Pantex Facility 10-Year Natural Phenomena Flood Hazard Analysis

Presented by

B&W technical services Pantex

and

Pro2Serve® Professional Project Services, Inc.

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Presentation Outline

I. Introductions

II. Pantex

III. 10 Year Update

IV. Final Results

V. July 2010 Event

VI. Emergency Planning

VII. What's Next

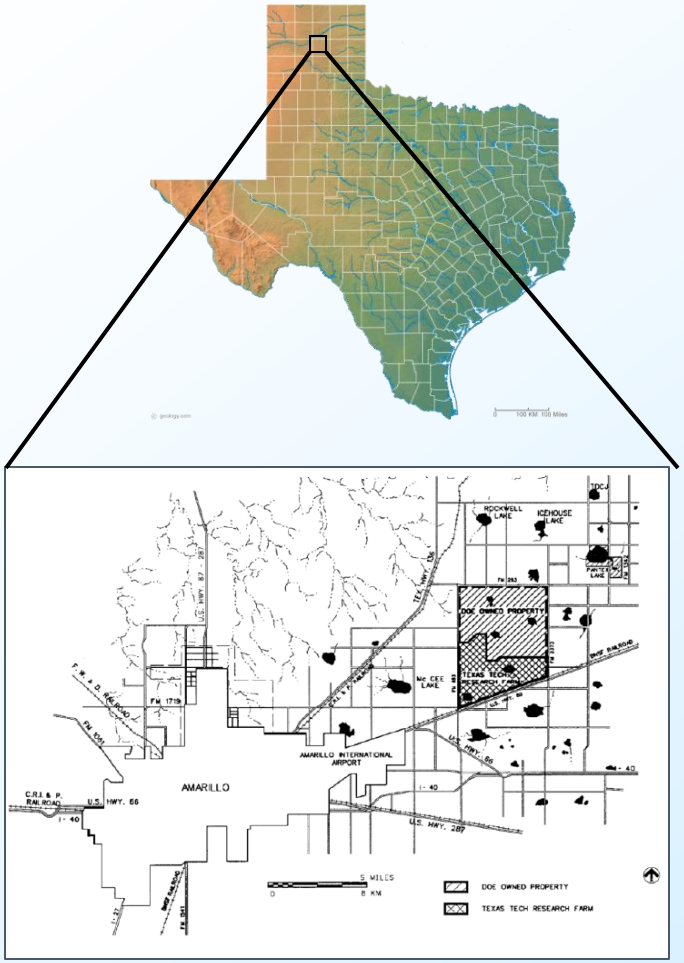
Pantex

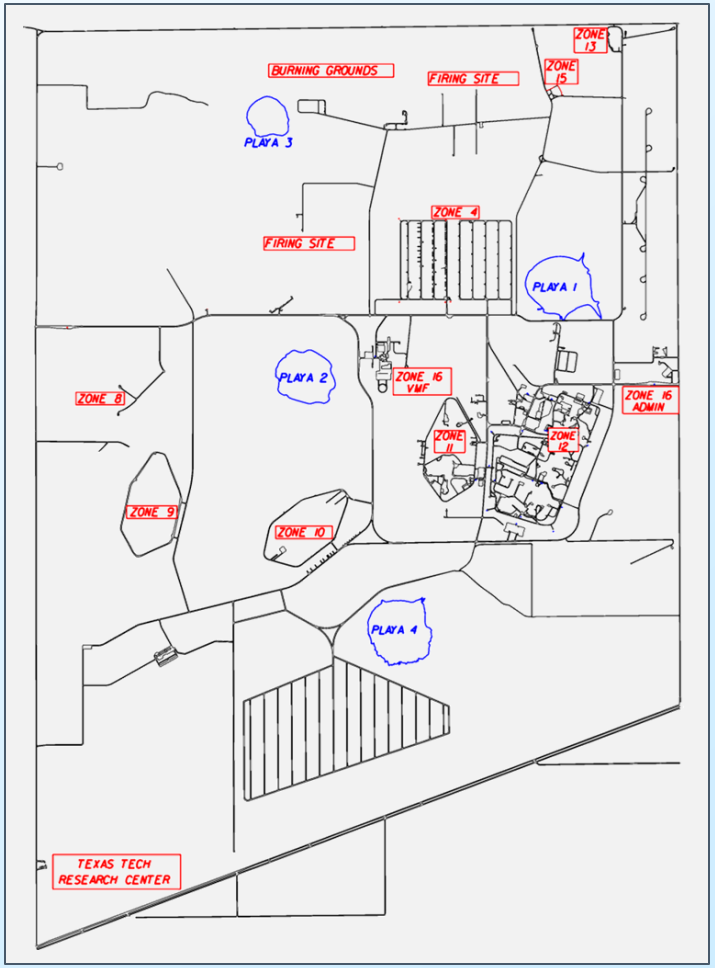
The Pantex Plant, located 17 miles northeast of Amarillo, Texas, in Carson County, is charged with maintaining the safety, security and reliability of the nation's nuclear weapons stockpile.

Worked performed at Pantex supports three core missions.

- Stockpile Stewardship
- Nonproliferation and
- Safeguards and Security

Pantex (cont.) - Location





Pantex (cont.) - Weather Patterns

- Precipitation is typical for Southwest climate, mainly in the form of Spring and Summer Thundershowers
- Storms are characterized by short duration and high intensity rainfall
- Annual precipitation is 19.7 inches
- Three-fourths of the average falls from April through September

10 Year Update

Literature Review

- NOAA Hydrometeorlogical Reports
- Federal Emergency Management Agency
- United States Geological Survey
- State and Local municipalities
- Existing Pantex studies

10 Year Update (cont.)

Rainfall Determination

- USGS Reports
  - Depth-Duration Frequency of Precipitation for Texas (USGS-WRI-98-4044)
  - Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas (USGS-SIR-2004-5041)

10 Year Update (cont.)

Rainfall Determination (cont.)

- Generalized Logistic Distribution (GLO)

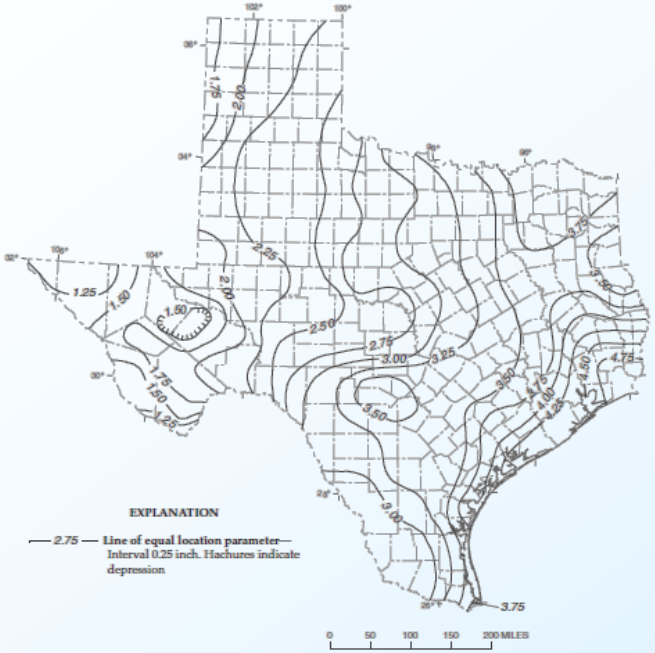
$$X_d(F) = \xi + \frac{\alpha}{\kappa}\left\{1 - \left[\frac{(1-F)}{F}\right]^{\kappa}\right\}, \qquad (10)$$

where

ξ, α, and κ = location, scale, and shape parameters, respectively, of the GLO distribution, and

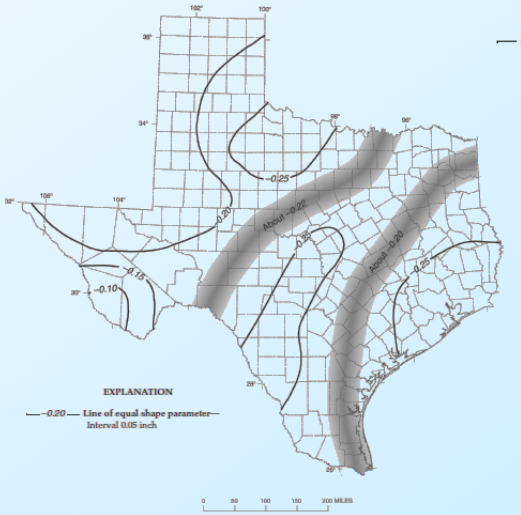
F = annual nonexceedance probability, 1 – exceedance probability, or $[1 - (1/T)]$ where T is recurrence interval.

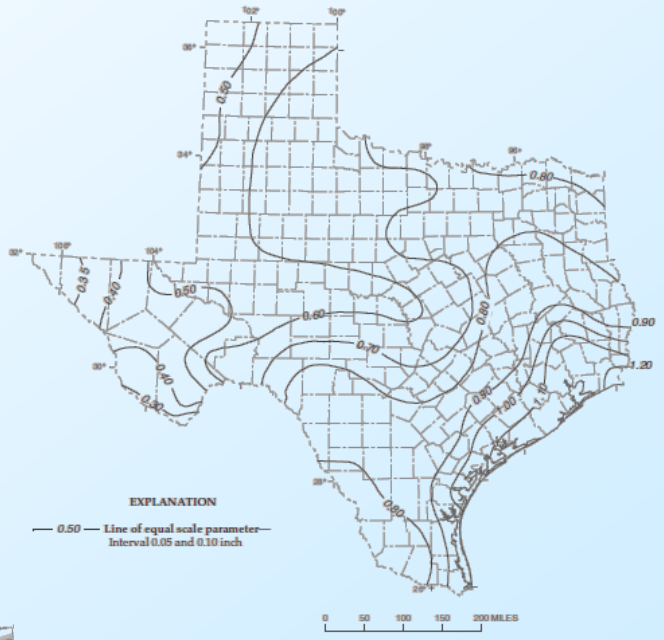
10 Year Update (cont.)



Location Parameter

Shape Parameter





Scale Parameter

USGS – WRI Report 98-4044

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10 Year Update (cont.)

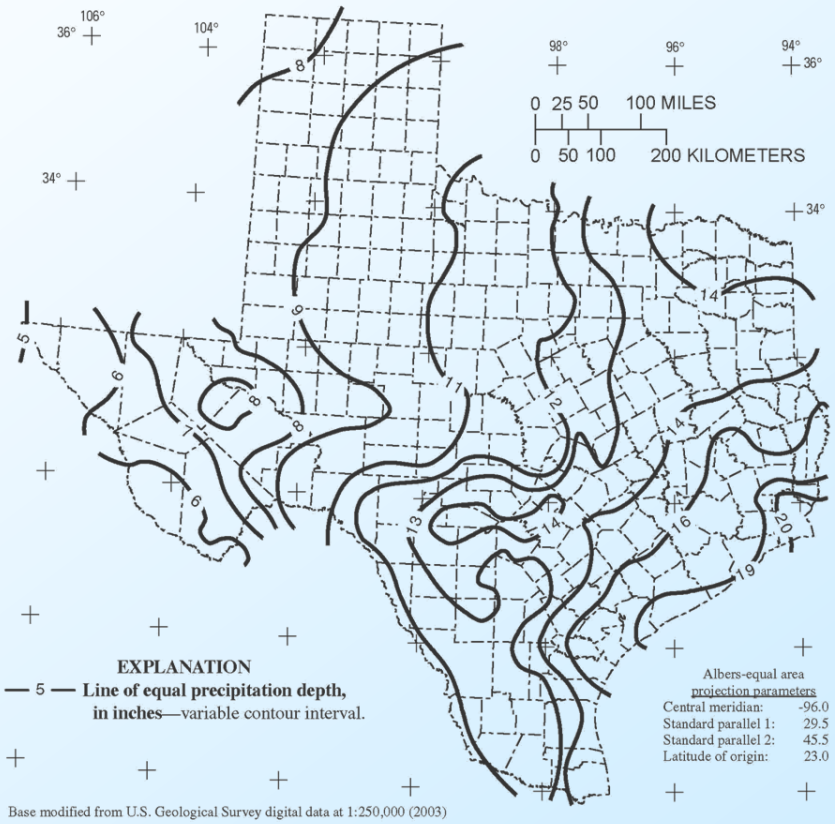


Figure 95. Depth of precipitation for 500-year storm for 1-day duration in Texas.

USGS –SIR Report 2004-5041

10 Year Update (cont.)

Rainfall Determination (cont.)

- No rainfall depth figures for 2000 year and 10,000 year storms
- Used GLO equation with 24 hour duration for location, scale and shape parameters
- Used equation for lesser storms (25 yr and 500 year) for consistency

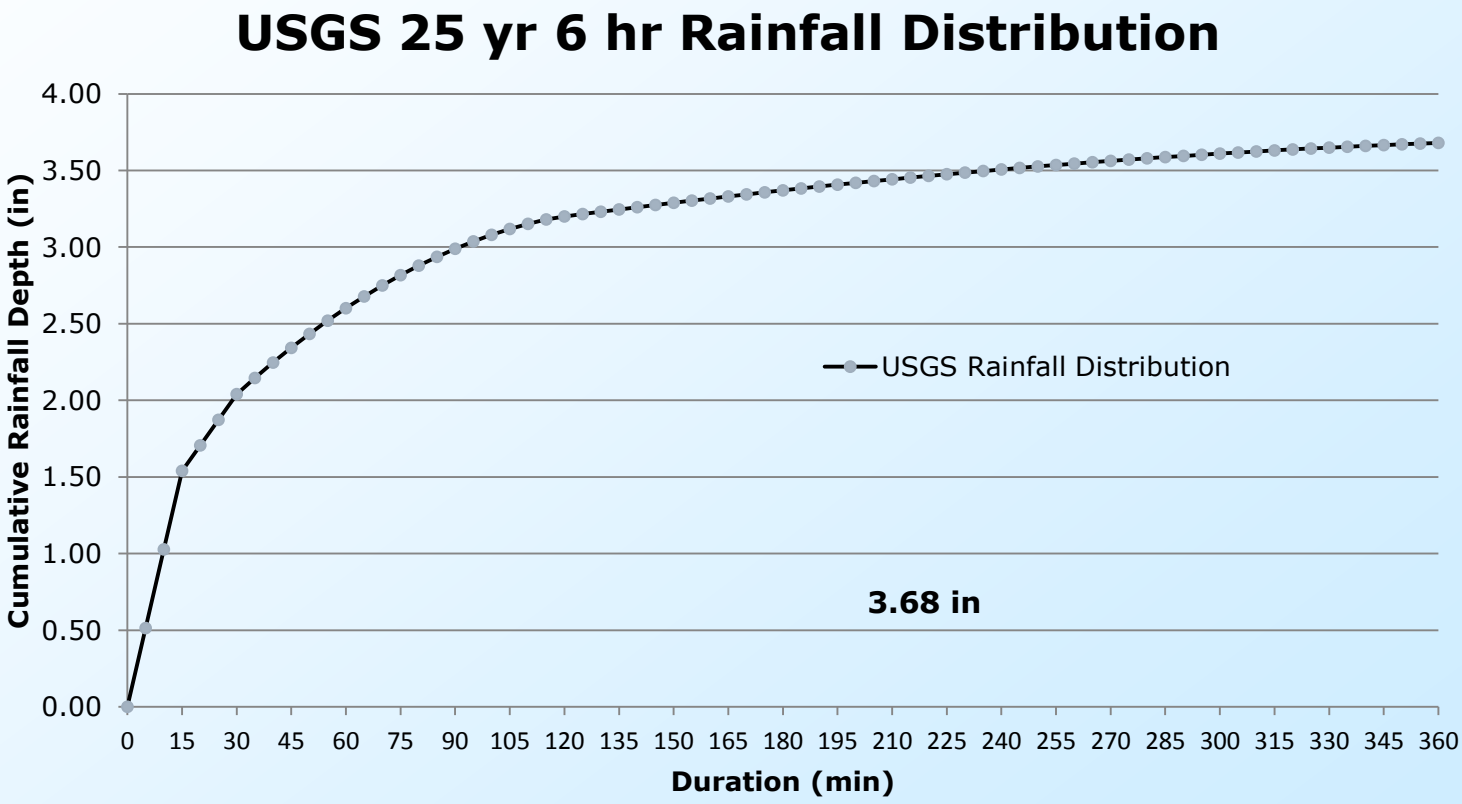
10 Year Update (cont.)

Final Rainfall Amounts

- 25 year - 6 hour storm – 3.68 in
- 100 year – 24 hr storm – 6.56 in
- 500 year (FDC 1) – 24 hr storm – 9.4 in
- 2,000 yr (FDC 2) – 24 hr storm – 12.7 in
- 10,000 yr (FDC 3) – 24 hr storm – 18.0 in

10 Year Update (cont.)

Rainfall Distribution Curve



10 Year Update (cont.)

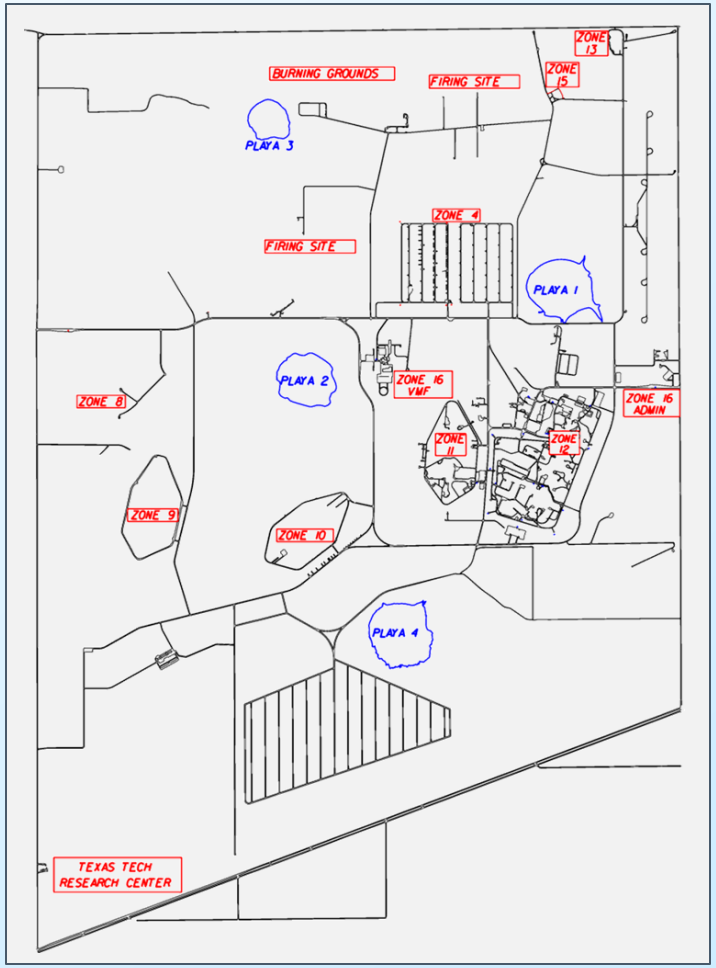
Methodology

- Comply with NQA-1 Quality Assurance Criteria – Design Basis Calculation
- Validate Modeling Software (EPA-SWMM)
- Gather storm water management information
  - As-built
  - Additional survey points

10 Year Update (cont.)

Methodology (cont.)

- Storm water management information (cont.)
  - Total of 488 sub-basins
  - Total of 544 culverts
  - Total of 717 ditches



10 Year Update (cont.)

Flooding Determination

- Water surface elevation on outside greater than Building Finished Floor Elevation
- Roadways, driveways and yard areas greater than 6” water depth

10 Year Update Results

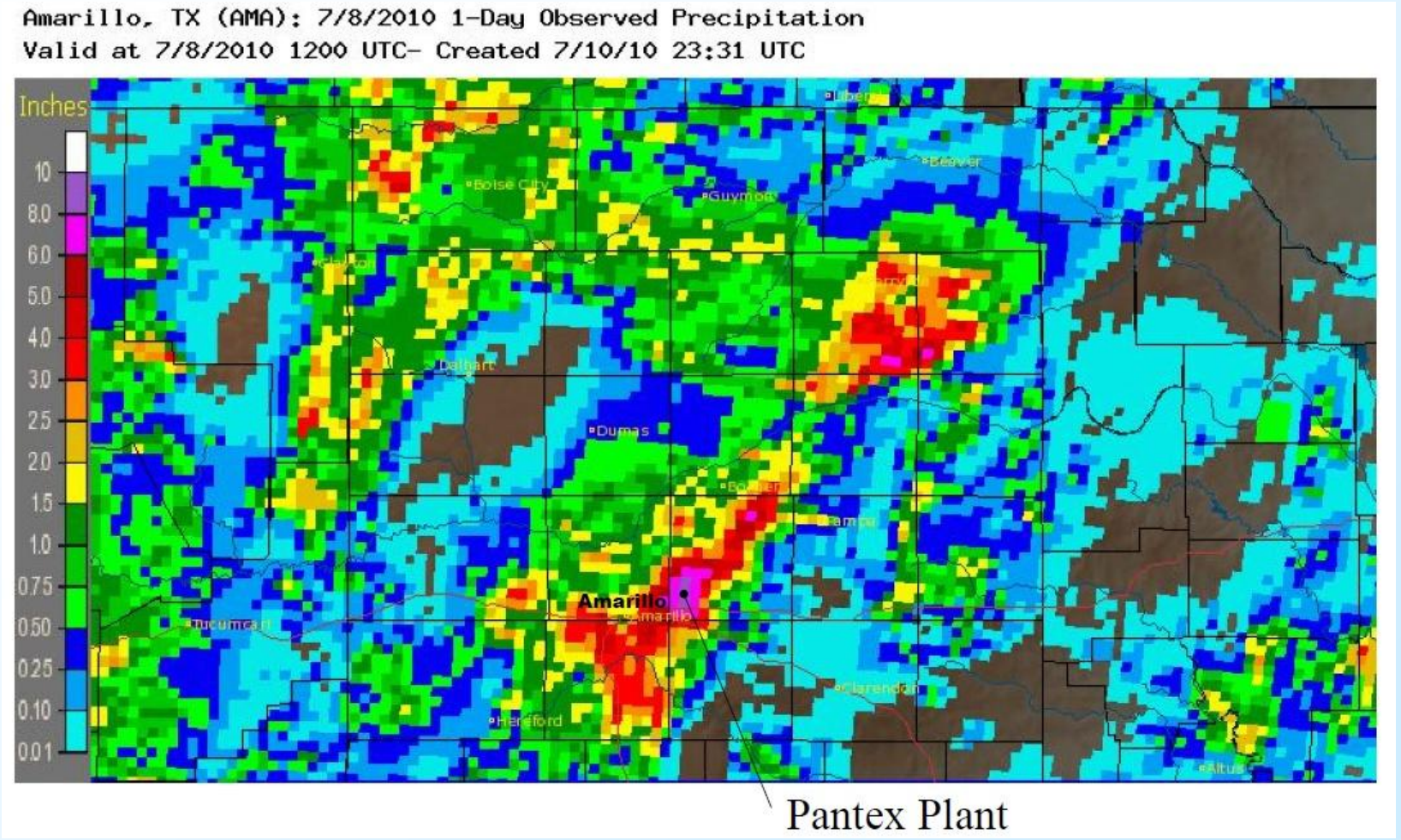
This graphic represents flooding potential of PC-2 and PC-3 buildings in Zone 12 South.

Red denotes flooding with depths greater than 12 inches.

Yellow denotes flooding with depths between 6 and 12 inches.

Blue denotes flooding with depths of less than 6 inches.

Events of July 7th and 8th, 2010



Events of July 7th and 8th, 2010 (cont.)

Rainfall at Pantex

- Amounts varied across the site
- Duration approximately 12 hours
- Highest estimated rainfall 11 inches

Comparison

- 500 yr – 12 hr: 8.0 in
- 2,000 yr – 12 hr: 10.9 in
- 10,000 yr – 12hr: 15.3 in

Events of July 7th and 8th, 2010 (cont.)

Validation of NPH Study

- Rainfall Depth
- Rainfall Distribution
- Modeling

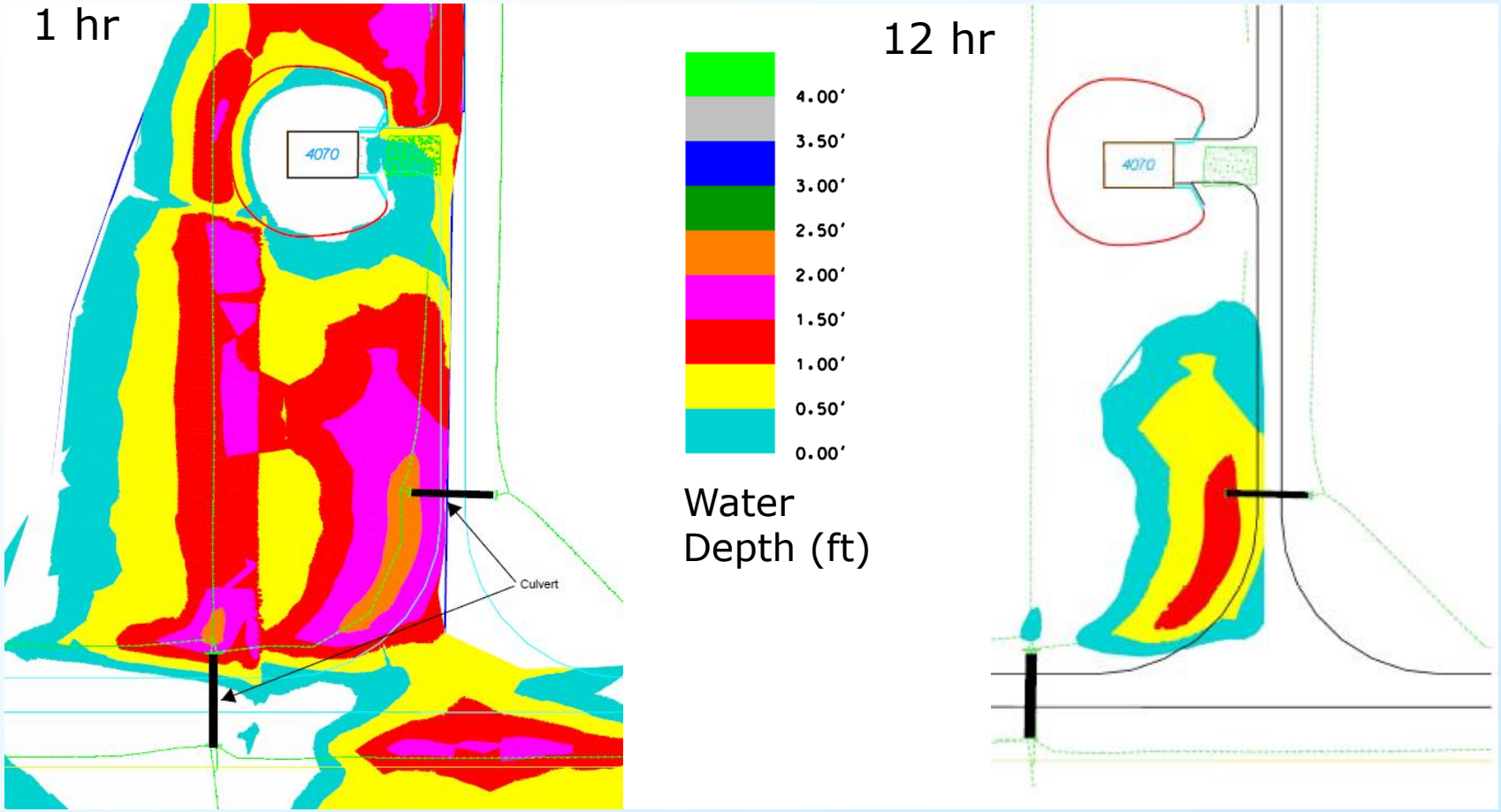
Emergency Planning

Developed Storm Water depth maps (isopachs)

- Expanded to the Pantex Boundary
- Included 12 Playa Basins
- Showed progression of flood water for increments of 1 hr, 2-hr, 6-hr, 12-hr, 18-hr, 24-hr and 36 hours

Emergency Planning (cont.)

Example of Color-Coded Isopachs



What's Next

FDC-1 Facilities (500 yr Storm)

- Critical Mission SSCs
- Essential Safety Facilities
- Essential Security Facilities

Conceptual Study

- Mitigation/Prevention Alternatives

Contacts

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Questions

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