

National Security Campus Fire Hazards Analysis – Final

DOE Fire Protection Conference

Las Vegas, Nevada

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Honeywell



National Nuclear Security Administration

Old Facility

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- **136 land acres**
- **38 buildings**
- **3.2M sq. ft.**
- **\$ 3.0B total value**
- **~ 50 MFL areas**
- **Largest MFL - \$250M**
- **~2510 FTES**



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New Facility

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- **Leased bldg.**
- Located in south KC
- 7 miles south of old facility
- 191 land acres
- 5 buildings
- 1.5M sq. ft.
- \$650M bldg. cost
- \$1.2B total project cost (including move cost)
- **Manufacturing Bldg. MFL**
 - Manuf. – \$411M
 - Stores - \$1B
- **~3200 FTES**
- **Move –in**
 - Start 1/2013
 - End 7/2014

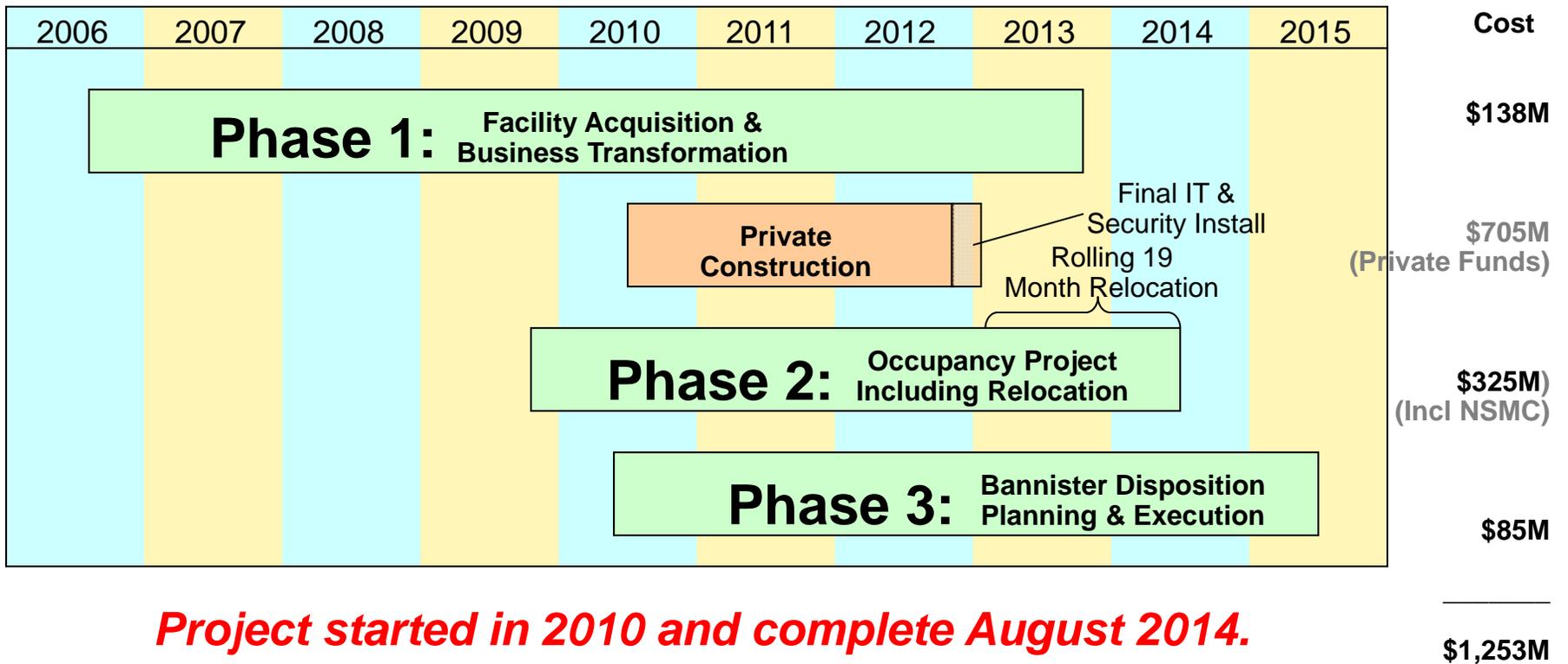


Transformation Schedule Summary



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Fire Protection Requirements and Insurance



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Applicable Codes

- DOE order 420.1c
- NFPA codes (all)
- Factory Mutual (guidance)
- City Building Codes
- International Building Codes
- International Fire Code (2006)

Insurance

- Building – Privately insured - \$1.16M
- Content - Government (self-insured)
- Mission Impact - Government (self-insured)



Staffing

- DOE/NNSA FPE – 0
- Honeywell FPE – 1
- Fire Brigade - 0
- First Aid/First Responder
 - provided by Security
- Emergency Management - 1

Emergency Response

Kansas City Fire Department

Response time –

In House First Responder –

3 Min

KC Fire w/ EMT – 5 min

KC Ambulance – 15 min

FHA Driver, History, and Cost

- **Required by Contract – DOE order 420.1c**
- **Preliminary FHA completed by A&E**
- **Final completed by Honeywell**
- **Started January 2013**
- **Completed December 15, 2014**
- **Cost ~ \$440K**
 - Honeywell – 0.75 FTE each year
 - Subcontractor - \$250K (\$140K of which was fire modeling)



Conducted during
occupancy phase

FHA Document provides all of the following all in one place:

- **Documentation of all fire protection design decisions**
- **Fire protection system drawings**
- **Building layouts**
- **HPR analysis**
- **Life Safety Analysis**
- **Building Assessments**
- **FDS fire modeling of 4 hazards**
- **Fire protection program assessment (performed independently by FPE subcontractor, the Fire Guy)**
- **Exemptions and equivalencies**

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Provides documentation of fire protection design decisions, exemptions, and equivalencies at the NSC, and all assessment contract requirements in one place. - 2700+ pages (9 volumes)

Models fire development proving that fire loss is within design parameters.

- **SMP Reactor Room - highest risk**
- **Stores - dollar loss exceeds Order limits**
- **ASRS – highest dollar loss w/ protection**
- **AEF – typical ordinary occupancy**

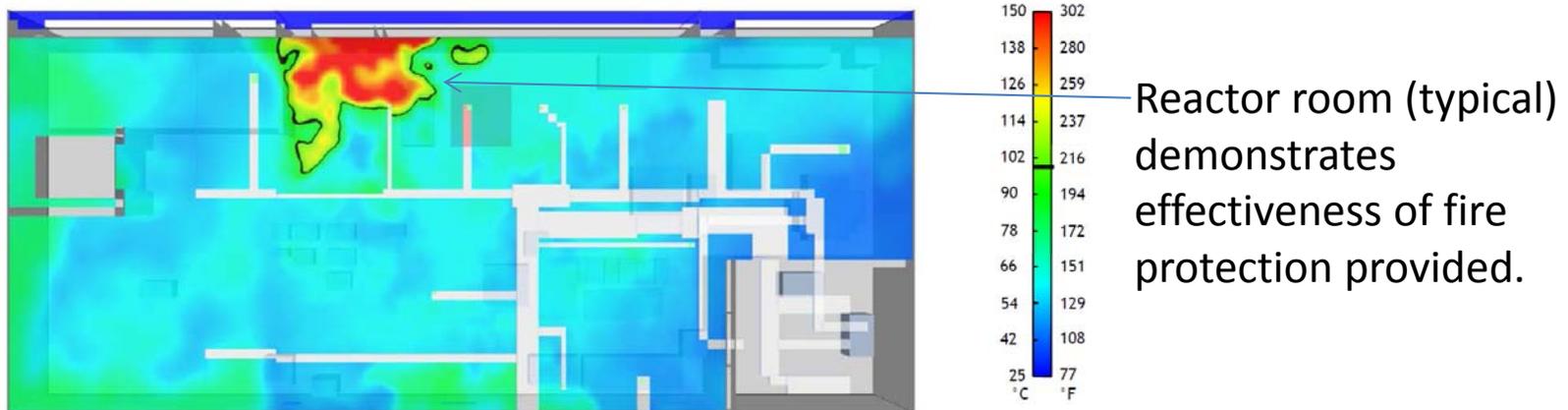


Figure 9 – Horizontal temperature distribution at 3.5 m (11.5 ft) elevation (lower level sprinklers) at the sprinkler actuation time (167 seconds).



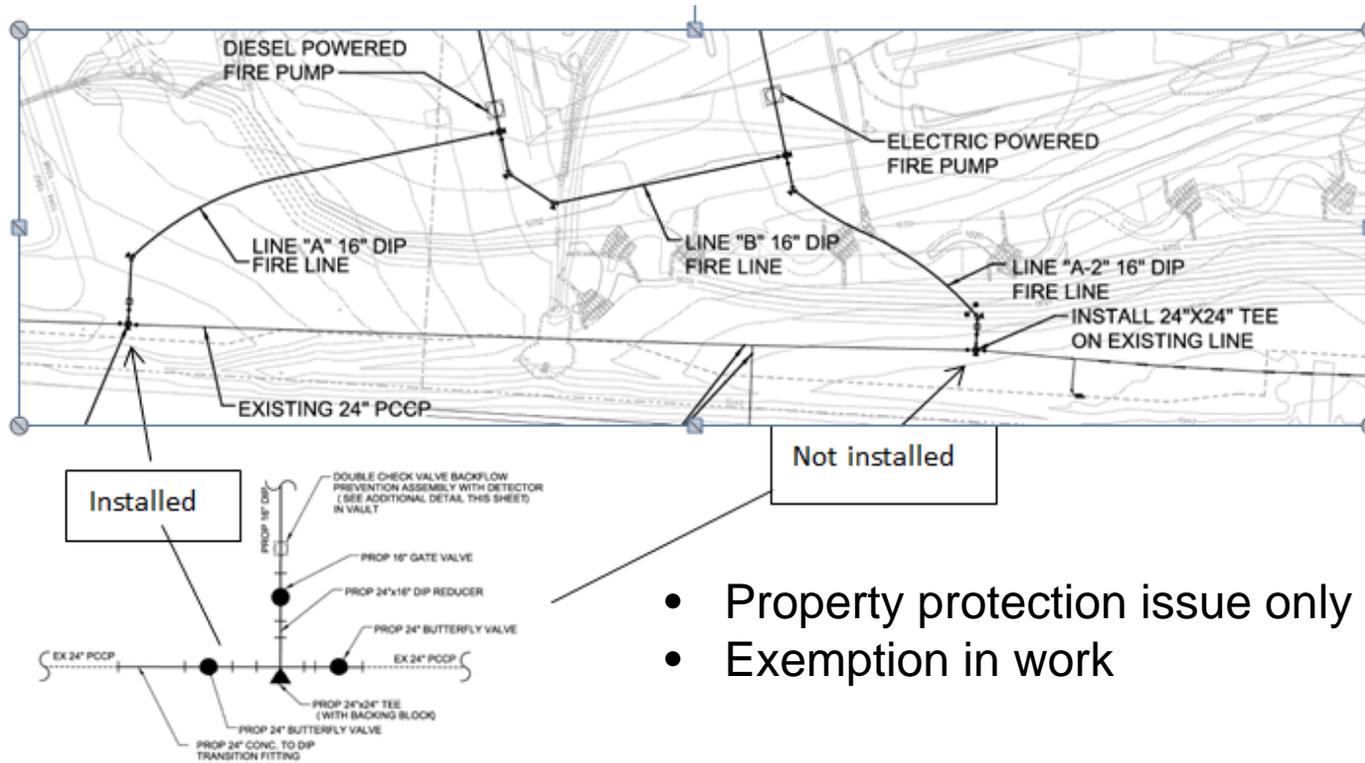
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Recommendations/Findings

Isolation valves in 24 inch city water line (in the design but not installed)



- Property protection issue only
- Exemption in work

Improper fire rated gypsum wall installation

Plan

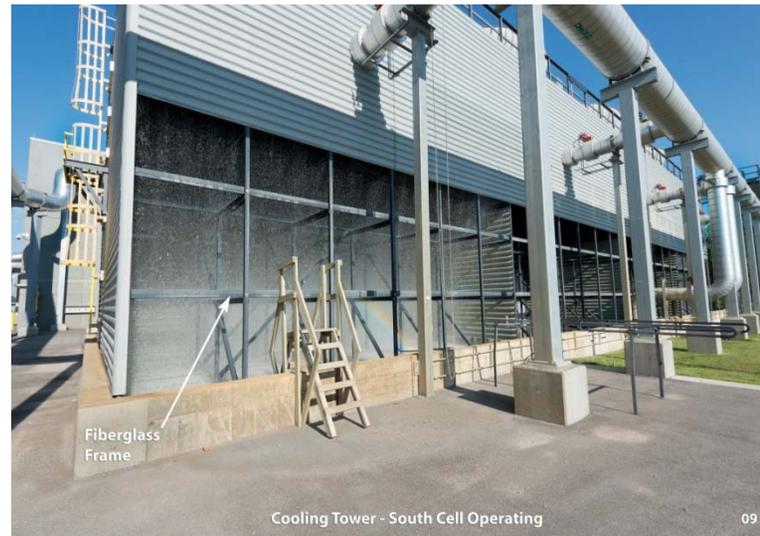
- Low Risk – Control Area wall
- Submit Exemption request



Cooling Tower equivalency needed – non FM approved tower without sprinklers but build or same materials and N+1 capability.



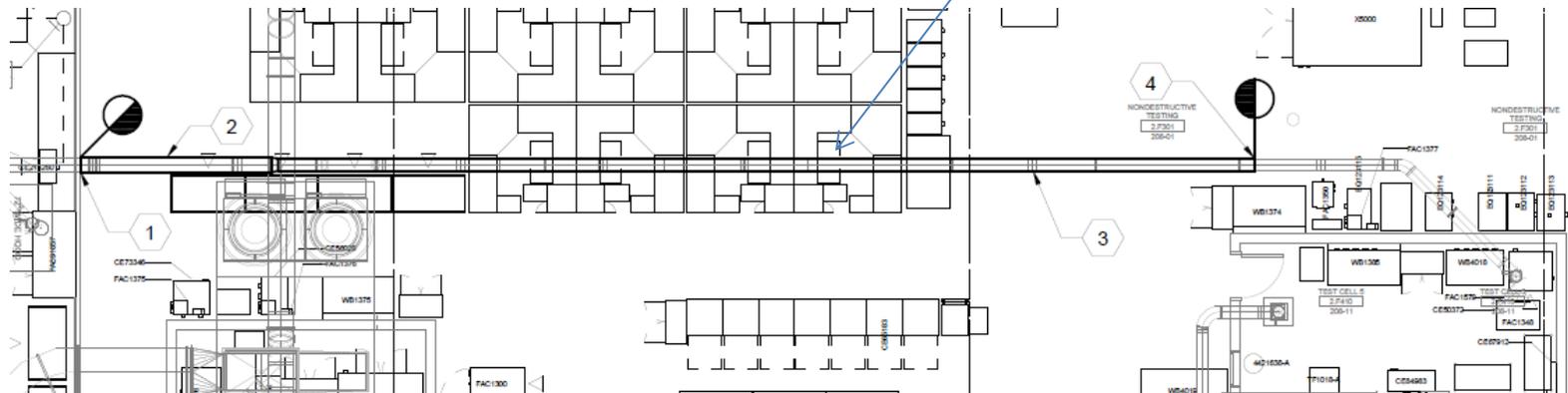
- Driver - NFPA 214, FM Data Sheet 1-6 and the Design Documents
- Low Risk accepted during build
- Equivalency in work



- **Test Cell 5 hood improperly exhausted thru Analytical Lab system**
- **NFPA 45 8.5.10.1 - Lab unit separately ducted**
- **Project 2361 in work**

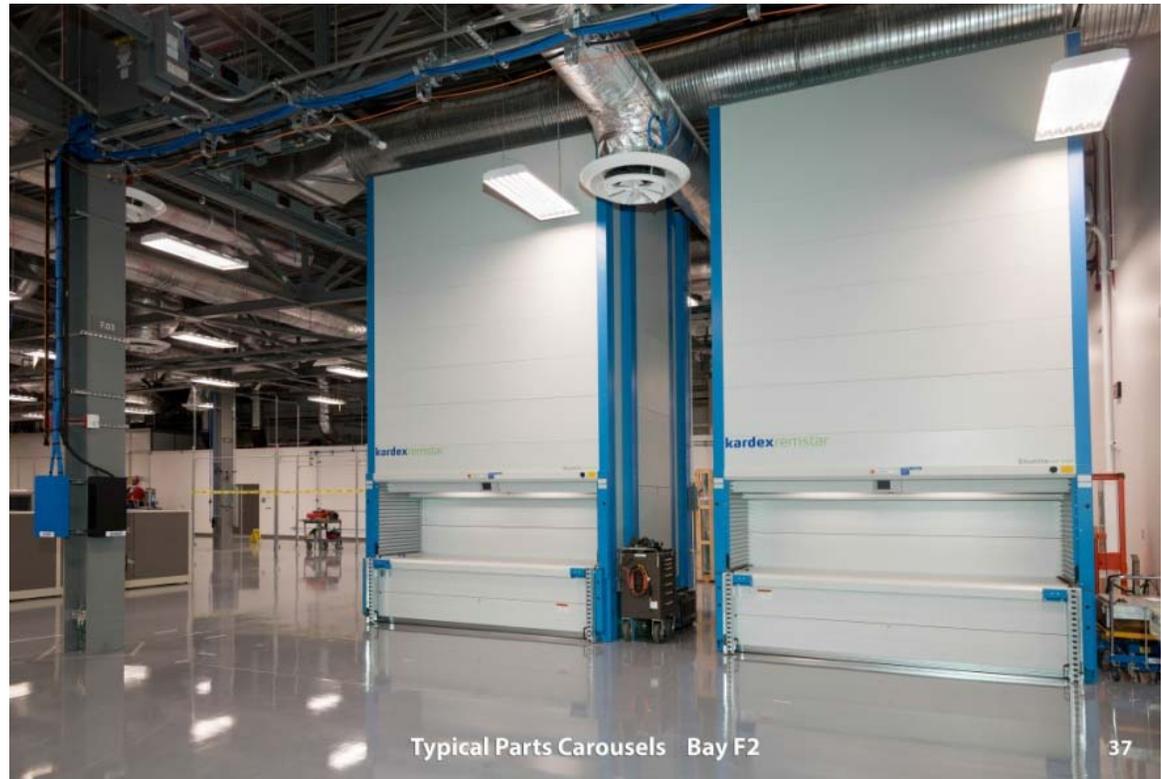
Analytical Lab ←

Relocate duct to new exhaust system



Additional fire protection needed for vertical storage units

- 15 new
- A few without fixed fire protection
- High value contents
- Program Interruption
- Project 2384 in work





Recommendations - Equipment/Occupancy Related **Honeywell**

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- **Emergency shutoff valves (dead-man) for flammable liquid dispensing in Reactor Room (completed 3/15/15)**
- **Electrical classified fork trucks for Waste Management and PODs.**
 - EE versus EX fork trucks for two locations
- **Use of classified electrical batteries for two way radios - was required but dropped due to poor battery performance.**
- **Complete flammable liquids bake-off in Ovens**
 - NFPA 86 compliance issue regarding bake-off of flammables
 - Complicated due to the use of Exhaust Air Valves (EAVs) to regulate loss of conditioned air
 - Approved equivalency for oven modifications
- **Determine plant minimum aisle widths so some aisles can be used for storage, etc.**



Recommendations - Procedures/Assessment Related

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- **Provide Baseline Needs Assessment for city response**
 - Facility is on the southern boundary of the Kansas City limits
 - Have experienced up to 15 minutes for medical response
 - NNSA influenced an agreement with neighboring City of Grandview
- **Complete fire protection systems procedures (bldg owner)**
- **Complete fire protection systems impairment procedure (bldg owner)**
- **Complete hot work permit system (bldg owner)**
- **Complete fire protection related procedures (Honeywell)**
- **Complete Fire Protection program self assessment annually (Honeywell)**



More Recommendations

1. **Sign identification for fire doors.**
2. **Additional Fire extinguisher for Data Center**
3. **Data Center Floor Pullers**
4. **Room needs exit signs**
5. **Sign identification for fire barriers**
6. **Additional fire extinguisher for Bldg. 5**
7. **Provide fire dampers in Bldg. 2**
8. **Provide horizontal exit fire door smoke detectors**
9. **Improvement need in ITM**
10. **Provide hose connection reducers**
11. **Provide exit sign for X-ray room**
12. **Provide exit sign for dark room**
13. **Provide paper bags for all sprinklers in paint booths**
14. **Provide smoke dampers for 14 dampers in horizontal exit wall**
15. **Review for Class II electrical for a room in Bldg. 2**
16. **Provide sprinklers beneath a cutting table in Bldg. 2**
17. **Provide Emergency Stop Buttons signage**
18. **Evaluate Analytical Lab for proper extinguisher placement**



Exemptions, Equivalencies, and CMRs

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- **4 Exemptions**

- Excessive MFL (\$1B) - approved
- Water supply valves - pending
- Non FM approved cooling tower (no AS) – pending
- Gypsum Board fire wall - pending

- **2 Equivalencies**

- Use of Class B ovens for small quantity of flammable liquids – approved, work in progress
- Ultrasonic cleaners using flammable liquids not UL. - approved

- **7 Fire Protection related Code Modification Request (CMRs) approved by Kansas City**

- Chemical Storage building – no sprinklers and unlimited H3/H4
 - (original and 1 revision)
- PVC exhaust ducts not meeting smoke rating
- 1 hr. rated roof under penthouse
- Office building firewall not independently supported
- MFL wall downgraded to fire barrier caused by pipe penetrations
- Use of ESFR sprinklers without roof vents

No Life Safety related Exemptions, Equivalencies, or CMRs



Conclusion

- **Verifies that with a few minor exceptions, the NSC has been built to every possible fire code (NFPA, IFC, IMC and DOE requirements).**
- **Fire modeling proves that fire loss expectancies are reasonable and within DOE thresholds.**
- **Captured fire protection design, build, and occupancy decisions at the NSC. (~2700 pages).**
- **Relationships developed with Honeywell, Bldg. Owner, GSA, NNSA, AE, fire protection consultants, and City Building Code officials.**
- **BIG PROJECT, FEW FINDINGS, Corrective actions in work.**



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QUESTIONS ?