

RAINFALL EVENT REPORT

July 8, 1999

prepared by
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Torrential rains deluged the Las Vegas Valley the morning of July 8, 1999 causing wide-spread drainage problems and damages to public and private properties. The rainfall intensities and/or depths recorded in many parts of the Valley exceeded the rainfall criteria used for the design of drainage facilities in the County. Perhaps the most notable feature of this storm system was the size of the area impacted by the intense rainfall. The largest rainfall depths appear to have occurred over the northwest, west, and southwest portions of the Valley resulting in significant flows in the Flamingo Wash, Duck Creek, and the Las Vegas Wash. Within the Las Vegas Valley, two District rain gages reported over 3 inches of rainfall, five other gages reported over 2 inches of rain, and an additional twelve gages received in excess of 1.5 inches of rain. Most of this rainfall occurred within a 60-90 minute period. The runoff that resulted from this intense rainfall caused widespread street flooding and record high flows in normally dry washes and flood control facilities. Flood flows from the entire Valley combined above Lake Las Vegas where the preliminary peak flow is estimated to have been 16,000 cfs. The news media reported two deaths resulting from this flood event, one of which was a drowning in the Flamingo Wash. The second death occurred as the result of a weather related traffic accident.

Damages to public property resulting from this storm are estimated at \$20,500,000. As a result of the severity of damages to public and private properties, the Clark County Board of Commissioners declared a State of Emergency on July 9, 1999. On July 15, the Governor's Office issued a Declaration of Emergency for the area and requested assistance from the Federal Emergency Management Agency. President Clinton declared the area a federal disaster area on July 19.

Over the two days preceding this storm, dewpoint temperatures increased rapidly from values in the mid-30 degree range to values in the high-50 to mid-60 degree range. This increase reflected an influx of extremely moist air into the area. While an increase in atmospheric moisture is typical during the Southwestern monsoon season, what was unusual for this event was the fact that the intense rainfall occurred in the late morning without the convective lift (i.e., daytime heating) which normally triggers summer storms.

The National Weather Service issued the first weather advisory at 3:45 am, based on heavy rainfall in northern Clark County and southern Lincoln County. Because of a concern that this rainfall would move into the Las Vegas Valley, the advisory included a Flash Flood Watch for the Las Vegas area. Rain in the northern part of the County did cause flooding in the Pahrangat Wash, which resulted in the closure of US-93 near SR-168. Throughout the remainder of the day there was concern that this flow would impact the communities of Moapa

and Glendale. However, no significant flows reached those areas.

In the Las Vegas Valley, rainfall began in the northwest shortly before 9:30 am and quickly intensified. By 10:00 am, nearly one inch of rain had fallen in the Lone Mountain area. At the same time, an intense band of rain cells that had developed in the extreme southern part of the County moved into the Valley from the south. This system appears to have merged with the cells that had developed in the northwest part of the Valley and the combined energy of the two systems triggered extremely intense rainfall over most of the Valley until shortly after noon. During the worst part of the storm, rainfall intensities of 3-5" per hour were not uncommon. McCarran International Airport operated under "weather hold" conditions from approximately 11:00 am until noon during which time approximately 20 departing flights were held on the ground and four arriving aircraft diverted to Los Angeles. The tables attached to this report provide a summary of the rainfall data for this event.

The runoff which resulted from this storm caused widespread street flooding throughout much of the Las Vegas Valley. Flows in the lower reaches of the Flamingo Wash, Duck Creek and Las Vegas Wash are estimated to be greater than any previously recorded flows. The following listing presents estimates of peak flows at various locations as determined by the US Geological Survey for this event, as well as previous record flows at these sites. These values are preliminary estimates and are subject to change as better information is developed.

<u>Location</u>	<u>Peak Discharge</u>	<u>Previous Maximum</u>
Duck Creek at Eastern Avenue	4300 cfs	
Duck Creek near Hollywood Blvd	3100 cfs	3000 cfs (9/11/98)
Flamingo Wash at Torrey Pines	1100 cfs	
Flamingo Wash at Decatur	3000 cfs	4760 cfs (8/10/83)
Flamingo Wash at Eastern Avenue	6800 cfs	4100 cfs (7/20/98)
Flamingo Wash at Nellis Blvd	5400 cfs	4100 cfs (6/10/90)
Tropicana Wash at Swenson	2000 cfs	
Las Vegas Wash near Sahara Ave	8600 cfs	4400 cfs (9/11/98)
Las Vegas Wash at Vegas Valley Drive	11,000 cfs	
Las Vegas Wash at Lake Las Vegas	16,000 cfs	9560 cfs (9/11/98)

Based on these flow estimates, it appears that in some reaches of the Las Vegas Wash this event may have exceeded a 100-year flood.

During this event, both Clark County and the City of Las Vegas opened their Emergency Operations Centers in order to coordinate damage assessments and response efforts. The areas most severely impacted by flood waters appear to have been along Duck Creek and the lower reaches of the Flamingo Wash. Severe erosion of unlined sections of these washes jeopardized buildings along the banks. At the Miracle Mile Mobile Home Park along the Flamingo Wash at Boulder Highway, flood flows and bank erosion resulted in the destruction of five residences. There was extensive damage to many roadways where flow in the washes exceeded culvert capacities and flow overtopped the roadways. There were reports of dozens of rescues of people trapped in their automobiles by flood waters. At Lake Las Vegas, the rate of flow in the Wash far exceeded the capacity of the two by-pass pipelines and a large fraction of the Wash

flow spilled into the Lake. The two low-level bladder dams were deflated early during this event in anticipation of extremely large flows in the Las Vegas Wash.

While the estimates of damages to public properties are believed to be in excess of \$20,500,000, the extent of the damages and loss of life are likely to have been much worse had it not been for completed flood control facilities. All of the completed facilities appear to have functioned as designed and provided a significant umbrella of protection to downstream properties. The following listing provides an estimate of the volume of runoff collected by detention basins throughout the Las Vegas Valley. The maximum water depths are based on high water marks observed at the basins after the storm.

<u>Detention Basin</u>	<u>Maximum depth of water</u>	<u>Volume Stored</u>
Angel Park	13 feet	200 acre feet
Carey/Lake Mead	11.5 feet	80 acre feet
Gowan North	9 feet	180 acre feet
Gowan South	22 feet	325 acre feet
Lone Mountain	8.5 feet	20 acre feet
Lower Las Vegas Wash	5.5 feet	10 acre feet
Meadows	11.5 feet	160 acre feet
Oakey	13.5 feet	85 acre feet
Red Rock	7.25 feet	200 acre feet
Tropicana	8-12 feet	20 acre feet
Upper Flamingo	5.5 feet	530 acre feet
VanBuskirk	3-5 feet	6 acre feet

Clark County Regional Flood Control District
July 8, 1999 Rainfall Totals (inches)

Device ID	4054	4059	4064	4074	4134
1500	0.00	0.00	0.00	0.00	0.00
1445	0.00	0.00	0.00	0.00	0.00
1430	0.00	0.00	0.00	0.00	0.04
1415	0.00	0.00	0.00	0.24	0.20
1400	0.04	0.00	0.08	0.00	0.00
1345	0.00	0.04	0.00	0.00	0.00
1330	0.00	0.04	0.04	0.00	0.00
1315	0.12	0.00	0.04	0.00	0.00
1300	0.00	0.16	0.04	0.00	0.08
1245	0.00	0.00	0.04	0.00	0.24
1230	0.04	0.16	0.51	0.35	0.67
1215	0.12	0.39	0.51	0.00	0.00
1200	0.00	0.35	0.00	0.24	0.00
1145	0.00	0.04	0.00	0.59	0.00
1130	0.12	0.00	0.00	0.00	0.00
1115	0.24	0.00	0.00	0.00	0.00
1100	0.00	0.00	0.00	0.00	0.00
1045	0.00	0.00	0.00	0.00	0.00
1030	0.04	0.00	0.00	0.00	0.00
1015	0.04	0.00	0.00	0.00	0.00
1000	0.28	0.00	0.00	0.00	0.00
0945	0.43	0.00	0.00	0.00	0.00
0930	0.20	0.00	0.00	0.00	0.00
0915	0.00	0.00	0.00	0.00	0.00
TOTALS:	1.65	1.18	1.26	1.42	1.22

4054 1/4 mi N of Lone Mtn Rd, 5 mi W of US-95

4059 1/4 mi N of Craig Rd near Highland Dr

4064 1/4 mi S of Ann Rd near Camino Al Norte

4074 intersection of Lake Mead Blvd and Pecos Rd

4134 6 miles NW of Nellis AFB

Clark County Regional Flood Control District
July 8, 1999 Rainfall Totals (inches)

Device ID	4204	4209	4214	4224	4229	4234	4239
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1445	0.00	0.00	0.00	0.00	0.00	0.00	0.08
1430	0.00	0.00	0.00	0.00	0.00	0.16	0.00
1415	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1400	0.00	0.04	0.00	0.00	0.00	0.00	0.00
1345	0.00	0.00	0.00	0.00	0.00	0.00	0.04
1330	0.00	0.04	0.00	0.00	0.00	0.00	0.08
1315	0.00	0.00	0.00	0.12	0.00	0.12	0.00
1300	0.04	0.04	0.04	0.00	0.00	0.00	0.04
1245	0.04	0.00	0.04	0.00	0.04	0.08	0.04
1230	0.00	0.04	0.16	0.20	0.00	0.16	0.24
1215	0.04	0.04	0.20	0.00	0.08	0.20	0.20
1200	0.04	0.12	0.12	0.00	0.00	0.20	0.24
1145	0.12	0.04	0.04	0.04	0.12	0.47	0.28
1130	0.24	0.24	0.39	0.24	0.16	0.31	0.00
1115	0.55	0.31	0.63	0.98	0.87	0.24	0.00
1100	0.67	0.67	0.00	0.00	0.20	0.00	0.00
1045	0.04	0.04	0.00	0.00	0.00	0.00	0.00
1030	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1015	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0945	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0930	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0915	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	1.77	1.61	1.61	1.57	1.46	1.93	1.22

- 4204** 2 1/2 mi NW of Red Rock DB
- 4209** Smoke Ranch Rd alignment 3mi W of Hualpai
- 4214** Summerlin Pkwy 1 mi E of Town Center
- 4224** intersection of Hualpai Way and Westcliffe Dr
- 4229** intersection of Charleston Blvd and Rampart
- 4234** intersection of Smoke Ranch Rd and Buffalo Dr
- 4239** Carey/Lake Mead DB (NLV Airport)

Clark County Regional Flood Control District
July 8, 1999 Rainfall Totals (inches)

Device ID	4304	4314	4324	4334	4344	4349	4359
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1445	0.00	0.04	0.00	0.00	0.00	0.00	0.00
1430	0.04	0.00	0.12	0.00	0.00	0.00	0.00
1415	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1400	0.04	0.04	0.00	0.00	0.00	0.00	0.00
1345	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1330	0.00	0.00	0.00	0.00	0.00	0.00	0.08
1315	0.04	0.08	0.00	0.00	0.00	0.00	0.00
1300	0.00	0.00	0.00	0.00	0.04	0.00	0.00
1245	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1230	0.04	0.00	0.00	0.12	0.12	0.00	0.24
1215	0.04	0.04	0.04	0.00	0.00	0.00	0.00
1200	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1145	0.08	0.04	0.08	0.08	0.12	0.08	0.00
1130	0.08	0.12	0.08	0.00	0.47	0.31	0.08
1115	0.43	0.28	0.00	0.20	1.06	0.08	0.28
1100	0.59	0.63	0.04	0.20	0.59	0.31	0.63
1045	0.00	0.94	0.71	0.91	0.16	0.31	0.00
1030	0.00	0.71	0.87	0.28	0.04	0.00	0.00
1015	0.00	0.28	0.12	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0945	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0930	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0915	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	1.38	3.19	2.05	1.77	2.60	1.10	1.30

- 4304** on Blue Diamond Ridge 2miE of Blue Diamond
- 4314** on Blue Diamond Ridge 7 mi W of Spanish Trails
- 4324** Red Rock Canyon Visitor Center
- 4334** 3 mi SW of Spanish Trails
- 4344** Red Rock DB
- 4349** Upper Flamingo DB
- 4359** 1/4 mi SW of Durango and Desert Inn

Clark County Regional Flood Control District
July 8, 1999 Rainfall Totals (inches)

Device ID	4364	4369	4374	4379	4384	4454	4484
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1445	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1430	0.04	0.00	0.00	0.00	0.16	0.00	0.08
1415	0.00	0.04	0.12	0.00	0.00	0.00	0.00
1400	0.08	0.00	0.00	0.00	0.00	0.00	0.00
1345	0.00	0.08	0.00	0.00	0.00	0.00	0.00
1330	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1315	0.04	0.00	0.00	0.00	0.00	0.00	0.00
1300	0.12	0.08	0.00	0.00	0.00	0.04	0.08
1245	0.00	0.00	0.00	0.00	0.04	0.00	0.00
1230	0.00	0.00	0.16	0.00	0.04	0.00	0.00
1215	0.00	0.16	0.28	0.12	0.04	0.08	0.12
1200	0.00	0.12	0.16	0.00	0.04	0.04	0.04
1145	0.39	0.16	0.43	0.24	0.55	0.20	0.31
1130	1.14	0.59	1.30	1.14	0.63	0.51	0.63
1115	0.00	0.00	0.00	0.12	0.08	0.55	0.12
1100	0.20	0.04	0.00	0.00	0.00	0.00	0.00
1045	0.51	0.08	0.00	0.00	0.00	0.20	0.00
1030	0.00	0.00	0.00	0.00	0.00	0.04	0.00
1015	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0945	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0930	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0915	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	2.52	1.34	2.44	1.61	1.57	1.65	1.38

- 4364** Torrey Pines Dr 1/4 mi N of Tropicana Ave
- 4369** Decatur Blvd 300 ft N of Tropicana Ave
- 4374** near intersection of Eastern Ave and Twain Ave
- 4379** VanBuskirk DB near Harmon and McLeod
- 4384** Desert Inn and Las Vegas Blvd
- 4454** near intersection of Warm Springs and Jones
- 4484** Swenson Ave 1/4 S of Flamingo Rd

Clark County Regional Flood Control District
July 8, 1999 Rainfall Totals (inches)

Device ID	4614	4624	4634	4644	4654	4754	4789	4794
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1445	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
1430	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
1415	0.04	0.00	0.00	0.00	0.08	0.28	0.00	0.04
1400	0.04	0.00	0.00	0.12	0.00	0.00	0.00	0.00
1345	0.12	0.00	0.00	0.00	0.12	0.00	0.00	0.00
1330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1315	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
1245	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.00
1230	0.04	0.20	0.16	0.28	0.08	0.00	0.28	0.12
1215	0.08	0.00	0.00	0.00	0.24	0.16	0.59	0.35
1200	0.04	0.00	0.08	0.00	0.00	0.04	0.12	0.00
1145	0.31	0.16	0.04	0.31	0.12	0.00	0.12	0.16
1130	0.55	0.12	0.04	0.55	0.20	0.20	0.00	0.12
1115	0.98	1.38	0.59	0.51	0.20	0.55	0.28	0.55
1100	0.43	1.34	0.31	0.00	0.08	0.16	0.08	0.04
1045	0.00	0.04	0.00	0.00	0.04	_____	0.00	0.00
1030	0.08	0.00	0.00	0.04	0.00	_____	0.00	0.00
1015	0.04	0.00	0.00	0.00	0.00	_____	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	_____	0.00	0.00
0945	0.00	0.00	0.00	0.00	0.00	_____	0.00	0.00
0930	0.00	0.00	0.00	0.00	0.00	_____	0.00	0.00
0915	0.00	0.00	0.00	0.00	0.00	_____	0.00	0.00
TOTALS:	2.76	3.23	1.22	1.81	1.22	1.38	1.54	1.42

- 4614** Torrey Pines Dr ¼ mile S of Blue Diamond Rd
- 4624** Paradise Rd ¼ mile N of Windmill Rd
- 4634** Eastern Ave ¼ mile S of Warm Springs Rd
- 4644** NWS Offices on Industrial Rd N of Blue Diamond Rd
- 4654** Rainbow Blvd 3 ½ miles S of Blue Diamond Rd
- 4754** Equestiran DB near Equestrian Dr and Magic Way
- 4789** near Equestrian/Foothills Dr
- 4794** 3 miles E of Boulder Hwy/Lake Mead Dr