American Society of Military Engineers Resiliency Workshop

October 15, 2019
Karen Keith, County Commissioner
Tulsa County, District 2
FLOOD 2019
MOVING HOMELESS FOLKS OFF OF THE LEVEE
Approximately 14 feet above normal

287,000 CFS

Current Readings:

- 13.94 ft ABOVE normal
- Pool elevation is 736.94 feet on Wednesday 08May19 Time: 0100 hours.
- At this elevation the total amount of water stored in Keystone Lake is 809542 acre-feet.
- Reservoir release is 39896 cubic feet per second on Wednesday 08May19 Time: 0100 hours.
- Flood control pool is 33.46% full.
- Flood control pool storage filled is 377622 acre-feet which is equivalent to 0.32 inches of runoff over the entire drainage basin.
- Flood control pool storage empty is 751058 acre-feet which is equivalent to 0.63 inches of runoff over the entire drainage basin.
Water release amounts crept up many times resulting in too much water downstream.
FLOOD CONTROL STATS

Approximately 18 feet above normal

60,000 CFS

Current Readings:

- 17.92 ft ABOVE normal
- Pool elevation is 740.92 feet on Friday 10 May 19 Time: 0700 hours.
- At this elevation the total amount of water stored in Keystone Lake is 959080 acre-feet.
- Reservoir release is 71205 cubic feet per second on Friday 10 May 19 Time: 0700 hours.
- Flood control pool is 46.71% full.
- Flood control pool storage filled is 527160 acre-feet which is equivalent to 0.44 inches of runoff over the entire drainage basin.
- Flood control pool storage empty is 601520 acre-feet which is equivalent to 0.50 inches of runoff over the entire drainage basin.
21st STREET BRIDGE
ALONG RIVERSIDE DRIVE
RABBIT ROAD, SAND SPRINGS
SAND BAG DETAIL
FLOOD CONTROL STATS

Approximately 26 feet above normal

100,000 CFS

Current Readings:

- 25.35 ft ABOVE normal
- Pool elevation is 748.35 feet on Tuesday 14May19 Time: 2000 hours.
- At this elevation the total amount of water stored in Keystone Lake is 1276479 acre-feet.
- Reservoir release is 100128 cubic feet per second on Tuesday 14May19 Time: 2000 hours.
- Flood control pool is 74.83% full.
- Flood control pool storage filled is 844559 acre-feet which is equivalent to 0.71 inches of runoff over the entire drainage basin.
- Flood control pool storage empty is 284121 acre-feet which is equivalent to 0.24 inches of runoff over the entire drainage basin.
RISING WATER “WATCH”

Blue Rose @ River Parks
Current Readings:

- Approximately 24 feet above normal
- 23.58 ft **ABOVE** normal
- Pool elevation is 746.58 feet on Friday 17May19 Time: 1200 hours.
- At this elevation the total amount of water stored in Keystone Lake is **1195425** acre-feet.
- Reservoir release is 90018 cubic feet per second on Friday 17May19 Time: 1200 hours.
- Flood control pool is 67.65% full.
- Flood control pool storage filled is 763505 acre-feet which is equivalent to 0.64 inches of runoff over the entire drainage basin.
- Flood control pool storage empty is 365175 acre-feet which is equivalent to 0.31 inches of runoff over the entire drainage basin.
EMERGENCY OPERATIONS CENTER (EOC)
SEVERE WEATHER

Tornado Warning
Valid from: Tue 21 May, 6:17 AM, CDT
37 min remaining

Discussion
The National Weather Service in Tulsa has issued a
* Tornado Warning for...
Southwestern Rogers County in northeastern Oklahoma...
Northern Tulsa County in northeastern Oklahoma...
* Until 700 AM CDT.
* At 616 AM CDT, severe thunderstorms capable of producing a tornado
were located along a line extending from 2 miles southwest of Sand
Springs to Jenks Riverside Airport, moving northeast at 55 mph.
HAZARD...Tornado.
SOURCE...Radar indicated rotation.
IMPACT...Flying debris will be dangerous to those caught without
shelter. Mobile homes will be damaged or destroyed.
Damage to roofs, windows, and vehicles will occur. Tree
damage is likely.
* Locations in or near the path include...
Tulsa... Broken Arrow...
Sand Springs... Claremore...
MEADOW VALLEY & FISHER CREEK

Sand Springs Police protected vacated neighborhoods
TULSA BOYS HOME
SANDY PARK APARTMENTS
O’BRIEN PARK

Tulsa County’s O’Brien Park - almost underwater
FLOOD CONTROL STATS

Approximately 30 feet above normal

207,000 CFS

Current Readings:

- 29.18 ft ABOVE normal
- Pool elevation is 752.18 feet on Wednesday 22May19 Time: 2000 hours.
- At this elevation the total amount of water stored in Keystone Lake is 1465223 acre-feet.
- Reservoir release is 206766 cubic feet per second on Wednesday 22May19 Time: 2000 hours.
- Flood control pool is 91.55% full.
- Flood control pool storage filled is 1033303 acre-feet which is equivalent to 0.87 inches of runoff over the entire drainage basin.
- Flood control pool storage empty is 95377 acre-feet which is equivalent to 0.08 inches of runoff over the
This IS an important gauge.
FLOOD CONTROL STATS

Approximately 33 feet above normal

254,000 CFS

Current Readings:

- 32.42 ft ABOVE normal
- Pool elevation is 755.42 feet on Friday 24May19 Time: 06:00 hours.
- At this elevation the total amount of water stored in Keystone Lake is 1637919 acre-feet.
- Reservoir release is 253971 cubic feet per second on Friday 24May19 Time: 06:00 hours.
- Flood control pool is 106.85% full.
- Flood control pool storage filled is 1205999 acre-feet which is equivalent to 1.01 inches of runoff over the entire drainage basin.
- Flood control pool storage empty is 0 acre-feet which is equivalent to 0.00 inches of runoff over the entire drainage basin.
Candlestick Beach
CHECKING FOR A LEVEE BREACH
CONGRESSMAN HERN ON THE LEVEE
EFRAM WALKS
THE LEVEE
RESIDENTS COPING WITH THE WATER
Brothers Don & Jon Comstock - Don lives in Mayfair Addition & had to relocate during flood.
PAUL ZACHARY,
CITY OF TULSA ENGINEER
CASE COMMUNITY CENTER
WALKING THE LEVEE
CREEK NATION SUPPORTING RIVER SPIRIT CASINO
FLOOD CONTROL STATS

Approximately 33 feet above normal

255,000 CFS

Current Readings:

- 32.65 ft ABOVE normal
- Pool elevation is 755.65 feet on Saturday 25May19 Time: 0500 hours.
- At this elevation the total amount of water stored in Keystone Lake is 1650799 acre-feet.
- Reservoir release is 254943 cubic feet per second on Saturday 25May19 Time: 0400 hours.
- Flood control pool is 107.99% full.
- Flood control pool storage filled is 1218879 acre-feet which is equivalent to 1.02 inches of runoff over the entire drainage basin.
- Flood control pool storage empty is 0 acre-feet which is equivalent to 0.00 inches of runoff over the entire drainage basin.
SANDBAGGING IN FULL FORCE

Had to build a road to help facilitate the work by the National Guard
Army Corps pumps assisted to get water back into the river

Levee Commissioner Kilpatrick with National Guard
Abandoned Walker
FLOOD CONCERNS

Concerns about the Refinery being flooded

University Towers in the background
RESIDENTS MOVING OUT
Many homes were affected throughout Tulsa County
FLOOD 2019

From Water & Debris

To Clean Out & Down to Bare Studs
FLOOD 2019
Saving the Animals

Undersheriff George Brown - rounding up animals
FLOOD 2019
Housing the Homeless Animals
FLOOD 2019
Fishing Anyone?
HOME OWNERS SALVAGING GOODS, HAD TO BE RESCUED
CONGRESSMAN HERN ON THE WATER AGAIN
Though his house was impacted he still took the time to give tours and highlight his neighbor water issues.
HOME OWNERS WITH NO INSURANCE
JEREMY HERRINGTON, TOWN & COUNTRY RESIDENT
HOME OWNERS
SAVING POSSESSIONS
WEBCO- ABOVE & BEYOND

Air conditioned, cleaned, well stocked facilities

Air condition trailer with cleaning supplies, food & water
WEBCO EMPLOYEES- ABOVE & BEYOND
GOLDEN DRILLER

Bruce Plante was at it again!
CONGRESSMAN HERN & SHERIFF’S DEPUTIES
SPREADING THE MESSAGE

By Kevin Canfield
Tulsa World

Property owners seeking federal assistance to help rebuild their homes after last week’s flooding should not expect all of their costs to be reimbursed, an official with FEMA said Friday.

Kent Clark, response division
eers help Tulsa

FEMA will pay maximum of about $30,000, but average payout is about $4,000

Thursday, May 30, 2013

Many agencies and businesses are offering help for storm and flood victims. Oklahoma residents seeking non-emergency disaster or health and human service information, please contact your local 211. Services are available 24 hours a day by dialing 211 from your home or cellular telephone. Please call 911 for emergencies.

Free sandbags from U-Haul

U-Haul Companies of Tulsa and Oklahoma City are making 10-ton loads of sandbags available for 30 days for free sandbag storage to Oklahomans affected by continued flooding across the state. People seeking additional information on sandbags to arrange 30-days free sandbag storage should contact the nearest participating U-Haul store location. Find locations at uhaul.com.

Tetanus shots

All Tulsa Health Department immunization clinics are offering tetanus shots to those who were affected by the weather events in Tulsa County. Visit Tulsa health.gov for more information or call 918-582-1529 for hours and locations. Anyone who has sustained significant injuries is encouraged to seek medical attention from their primary care provider or urgent care. Many local pharmacies also offer tetanus shots.

Crisis cleanup

For those still in need, several relief agencies are setting up booths in the county to assist people with immediate needs. The Tulsa Regional Community Foundation has launched the Crisis Cleanup Fund, which will allow residents to make donations online. The fund will be used to purchase cleaning supplies and to help raise funds for cleanup crews. The organization is also setting up a disaster cleanup center at 4205 S. 45th East Avenue.

Free sandbags at U-Haul parking lot

This week Tulsa is offering free bags of sand at the Dril Bobino University parking lot at East and Southaven, for visitors and residents who are still in need. The site is also offering 40-pound sandbags at each location for $1 per bag. The sand is available for pickup at 601 W. 2nd Street and 515 N. North Avenue locations.

Emergency housing assistance

Oklahoma Housing Finance Agency has emergency housing assistance available to Oklahomans affected by recent storms. The agency has released nearly $1.5 million in emergency housing assistance. To apply for assistance, call 405-479-7843 or visit your nearest Oklahoma Housing Finance Agency office.

Financial grants for veterans

Veterans who have been affected by the recent weather may be eligible for a financial grant, according to the Oklahoma Department of Veterans Affairs. Visit its website at veterans.ok.gov to apply. Veterans can also contact a service officer at 405-522-8950 to locate a service office in their area.

Hotel discounts

Visit the hotel website for more information on discounted rates for travelers in need.
Broadway Baptist opened their doors.

Senator Lankford & Commissioner Keith
Broadway Baptist opened their doors.

Insurance Commissioner Mulready

Teresa Tosh & Joseph Kralicek
Sheriff Regalado

Mike Abate, Army Corps of Engineers (seated)
CLEANING UP BEGINS
INSPECTIONS BEGIN

FLOOD RECOVERY • County building inspections begin in Town and Country addition

Waiting is the worst part

Bill Smith of the Oklahoma Flood Managers Association and Teresa Tosh, director of county inspections, survey homes in the flood-devastated Town and Country neighborhood west of Sand Springs on Friday.

JOSEPH RUSHMORE/for Tulsa World.
FEMA ARRIVES
FLOOD 2019
Disaster Relief Efforts

Spontaneous Volunteers & Groups Worked Tirelessly
FLOOD 2019
Disaster Relief Efforts

MULTI-AGENCY RESOURCE CENTER
FLOOD 2019
Disaster Relief Efforts

THANK YOU

You responded to calls for help.
You supplied items of need—
water and more.
You filled sand bags.
You supplied gloves.
You sheltered people, and their pets.
You supplied meals.
You supplied power.
You supplied hope.
You showed up.
You allowed others to help.
You did whatever it took.
You are the people who put others first.
Volunteers, law enforcement, National Guard, local leaders, first responders.
And others who just showed up.
As flood waters rose,
so did your determination.
These are your stories.
Your neighbors,
Today, we say thank you for being there—
what we needed you.
SO MANY HOMES UNDERWATER
WHAT A WAY TO CATCH FISH
FLOOD 2019
Helping in Town & Country

VP Pence, Com. Keith
& Joseph Kralicek
BETO O’ROUKE, PRESIDENTIAL CANDIDATE
FLOOD 2019

Many Officials Assessing the Areas

Gov. Stitt & Levee, Com. Todd Kilpatrick, & Levee Crew

Senator Lankford in EOC Center
FLOOD 2019
Gov. Stitt Sent Guard & Equipment

Dropping 3,000 lb. Sandbags
IMPORTANT SUPPORT FROM THE ARMY CORPS OF ENGINEERS

ASA R.D. James & Brigadier General Owen with Todd Kilpatrick

Lt. Gen. Todd Semonite w/Todd Kilpatrick
CONGRESSMAN LANKFORD’S VISIT TO THE LEVEE

Senator Lankford and his Team
Levee Commissioner Kilpatrick explaining the upgrades needed for the Tulsa/West Tulsa Levee System.
FLOOD 2019
Guard Protecting the Neighborhoods

Patrolling the Levee System
LEVEE DISTRICT

Tulsa-West Tulsa Levees

Arkansas River Corridor Feasibility Study
Tulsa/West Levee Feasibility Study
BUSINESS BEHIND THE LEVEE
Tulsa West Tulsa Levees – Recommended TSP

- **Recommended TSP – ALTERNATIVE 1E –**
  - Filtered berm with toe drain throughout Levee A and B, except a cutoff wall and landside impervious blanket at Superfund Site within Levee A for approx. 2,000 ft
  - Filtered berm at Floodway Structure and Levee B tieback
  - Detention Ponds at Levee B Tieback
  - Landslide impervious blanket at Levee B for overtopping
  - Reconstruction of PS 1-7

**Total Cost:** $148M
Fixing our levees will take how long?
FLOOD 2019
Concrete Failure Low Water Crossing

Cross Drain Pipe Washed Out Into Field

Alfalfa County
OTHER COUNTIES
Continued

Atoka County

Cross Drain Failure

Trees Blocking the Road
Erosion At Cross Drain Failure

Road Failure

Beaver County

Cleveland County
OTHER COUNTIES
Continued

Craig County

Creek County
West 51st

Creek County W. 141st St
OTHER COUNTIES
Continued

Lake Road

Hubbard Road @ Chikaskia River Bridge

Kay County
OTHER COUNTIES
Continued

Harper County Cross Drain

Kingfisher County Cross Drain

Kingfisher County Repairing Road - Note Leaning Power Poles
OTHER COUNTIES
Continued

Noble County

Cross Drain

Indep & W. Cty rd 140
OTHER COUNTIES

Continued

Osage County Peeling Asphalt off of Pavement

Osage County Red Eagle Road Cross Drain

Ottawa County Asphalt Peeled Off
OTHER COUNTIES Continued

Ottawa County Surface Erosion

Pawnee County Cross Drain Pipe

Pawnee County Erosion
OTHER COUNTIES
Continued

Payne County Flooding
OTHER COUNTIES
Continued

Washington County

Debris on the Roadway

Gravel Washed into the Ditch
BRIDGES IMPACTED

Blackburn Bridge-Drove Around Barricades

Pawnee/Osage Counties Blackburn CIRB Funded Bridge in the Background Across the Arkansas River
BRIDGES IMPACTED

Continued

Osage County, Debris Stacked Up on Bridge on Union Road

Ottawa County Flooding Around Bridge
Grant County Bridge
Oklahoma County CIRB Bridge Project on McArthur
Handling the Flood Waters
TOWN & COUNTRY TRAILER PARK
PRESS CONFERENCE - EMERGENCY OPERATIONS CENTER

Mayor Bynum with City & County Officials
PRESS CONFERENCE - EMERGENCY OPERATIONS CENTER

Senator Inhofe with City & County Officials
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Senator Lankford with City & County Officials