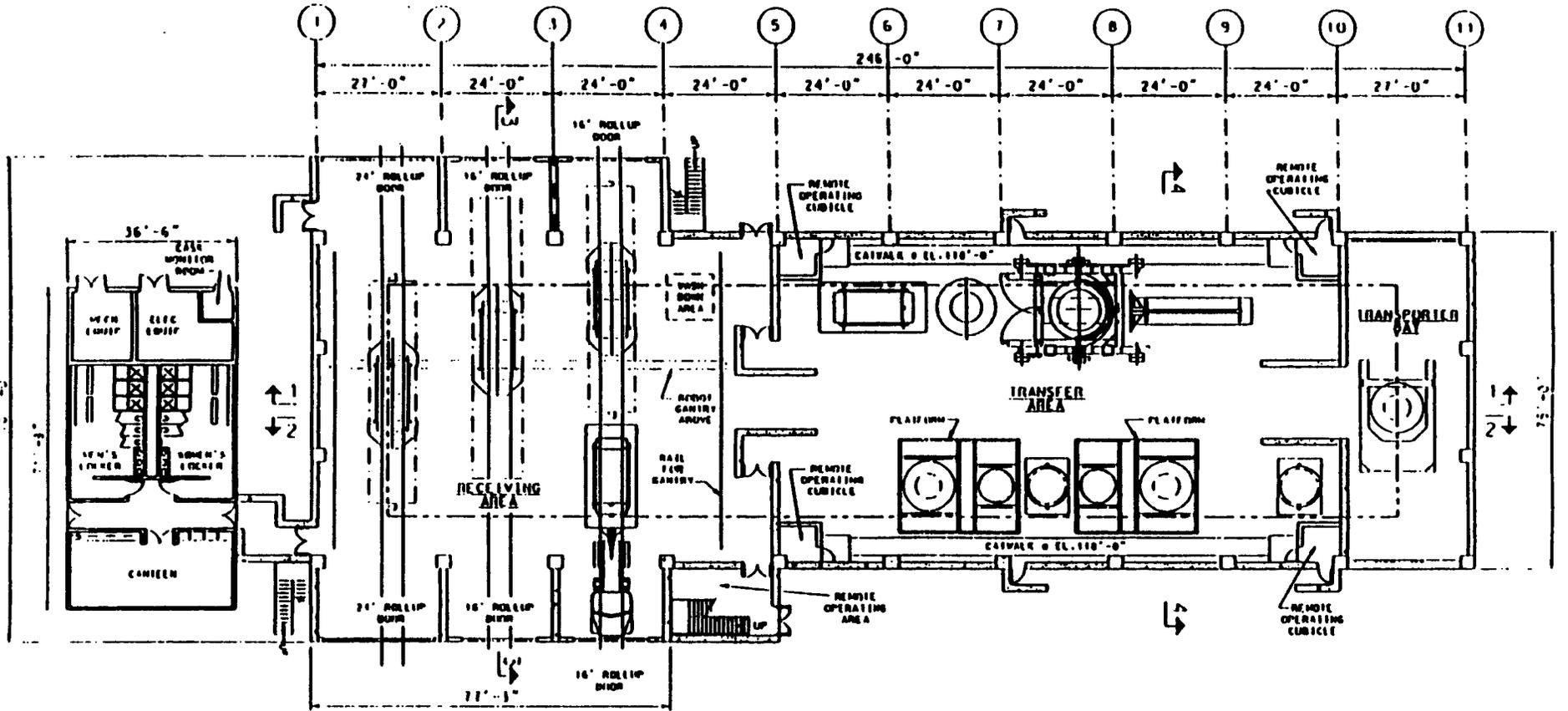
1. TRANSFER FACILITY
2. CONCRETE CASK STORAGE PADS
3. HORIZONTAL STORAGE PADS
4. SHIPPING CASK QUEUING AREAS
5. SWITCHYARD
6. BADGING AREA
7. SECURITY COMPLEX
8. INSPECTION GATEHOUSE
9. MAIN GATE HOUSE
10. WATER UTILITIES & FIRE PROTECTION
11. CONCRETE CASK STAGING AREA
12. OFF-NORMAL HOLDING AREAS
13. ON-SITE RECEIVING AREA
14. TRANSPORTER WASH DOWN STATION
15. RECEIVING GATE HOUSE

ISF TSAR PHASE I - SITE PLAN

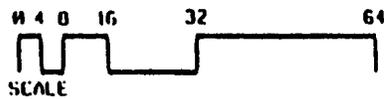




TRANSFER FACILITY GENERAL ARRANGEMENT



ISF TRANSFER FACILITY - PLAN AT EL. 101+0



PLANT

Average Individual Exposures ALARA Methods

- Average dose ranges from 0.04 to 0.1 person-rem per cask.
- Exposure is shared between 8 to 10 operations personnel who average about 4 to ~~20~~ ¹⁰ millirem per person per cask.
- Facility is designed to receive up to 200 casks per year in Phase I.
- Average annual exposure 0.8 - 2 rem per person. Complies with Part 20 limits, ALARA goals.

ALARA Evaluation Results

- Traditional manual cask handling methods exceed dose limits due to the number of casks handled.
- Remote and automated techniques are feasible and justified based on dose savings.
- Average individual exposures can be expected to be less than 1 rem per year.
- Additional reduction may be necessary depending on the type and number of specific storage technologies received in one year.

Potential Technical and Regulatory Issues

- Off-normal recovery methods.
- Enveloping site criteria including increased seismic, soil, and flood criteria on existing storage system designs.
- Design basis accidents.

Design Summary

- As design proceeds issues will arise.
- ISF design can accommodate some issues and vendor analyses may need to be reviewed and possibly revised to accommodate others.
 - Vendor designs may need to be modified to bound environmental criteria for all sites.
 - Standard cask handling practices may need to be modified to meet ALARA principles.

NRC Interactions

- Two NRC meetings to date
 - First meeting on August 20, 1996
 - Introduced project
 - Generic site design criteria
 - Second meeting on November 20, 1996
 - Design Basis Events
 - Design Criteria
 - Nuclear Analysis

NRC Interactions

- NRC feedback
 - Pre-application meetings are valuable and productive
 - TSAR submittal will provide early resolution to various issues
 - Design of a facility that uses many different systems
 - Solidify process for DOE/NRC interaction
 - Resolve technical issues associated with facility not co-located with Part 50 site
 - Consideration of issues associated with handling many casks

Interim Storage Schedule

