



INL/INTEC Wireless Emergency Communications System

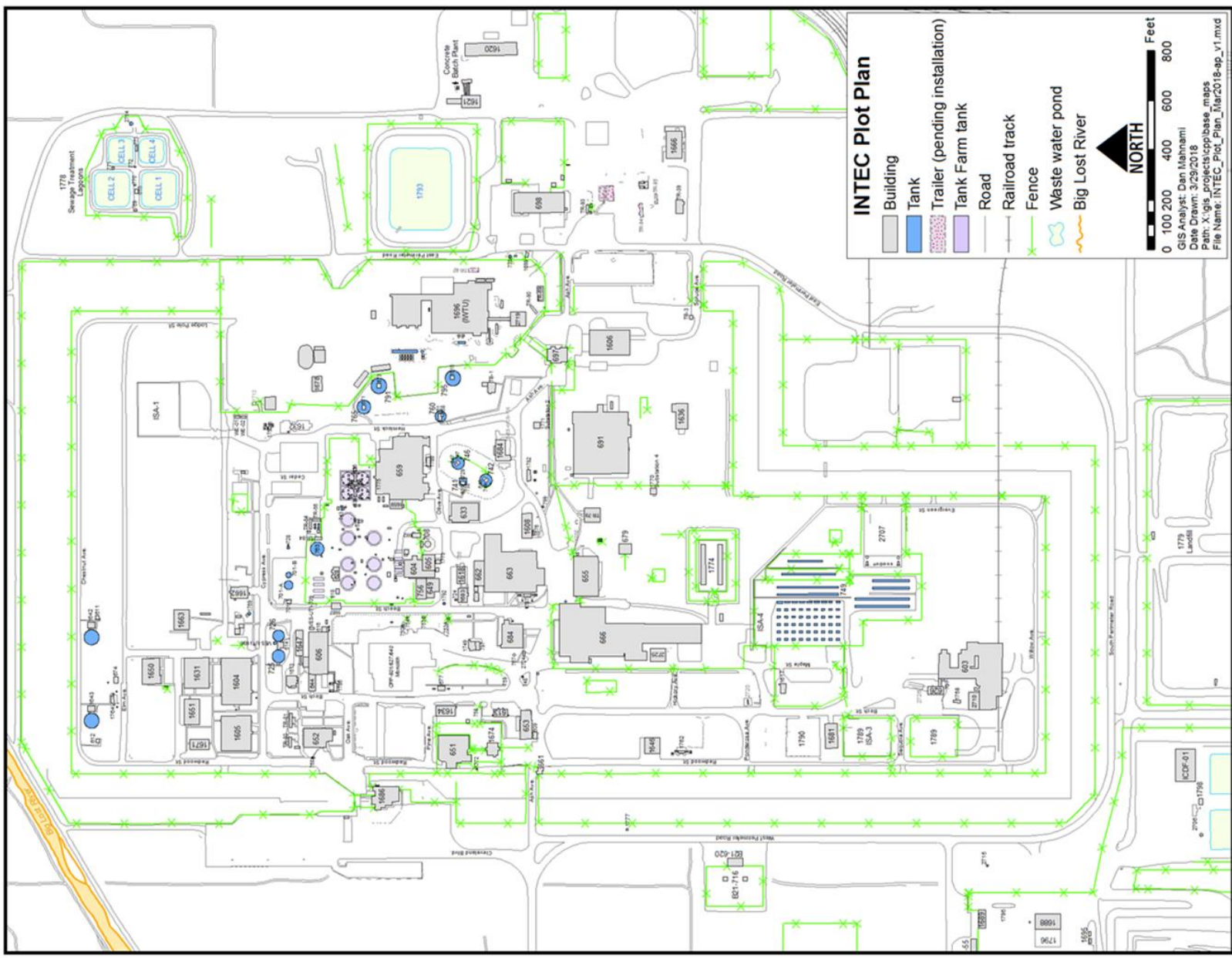
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Background

- Idaho Nuclear Technology and Engineering Center (INTEC), located at the Idaho National Laboratory, receives and stores spent nuclear fuels and radioactive waste, treat and convert waste, and develop new technologies for waste and waste management for the DOE.
- Construction of the first facilities at INTEC was completed in 1951.
- Includes a combination of nuclear and non-nuclear facilities.
- Complex operates 24/7 and employs approximately 600 personnel.

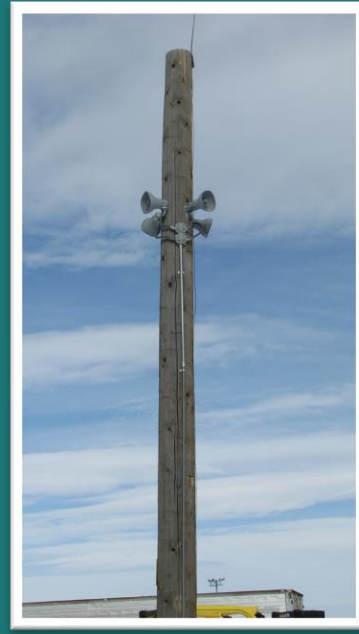


Outdated Emergency Communication System

- INTEC's existing Emergency Communication System (ECS), the Random Access Digital Audio (AKA- RADA) System was over 25 years old.
- System was unreliable and difficult to maintain.
 - System software was DOS based
 - Programming changes were difficult (was done with a dedicated laptop)
 - External Tech Support became non-existent
 - Replacement system hardware was no longer available
- Modifying the system to include/exclude facilities was problematic.
 - System was "hard-wired"
- Stand-alone system.
 - Received output alarm information from the building fire alarm panels, but was a separate system with dedicated speakers.

Outdated ECS System (continued)

- Had inherent design weaknesses, for example, in a fire alarm activation:
 - Received input alarm information from the building fire alarm panels. The information was transmitted to a central processing unit (e.g. Head-end) and then transmitted a pre-programmed emergency message to the building in an alarm and alert message to all other buildings at INTEC.
 - Loss of communication with the Head-end would result in the loss of fire evacuation notification in all INTEC Buildings.
 - Did not include all important buildings which were added after the RADA system was installed.
- Messages broadcast over the INTEC Compound's External Speakers were difficult to understand (Intelligibility Concerns).



INTEC ECS System Requirements/Objectives

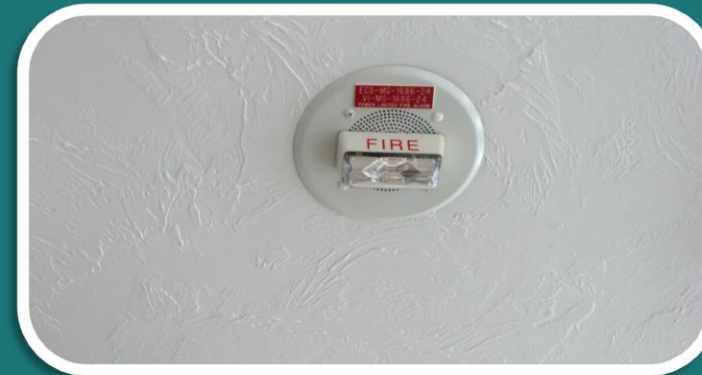
- Provide multi-tone signals, live voice messages, and pre-recorded messages to the normally occupied facilities at INTEC in accordance with NFPA 72.
- Support a multi-building complex with the capability of activating any combination of zones.
- Use a wireless platform to control and communicate with INTEC buildings, building groups, and yard areas.
- Be fully supervised and monitor for loss of power, loss of communication, and other system fault conditions (29 CFR 1910.165 [d][4]).
- The base stations, transceiver, antenna, and wireless communication shall be NRTL listed as an employee alarm system (29 CFR 1910.165).
- The system components that are used to activate local fire alarm notification appliance circuits be NRTL listed for that function (NFPA 72).

INTEC ECS System Requirements/Objectives (continued)

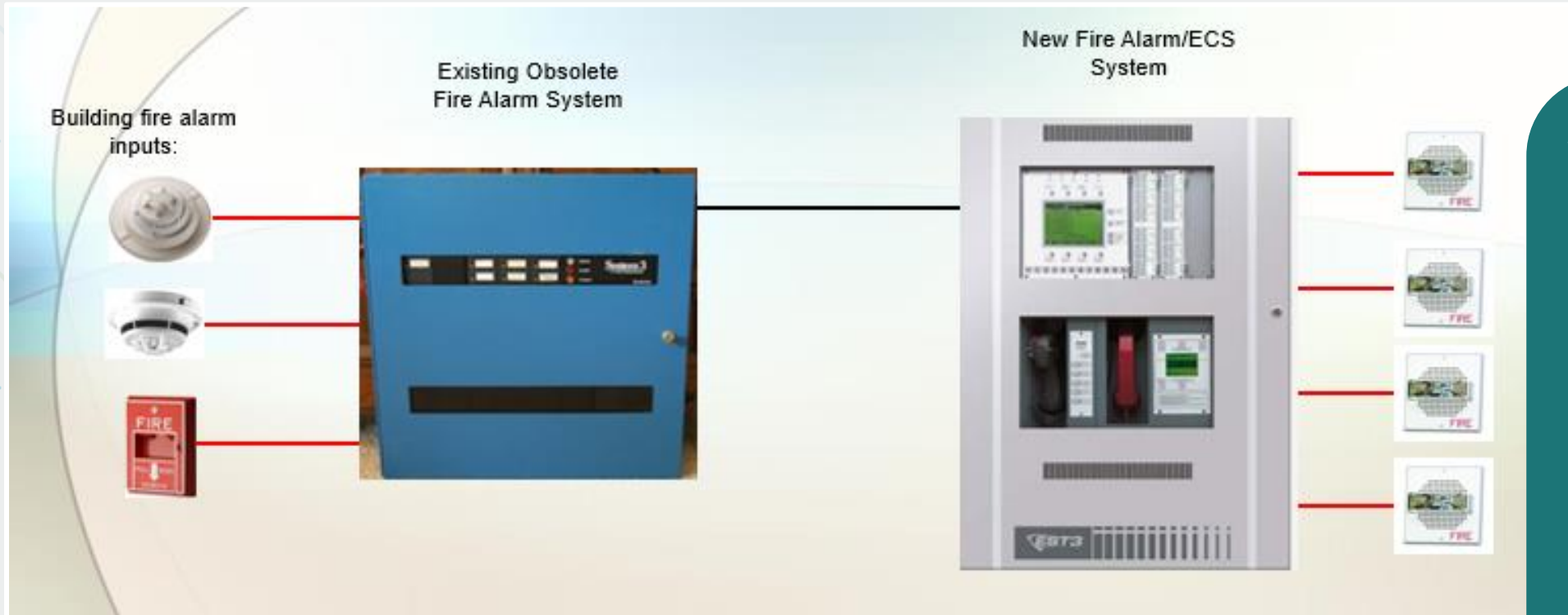
- Be capable of being updated and maintained by manufacturer-trained Idaho Cleanup Project (ICP) personnel (best management practice [BMP]).
- Be capable of accepting input signals from other systems (e.g., existing building fire alarm panels).
- Operate on radio frequencies currently available at the Idaho National Laboratory (INL) Site. (*INL Site requirement*)
- Intelligible mass notification throughout the INTEC yard areas.
- Head End Unit control units and field control units be UL 2517 listed. (*Mass Notification Systems*)
- Field control units be UL 864 listed to operate as a *stand-alone* fire alarm panel. (*Standard for Control Units and Accessories*)

Edwards EST3 System Selected

- Project included adding new ECS panels in occupied buildings with new audible devices (speakers) and new strobes (where applicable). The new panels were installed adjacent to the existing fire alarm panels.
- Outdoor, high power speaker arrays (HPSA's) were installed.
- Field panels are a combination ECS/Fire Alarm Control Unit (NRTL Approved for both Mass Notification and Fire Alarm).



Integrate New ECS and Existing Fire Alarm



SEQUENCE OF OPERATIONS

Fire alarm device activates in building:

- Activates alarm on existing panel
- Sends signal to new local ECS/Fire Alarm panel
- Activates local alarm notification appliances and transmit alarm signal to new ECS Head-end
- New ECS Head-end broadcasts alert message throughout INTEC buildings and outdoor areas

Phase I – Integrate ECS and Fire Alarm

- Existing Fire Alarm Panel makes/manufacturers:
 - System 3
 - KDR-1000
 - FCI-7100
 - Firequest 200
 - Radionics D7024
 - Radionics D9068



System Installation Approach

- Design and System Hardware by Licensed EST Authorized Dealer/Subcontractor.
- On-site Technical Oversight by Fire Alarm NICET III Subcontractor Representative.
- Installed by Force Account Electricians.
- Work Control Provided by ICP.
- ICP Technical Support by FPE and LSS.

Installation Challenges

- 30 new fire alarm/ECS panels installed.
- ECS cutover required maintaining 2 systems (RADA and Edwards).
- System software required tweaking to adapt to wireless bandwidth constraints.
- Force account approach included prioritizing the installations with “easy” buildings first, large non-nuclear buildings second, and nuclear facilities last.
- Equipment shortages due to COVID impacts.

New System Benefits

- Stand alone fire alarm systems in each building.
- More reliable and survivable Fire Alarm and Emergency Communications System.
- Dramatic improvement in external speaker intelligibility.
- Relatively straight forward approach in adding or removing building systems.
- Tech. and equipment support from manufacturer.

Current Status

- RADA system removed from service.
- New ECS fully functional.
- Initiating Phase II of the ECS fire alarm upgrade.



**OUTDOOR SPEAKER
(HYPERSPIKE)**

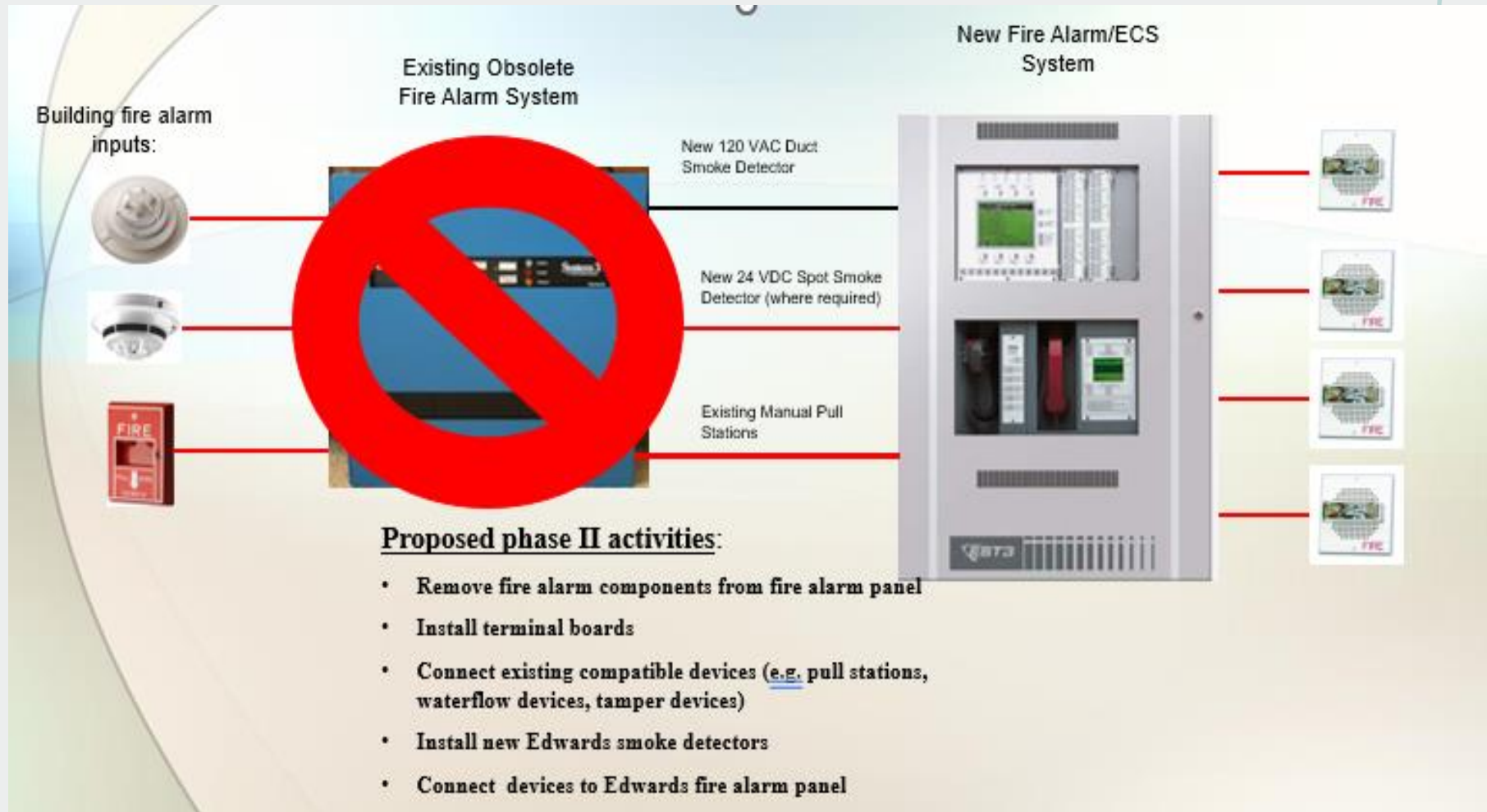


**SYSTEM
TRANSCIVER**



**INSTALLED FIRE
ALARM/ECS PANEL**

Phase II – Eliminate Existing Obsolete Fire Alarm Control Panels and Incompatible Devices (e.g. smoke detectors)



Phase II – Status

- Contract with same subcontractor (Alt #1 provision exercised).
- Cutover drawings in review.
- Similar approach to use force account electricians and ICP work control with technical oversight by subcontractor.



Questions?