



Evening Monsoon thunderstorm looking WNW from Papago Park, 08-17-2014, D. Henz

Flood Control District of Maricopa County

Engineering Division, Flood Warning Branch

MSP Verification Report & Season Recap: Monsoon Season 2014



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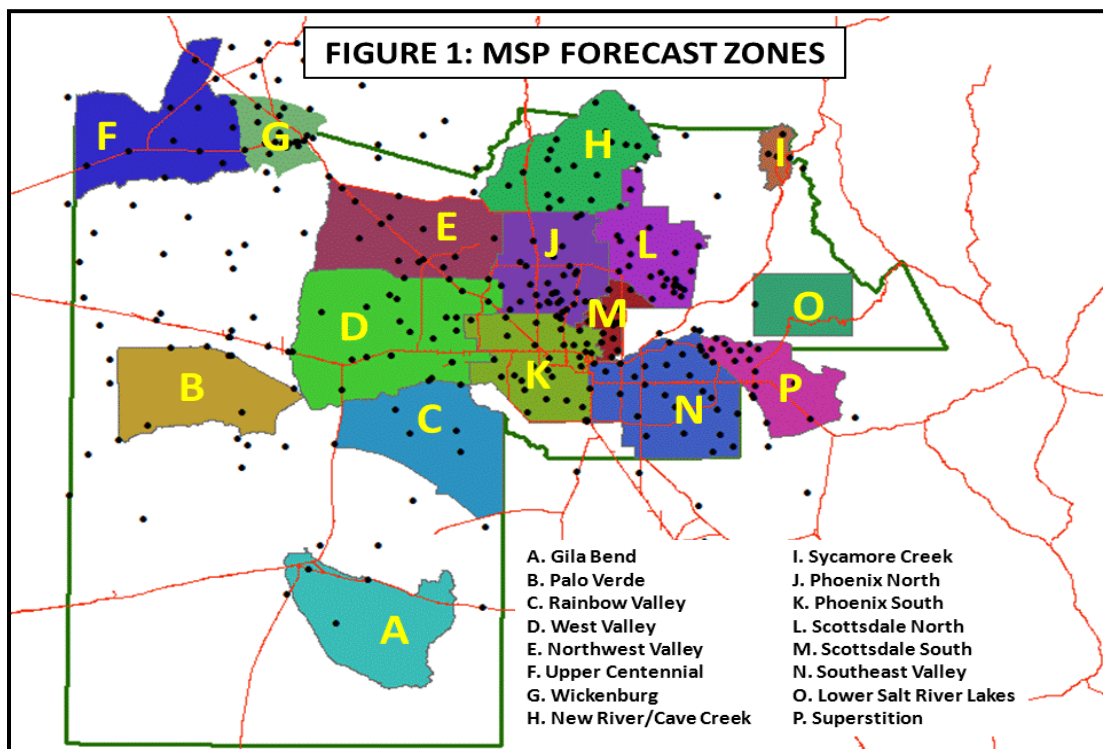
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INTRODUCTION

This report was generated by the Flood Warning Branch of the Flood Control District of Maricopa County (FCDMC). It covers the length of the monsoon season as defined by the National Weather Service Phoenix WFO: June 15th- September 30th. This report includes daily records on Weather Outlooks and Statements issued by the Meteorological Services Program (MSP) as well as a complete verification and summary of these products.

The Flood Warning Branch of the FCDMC operates a year round MSP that's purpose is to provide detailed meteorological forecasts and support to county, city, and other local agencies. The program covers 5,400 square miles encompassing Maricopa County and surrounding watersheds. The goal of the Flood Control District's MSP is to reduce response time for emergency managers by providing timely and accurate weather information, primarily regarding the potential for flood-producing rainfall. During the length of the Monsoon season the MSP goes on a weekly rotating 24/7 manned schedule. A Duty Officer is selected for each day who is responsible for issuing MSP products, providing support to clients, and serves as the on-call supervisor during non-business hours. A supporting officer is also named and can be available to the duty officer in the case of a significant weather event. All MSP forecast products are disseminated via email, fax, and occasionally via pager. Emergency managers may also be notified by telephone to aid in decision making.

The MSP has broken down the 5,400 square mile operational area into 16 forecast zones. These zones are the primary warning areas identified by emergency management officials. A map of the forecast zone locations is shown below in Figure 1.



MSP PRODUCT DESCRIPTION

Weather Outlook:

The Weather Outlook is disseminated to clients daily no later than 2PM during the monsoon season. This product covers the today through tomorrow period and occasionally the following 2-3 days where appropriate. Occasionally, due to unexpected weather pattern changes, Weather Outlooks will be updated throughout the day or first thing the following morning. Weather Outlooks include a synopsis of expected weather conditions; the “probability of occurrence” of rain; the expected “prime time” for the bulk of the rain; and the amount of rain expected during the prime time period. Temperature forecasts and trends are included as well as a forecast of peak wind speeds. Click [here](#) for an example.

Message 1 – Alert:

When it is believed developing weather conditions may lead to heavy rain and/or minor to moderate flooding an Alert is issued. Lead time will generally be less than an hour in advance of the expected event. The Alert will normally identify the affected zone(s), the time frame of the event (valid time), rainfall potential, and the type of areas that will be impacted, such as roads and/or washes. Click [here](#) for an example.

Message 2 – Flash Flood Watch:

When it appears the developing weather event may lead to flash flooding a Watch is issued for the possible affected areas. Lead time will generally be 1 to 2 hours in advance of the expected event, but can stretch to a day or more with reliable guidance. The Watch will include the time frame it will be in effect (valid time), and a section describing what may take place (comments). Click [here](#) for an example.

Message 3 – Flash Flood Warning:

When it appears that significant flash flooding is imminent or has started to take place, a Warning will be issued for the affected areas. Lead time will generally be less than an hour. The Warning will normally identify the affected zone(s), a time frame of the event, rainfall potential, and a section describing what is expected to take place (comments). Click [here](#) for an example.

Message 1, 2 and 3 Update:

This product, issued as needed, will update an existing Alert, Watch or Warning. Click [here](#) for an example.

Message 4 – Cancel:

When an event (Watch or Warning) no longer poses a threat, and the expiration time has not been reached, a Cancel message may be issued. Click [here](#) for an example.

Lake Alerts:

In addition to the above MSP program, weather guidance is provided for Maricopa County lakes/reservoirs from June 15 through October 15. Lake Alerts are issued as needed to inform of approaching adverse weather conditions. Emphasis in these statements is on expected wind gusts and lightning activity. Click [here](#) for an example.

Additional Products:

During the summer months, a program exists to aid the Boy Scouts at Camp Geronimo. Though in Gila County, many of the scouts reside within Maricopa County. The Camp exists below a watershed that was recently burned, and NWS Flagstaff declined a request for localized support. A call is made to the officials at the camp when needed, stating the expected flood problem.

At the request of clients, site specific products may be issued to support unusual or special operations, such as specific wind forecasts to aid in the fighting of fires, or forecasting for special events at the County lakes or parks, or District construction projects.

Additional information and data regarding the FCDMC can be found online [here](#)

2014 MONSOON SEASON RECAP

According to the FCDMC ALERT rain gage network, the 2014 monsoon season was the wettest on record spanning the last 31 seasons. When averaged across the entire county mesonet, 6.92" of rain fell which was over double the mean value of 3.04". An image showing the full 31 year period of record can be viewed [here](#). Unsurprisingly, well above average rainfall was recorded at Sky Harbor Airport for the third consecutive season. The official rainfall total as reported by the NWS Phoenix office was 6.34" which went down as the seventh wettest during its 118 year period of record. Figure 2, below, offers a more comprehensive picture of the rainfall distribution across the MSP forecast area. This figure was generated using FCDMC ALERT rain gage data from around the county. The shaded contours depict precipitation totals from June 15th – September 30th.

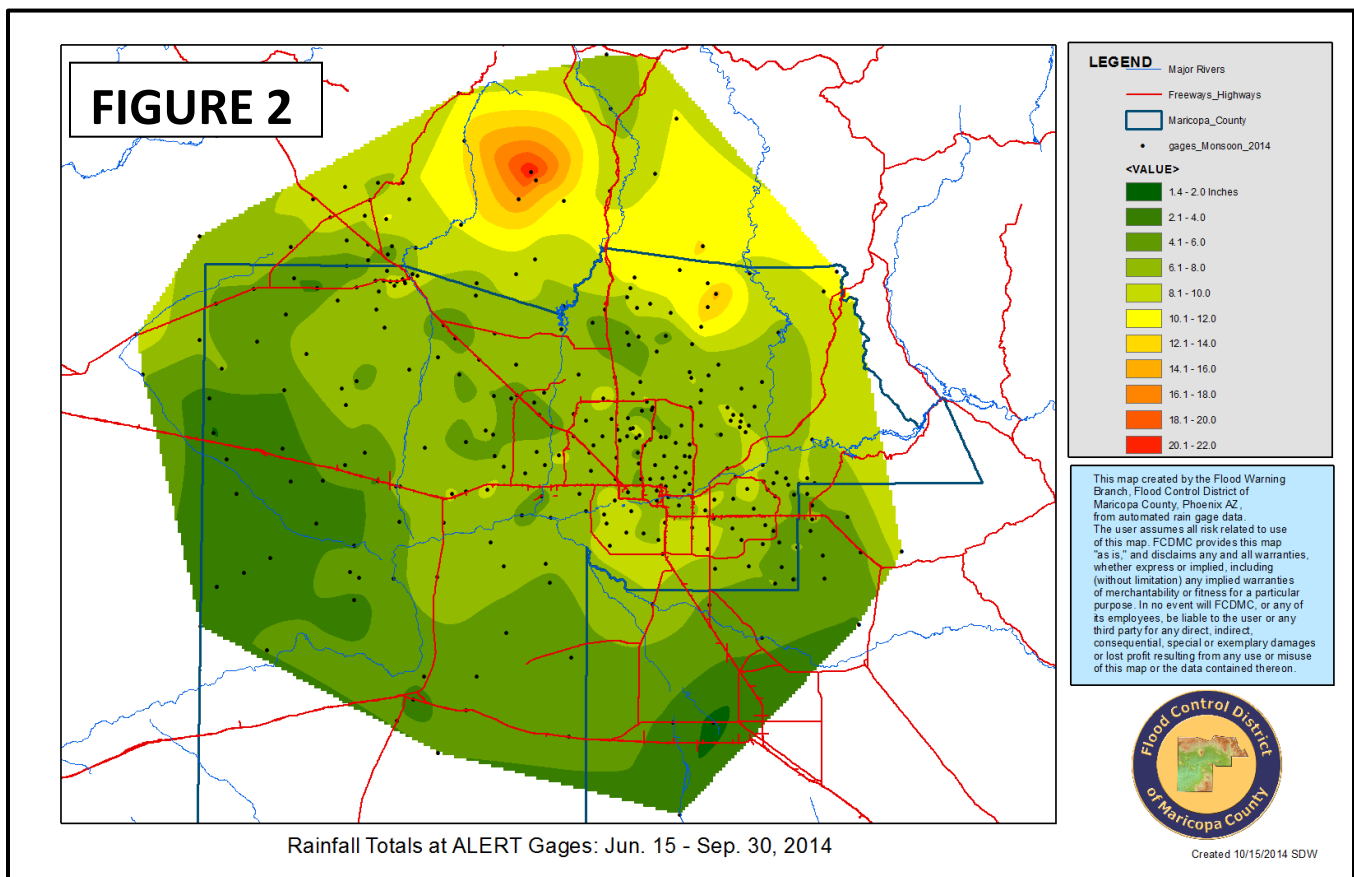
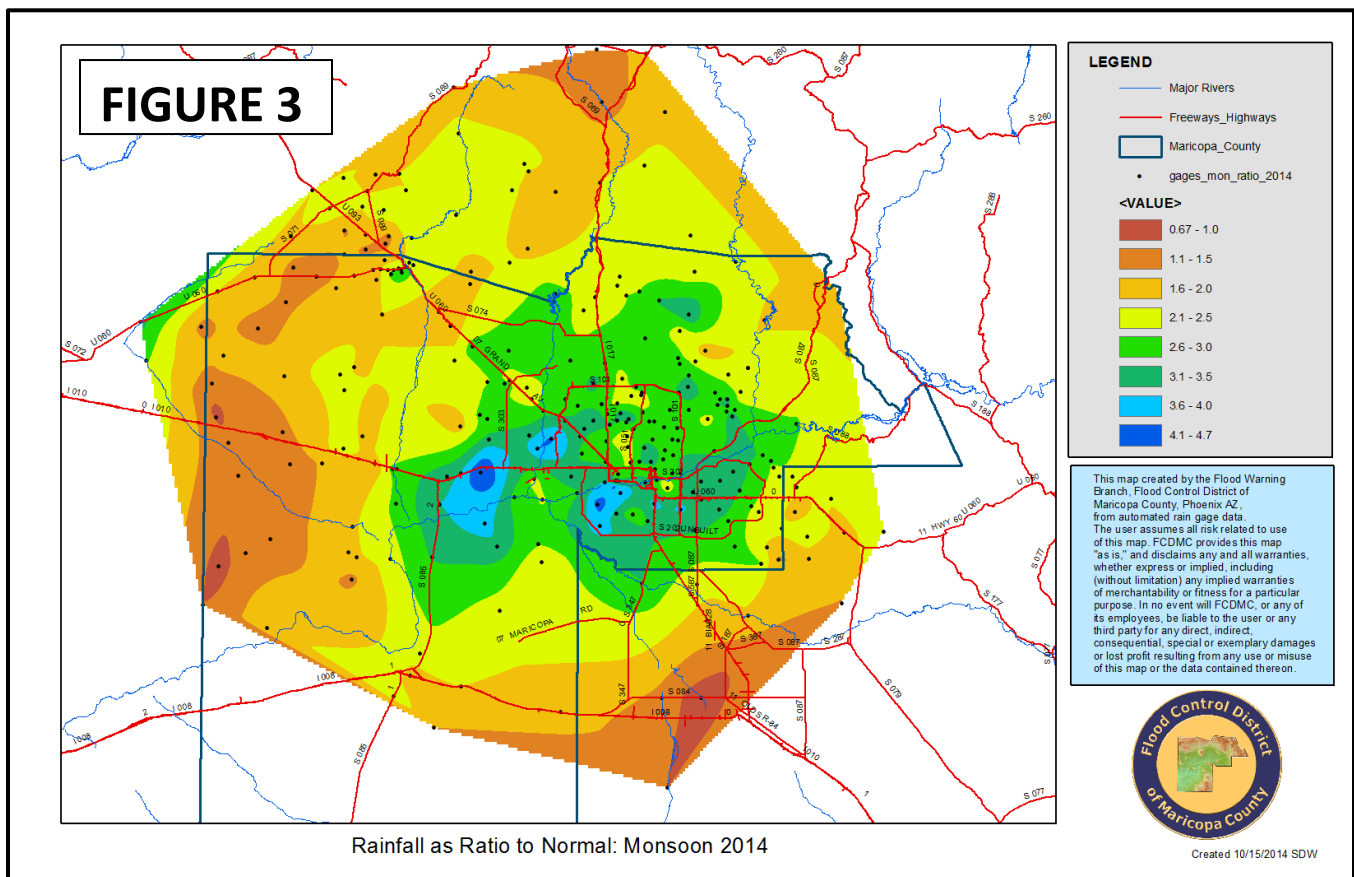


Figure 3 on the next page shows the ratio of 2014 monsoon precipitation versus average monsoon precipitation. Similar to Figure 2, contours were generated using FCDMC ALERT rain gage data from around the county. Amazingly, above average rainfall totals for the season are denoted by all contours except for the darkest shade of red. Most locations were above average with the bulk of the urban corridor 3.5 to 4.5 greater than average. These two figures serve as a strong reminder to the importance of having a widely distributed rain gage network in order to fully understand the distribution of monsoon rains.

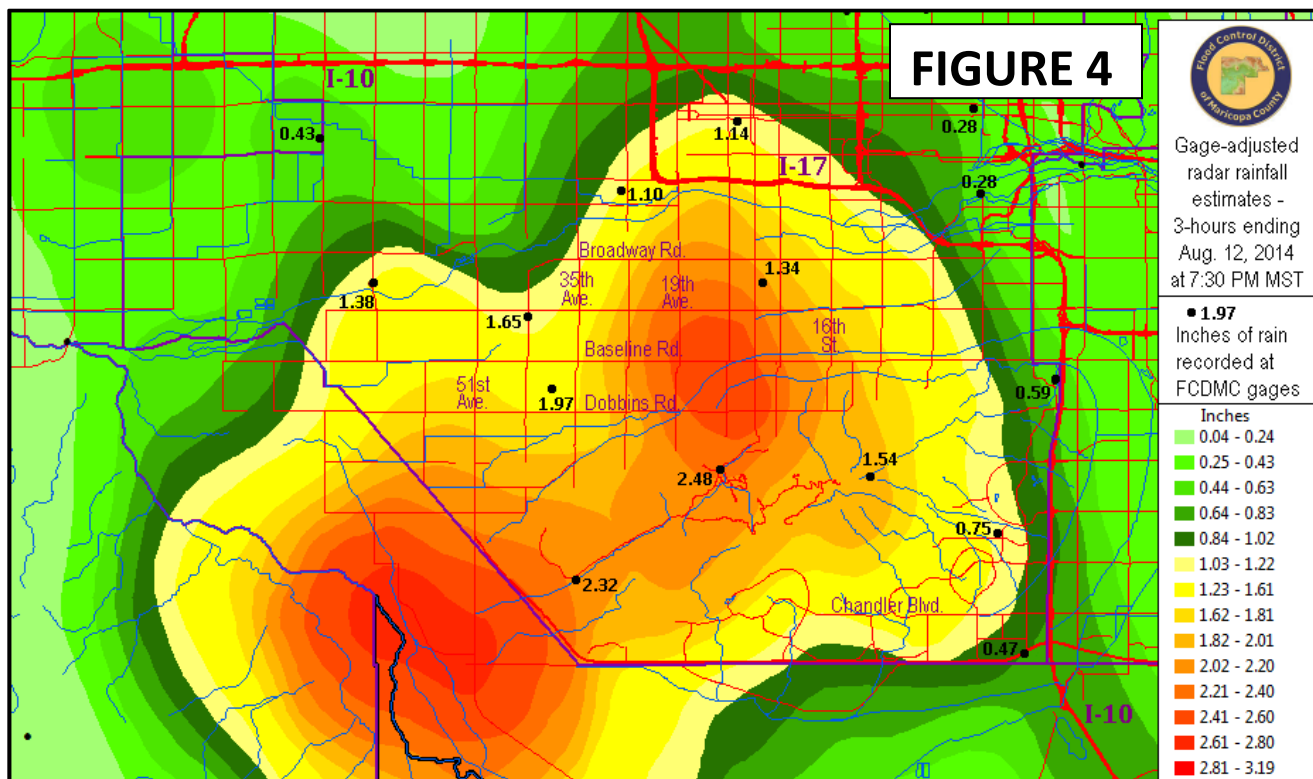


The monsoon season existed in name only through the second half of June with dry conditions prevailing, before getting got off to a fast start near the beginning of July. The first MSP message statements were issued on July 3rd, as a major dust storm and subsequent thunderstorms rolled through the Phoenix Valley during the evening hours. Daily isolated thunderstorm activity continued through July 7th before noteworthy heavy rain and a strong microburst ripped through eastern portions of the Valley on the 8th. Activity slowed the next four days through July 12th before the next multi-day period of rainfall producing t-storms within the county which came July 13th-15th. The 13th and 14th were the two most active July days in terms of message issuance for the District as a deep gulf surge aided by a passing inverted trough brought widespread t-storms to most of the county. Another break period to the monsoon began on the 16th lasting through the 25th. This quiet time also brought a significant heat wave as daily record high temperatures were set on the 23rd and 24th.

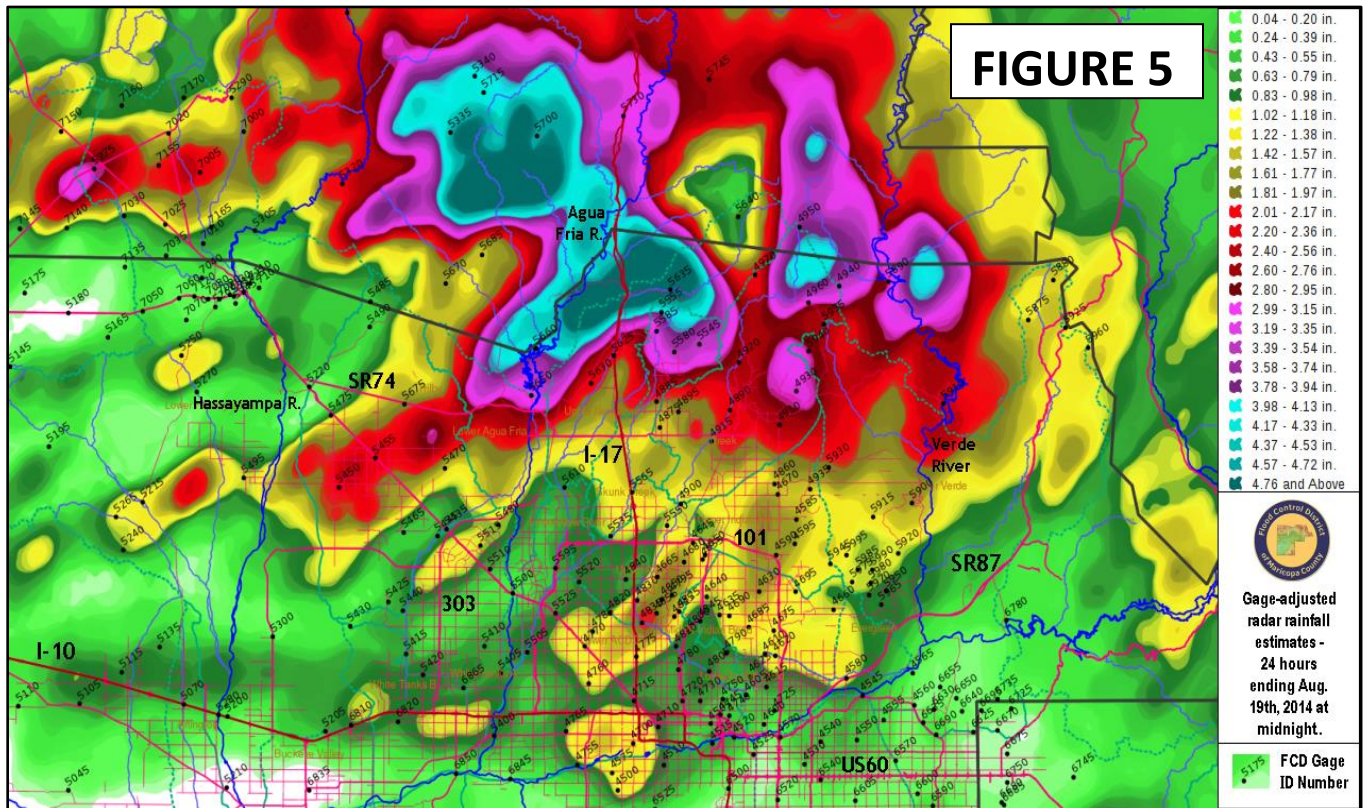
A widespread wind (macroburst) and rain event occurred during the evening hours on July 26th as an intense line of thunderstorms moved west off the higher terrain through northern portions of the Valley. Winds in excess of 50-70mph covered a roughly twelve square mile area around the Loop 101/51 interchange causing widespread damage. Daily isolated thunderstorm occurrences continued through the end the month without any noteworthy rain events and generally hot temperatures.

The first three days of August were very active as an unusually strong low pressure system slowly moved east out of the eastern Pacific Ocean/Gulf of California into the Desert Southwest. Heavy rains fell across the western half of the County during the evening hours of the 1st. Flash Flood Watches were then issued on the 2nd to accommodate heavy rains occurring from the Scottsdale area west through Wickenburg during the evening hours. Severe thunderstorms developed across the Phoenix area during the afternoon hours on the 3rd bringing severe downdraft winds to the southeast Valley and heavy rains to the central Valley. The next major break period to the monsoon quickly followed lasting until the 11th.

Two significant widespread rain and flooding events occurred during a seven day period through mid-August. The first event unfolded on August 12, as a rigorous inverted trough lifted north out of Baja California with a robust gulf surge of moisture producing organized clusters of strong t-storms. Torrential rains fell over many portions of the county with the Phoenix South Mountain communities (Figure 4, below) hit particularly hard. A complete storm overview of this event was generated by the FCDMC and can be viewed [here](#).



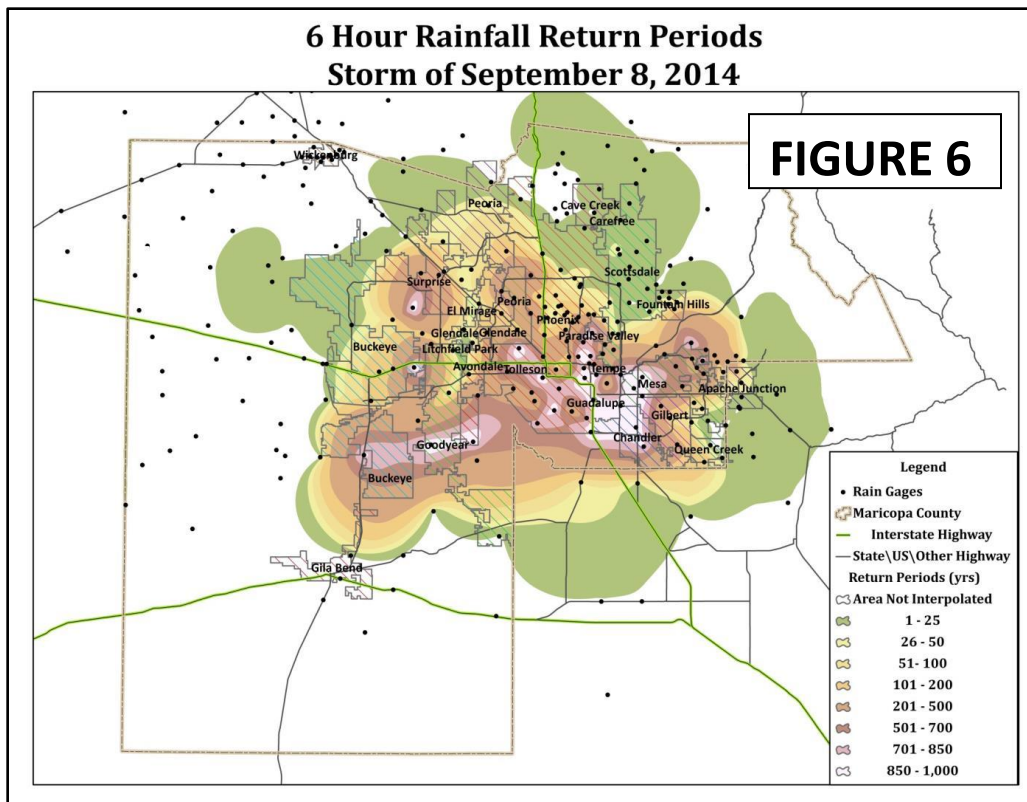
The second event took place on August 19th. This event was highlighted by forcing from an approaching upper-level trough collocated over an unstable and moist atmosphere across southcentral AZ. Multiple waves of training thunderstorms dropped heavy rainfall across the high terrain and lower deserts of central Maricopa County over a twelve hour period (See rainfall totals in Figure 5 on the next page). Torrential rains over the Hassayampa, New River, Skunk Creek, and Cave Creek watersheds brought significant runoff south to FCD dams. A complete storm overview of this event was generated by the FCDMC and can be viewed [here](#).



The bulk of the upper-level disturbance eventually moved inland into southern CA and AZ on the 21st bringing another round of t-storms and general rains to the county. The monsoon pattern slowed for the remainder of August with the only other noteworthy rain event occurring on the 25th across the Wickenburg area.

September picked up where August left off with a lull in activity through the 7th. Typically, the monsoon season tends to come to a close during this time, but an already active Eastern Pacific Tropical Cyclone season peaked during the month with several noteworthy systems that ultimately affected the state of AZ. Tropical moisture associated with the remnants of Hurricane Norbert and forcing from an approaching upper-level trough led to the generation of two Mesoscale Convective Systems which merged over central Maricopa County early in the morning of the 8th. These systems produced 3.30" of rain at Phoenix Sky Harbor airport which was the most rain ever recorded on a calendar day. Other locations across central portions of the County registered even greater totals with upwards of 4.00"-5.50" (see Figure 6 on the next page for rainfall return periods). Heavy rain from this event ultimately led to significant urban flooding in and around the greater Phoenix area. A complete storm overview of this event was generated by the FCDMC and can be viewed [here](#).

A little over a week later, Tropical system Odile drew large attention around the country as it was forecast to track into southern AZ with its circulation intact bringing the potential for another significant rain event . Ultimately, the system took a major last minute shift eastward on the 17th and the bulk of the heaviest rainfall fell across extreme southeastern AZ.



In and around the County, several strong thunderstorms developed across the Southeast Valley bringing heavy rains to the Mesa and Apache Junction areas. Otherwise, it ended up being a null event. The month of September came to a roaring close with one final significant rain and severe weather event that unfolded on the 27th.

The setup for this event closely mimicked a transitional severe weather/flooding event which historically tends to mark an end to the monsoon season by ushering in a fall weather pattern. A cut-off upper-level disturbance with an attendant Pacific cold front moved from west to east across central AZ on the 27th. Widespread discrete severe thunderstorms brought heavy rain and hail from the Lower Colorado River Valley east through western Maricopa County. Storms grew upscale into an organized squall line which traversed Phoenix's urban corridor bringing severe wind damage to large areas of the Valley including Phoenix Sky Harbor Airport. The airport picked up 1.66" from the event with much of the Southeast Valley and higher terrain areas east of Phoenix seeing upwards of 2.00"-3.00" of rain. A complete storm overview of this event was generated by the FCDMC and can be viewed [here](#). When all was said and done for the month, September ended up being the second wettest on record at Phoenix Sky Harbor with 5.11" of rain.

MSP Issued Products Recap:

A total of 326 forecast zone-specific messages were issued by the MSP spread across thirty-two different days during the length of the monsoon season. Table 1, on the next page, shows the monthly break down by forecast zone of messages issued including season totals.

TABLE 1: MSP Messages Issued - 2014 Monsoon Season					
Forecast Zone	June	July	August	September	Total
Gila Bend	0	5	3	5	13
Palo Verde	0	3	7	5	15
Rainbow Valley	0	3	5	9	17
West Valley	0	7	9	11	27
Northwest Valley	0	5	10	8	23
Upper Centennial	0	3	6	4	13
Wickenburg	0	8	20	7	35
New River/Cave Creek	0	5	13	7	25
Sycamore Creek	0	4	5	3	12
Phoenix North	0	2	12	7	21
Phoenix South	0	5	10	11	26
Scottsdale North	0	9	14	9	32
Scottsdale South	0	4	10	8	22
Southeast Valley	0	3	9	14	26
Lower Salt River Lakes	0	1	1	2	4
Superstition	0	1	5	9	15
All Zones	0	68	139	119	326

Of the 326 Messages issued, 188 were Message-1 Alerts, fifty-five were Message-2 Flash Flood Watches, seventy-two were Message-3 Flash Flood Warnings and the remaining eleven were Message-4 Cancels. Table 2 below shows the monthly break down by forecast zone of Lake Alerts issued including season totals. Fifty-seven Lake Alert statements were issued for the County Lakes Program including Lake Pleasant, Bartlett Lake, Horseshoe Lake, Saguaro Lake, Canyon Lake, and Apache Lake.

TABLE 2: MSP Lake Alerts Issued - 2014 Monsoon Season					
Recreational Zone	June	July	August	September	Total
Lake Pleasant	0	4	3	0	7
Horseshoe Lake	0	0	0	0	0
Bartlett Lake	0	3	5	1	9
Saguaro Lake	0	4	6	2	12
Canyon Lake	0	5	6	2	13
Apache Lake	0	7	7	2	16
All Zones	0	23	27	7	57

The Alert Operation Center (AOC) was activated twice this monsoon season: August 19th and September 8th. While both of these historic events led to widespread heavy rainfall and flooding, neither posed any serious threat to county/city dams or District flood control facilities.

MSP VERIFICATION METRICS AND CRITERIA

Several key verification metrics and a clear set of operational based criteria were adopted in order to conduct a thorough and complete verification of MSP products issued during the 2013 monsoon season. This chapter is broken down into five sections: Outlooks, Messages, Lake Alerts, Peak Intensity, and Storm Total Precipitation. Each section discusses the verification metrics used and the criteria followed to compute the statistics displayed in the summary chapter sections. A list of frequently used terms including definitions and acronyms as used throughout this report is listed below.

Observed Rainfall: the amounts of total rainfall gathered from either ALERT rain gages, gage corrected radar estimations, or local storm reports (LSRs).

Operationally Significant Event (OSE): a rain event within a MSP forecast zone with observed rainfall equal or greater than 0.50”.

Hit: considered a correct forecast.

Miss: considered an incorrect forecast.

Correct Negative: considered a correct forecast ex. no rain forecast and no rain observed.

Forecast Accuracy: a measure of the ability to correctly forecast daily rainfall potential. Given in percent and calculated using Equation 1 below:

$$(1) \text{ Forecast Accuracy} = \left(\frac{\text{Correct Forecasts}}{\text{Total Forecasts}} \right) \times 100$$

Probability of Detection (POD): a measure of the ability to correctly discriminate heavy rain days (OSEs) from non-rain/minor rain days. Given in percent and calculated using Equation 2 below:

$$(2) \text{ POD} = \left(\frac{\text{OSEs Correctly Detected}}{\text{Total OSEs}} \right) \times 100$$

False Alarm: occurs when an OSE is forecast for a location but does not occur.

False Alarm Rate: measures the number of false alarms compared to forecast days i.e. over-forecasting. Given in percent and calculated using the Equation 3 below:

$$(3) \text{ FAR} = \left(\frac{\text{False Alarms}}{\text{Total Forecasts}} \right) \times 100$$

Threat Score: measures the fraction of observed and/or forecast events that were correctly predicted. TS can be thought of as forecast accuracy when correct negatives have been removed from consideration. Given in percent and calculated using Equation 4 below.

$$(4) \quad TS = \left(\frac{Hits}{Hits + Misses + False Alarms} \right)$$

Percent Error: a measure of relative error given in percent. Calculated using Equation 4 below:

$$(5) \quad \% Error = \left(\frac{Forecast - Observed}{Observed} \right) \times 100$$

Quantitative Precipitation Forecast (QPF): forecast zone or basin specific rainfall forecast including a rainfall amount given in inches and/or intensity.

Rainfall Intensity: the rate at which rain is falling including an amount in inches over a specific time period i.e. 0.50"/30min.

Storm Total Precipitation (STP): total rainfall from an identified storm or storm complex, given in inches.

Probability of Occurrence: forecast confidence, given in percent, that rainfall that could occur within a forecast zone or basin, usually given in conjunction with a QPF.

Gage Adjusted Quantitative Precipitation Estimate (GAQPE): radar estimated rainfall total, product provided by WDT Inc.

Lead Time: the amount of time between when the forecast statement was issued/valid and the onset of the event (observable).

Qualifying Event: an issued statement/QPF that counts in the verification process.

The following five sections explain the development of verification statistics as tabulated in Appendix A-E.

OUTLOOKS:

Forecast Accuracy:

Either a hit or a miss was selected for each day. A hit was assigned when observed rainfall met or exceeded the QPF. A miss was assigned when rainfall was observed and no QPF was made or if observed rainfall failed to reasonably meet the QPF. In some cases a hit was assigned when the QPF was not reasonably met by observed rainfall. In these cases the probability of occurrence was 30% or less and the QPF was below the OSE threshold. Values were then populated for each forecast zone and all zones combined. Forecast accuracy was then calculated by month.

Probability of Detection:

A dash was assigned to all days when observed rainfall was below the OSE threshold. On days when observed rainfall met or exceeded the OSE threshold either a hit or a miss was assigned. A hit was selected when the observed rainfall reasonably met the QPF. A miss was assigned when observed rainfall greatly exceeded the QPF or if no QPF was issued. Values were then populated for each forecast zone and all zones combined. A probability of detection was calculated by month and season total.

False Alarm Rate:

False alarms were denoted by an “x”. A false alarm was assigned on days where the observed rainfall failed to meet the OSE threshold, yet the QPF called for an OSE with a high probability of occurrence. The two relationships below outline the above criteria.

$$\begin{aligned} & \text{Probability} \geq 40\% \text{ and QPF} \geq 0.50'' \text{ AND Observed Rain} < 0.50'' \\ & \text{Probability} = 30\% \text{ and QPF} \geq 1.00'' \text{ AND Observed Rain} < 0.50'' \end{aligned}$$

Values were then populated for each forecast zone and all zones combined. False alarm rate was then calculated by month and season total.

Threat Score:

Similar to Forecast Accuracy, a Threat Score or Critical Success Index was calculated. Threat score is only concerned with forecasts that count (days with observable rain) and assumes correct negatives are not important. Values were populated for each forecast zone and all zones combined for the length of the season.

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP daily Outlooks can be found in [Appendix A](#).

MESSAGES:Forecast Accuracy:

A hit was assigned if a rain, stream, or dam alarm was triggered during the valid period of the issued Message and/or if observed rainfall reasonably met the QPF during the valid period. Conversely a miss was assigned if neither of these two criteria were met. Values were then populated for each forecast zone and all zones combined. Forecast accuracy was then calculated by month and season total.

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP Messages can be found in [Appendix B](#).

LAKE ALERTS:Forecast Accuracy:

A hit was assigned if any of the following observations occurred during the valid period of the issued Lake Alert: lightning within the recreational area boundary, wind > 30mph, or hail/heavy

rain. Conversely a miss was assigned if none of these three criteria were observed. Values were then populated for each recreational zone and all zones combined. Forecast accuracy was then calculated by month and season total.

Lead Time:

Lead time was calculated for each issued Lake Alert when possible. Time was measured from the valid time to the first observation (lightning within the recreational area boundary, wind > 30mph, or hail/heavy rain).

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP Lake Alerts can be found in [Appendix C](#).

QPF PEAK RAINFALL INTENSITY:

Forecast Accuracy:

Only message statements where QPF peak rainfall intensity was provided were evaluated. Observational data used for this verification included Maricopa County ALERT rain gages and/or local storm reports. Either a hit or a miss was selected for each event. A hit was assigned if the percent error was less than or equal to 25%. Conversely a miss was assigned if the percent error was greater than 25%. Values were then populated for each forecast zone and all zones combined. Forecast accuracy was then calculated by month and season.

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP Messages can be found in [Appendix D](#).

STORM TOTAL PRECIPITATION:

Forecast Accuracy:

Only message statements where a QPF storm total precipitation amount was provided were evaluated. Observational data used for this verification included Maricopa County ALERT rain gages, local storm reports, and/or radar GAQPE. Either a hit or a miss was selected for each qualifying event. A hit was assigned if the percent error was less than or equal to 25%. Conversely a miss was assigned if the percent error was greater than 25%. Values were then populated for each forecast zone and all zones combined. Forecast accuracy was then calculated by month and season.

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP Messages can be found in [Appendix E](#).

OUTLOOK VERIFICATION

Table 3 below shows the Outlook verification seasonal totals for each Forecast Zone (FZ). Complete data tables for each FZ, separated by month, can be viewed in [Appendix A](#): Table A-1. Overall, Outlook forecast accuracy during the length of the monsoon season for all FZs combined was quite good at 77.7%. The forecast accuracy for only three FZs fell below 75% on the season: Upper Centennial, Wickenburg, and Sycamore Creek but they remained well above the 50% threshold. This was somewhat expected given the forecast challenges associated with predicting storm potential and rainfall output over these mainly high terrain regions. Over-forecasting rain totals was a noticeable reason as to the lower accuracy and was easily visible when comparing with the false alarm rate, discussed below.

TABLE 3: MSP Weather Outlook Verification - SEASON TOTALS, 2014							
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)	TS (%)
Gila Bend	83/108	76.9%	13/20	65.0%	10	9.3%	65.0%
Palo Verde	83/108	76.9%	14/23	60.9%	6	5.6%	67.7%
Rainbow Valley	86/108	79.6%	13/16	81.3%	9	8.3%	68.7%
West Valley	90/108	83.3%	15/21	71.4%	6	5.6%	75.0%
Northwest Valley	85/108	78.7%	13/20	65.0%	10	9.3%	67.0%
Upper Centennial	79/108	73.1%	19/31	61.3%	4	3.7%	64.9%
Wickenburg	76/108	70.4%	16/22	72.7%	7	6.5%	59.8%
New River/Cave Creek	84/108	77.8%	22/24	91.7%	6	5.6%	68.8%
Sycamore Creek	78/108	72.2%	9/12	75.0%	15	13.9%	57.1%
Phoenix North	87/108	80.6%	10/12	83.0%	9	8.3%	69.7%
Phoenix South	89/108	82.4%	10/11	90.9%	4	3.7%	75.5%
Scottsdale North	87/108	80.6%	13/13	100.0%	9	8.3%	69.7%
Scottsdale South	87/108	80.6%	8/8	100.0%	5	4.6%	72.6%
Southeast Valley	83/108	76.9%	11/12	91.7%	7	6.5%	67.0%
Lower Salt River Lakes	84/108	77.8%	16/18	88.9%	6	5.6%	68.8%
Superstition	81/108	75.0%	14/18	77.85	9	8.3%	63.6%
All Zones	1342/1728	77.7%	216/288	76.9%	122/1728	7.1%	67.4%

The next metric computed was probability of detection. This metric was quite important because it distinguished how well MSP forecasters detected operationally significant events. Operationally significant events were defined as having 0.50" of rainfall or more. The POD during the length of the monsoon season for all FZs combined was 76.9%. In general, a POD of over 50% is considered sufficient and over 75% excellent in the forecast community. All FZs were at or above the 50% accuracy threshold with ten meeting or exceeding the 75% accuracy threshold.

The next metric included in Table 2 was False Alarm Rate (FAR). It is important to keep track of how often MSP forecasters predicted an operationally significant flooding day that did not occur. Too many false alarms can degrade user confidence in the forecasts. In general a FAR below 50% is sufficient and below 25% is considered excellent within the forecast community. The overall FAR for all zones during the length of the monsoon season was very low at 7.1% with none of the forecast zones exceeding 14%.

The final metric included in Table 2 was Threat Score (TS). The monsoon season officially runs from June 15th through September 30th of each year, yet the operational season (active weather days) tends to be much shorter beginning sometime in early July and finishing by mid September. TS is thought to serve as a better metric for overall forecast skill as it removes correct negatives that are not important when computing forecast accuracy i.e. dry days before and after the active monsoon season. This year the operational monsoon season began on July 1st and ended on September 28th. Overall, forecast skill was 67.4% for all FZs over the length of the active season. Only two FZs (West Valley and Phoenix South) met or exceeded the 75% accuracy threshold, while the remaining fourteen FZs remained above the 50% threshold. Sycamore Creek had the lowest TS at 57.1%. One of the main reasons for decreased score was due to false alarms as this zone had five more than the next highest zone at ten.

MESSAGE VERIFICATION

The MSP messages carry a higher priority threat-wise than the daily outlooks. These statements (Alerts, Watches, and Warnings) serve as the most critical products issued by the MSP during the monsoon season to our clients. A high level of accuracy is required when forecasting these types of events as the information they provide is directly applicable to the potential or imminent flooding situation. All of the messages issued fall under the category of operationally significant events.

Table 4 on the next page shows the issued message verification broken down by FZ and month. Complete data tables for each FZ can be viewed in [Appendix B: Tables B-1 and B-2](#). There were 263 qualifying messages issued over the length of the season. Forecast accuracy for all FZs combined, over the length of the season, was exceptional at 80.2%. Ten of the sixteen FZs met or exceeded the 75% accuracy threshold with five of the other six above the 50% accuracy threshold. As stated earlier, 50% accuracy is considered sufficient and 75% or above is considered excellent within the forecast community. The Lower Salt River Lakes (LSRL) zone fell below the 50% threshold at 33.3%. Only three message statements were issued for the LSRL zone with the sole warning product verifying and the two misses being watches.

No messages were issued in June for any of the FZs with the onset of the monsoon season holding off until July. Fifty-four messages were issued in July and forecast accuracy for the month for all FZs combined was 83.3%. The nine misses for the month were evenly distributed across twelve events with no rain event day exceeding two misses.

August was the busiest month with 119 messages issued across twelve operationally significant days. Overall, forecast accuracy decreased to 79.0%. Thirteen of the twenty-four misses for the month were a result of Flash Flood Watches. August included three of the five events (2nd, 12th, and 19th) with twenty or more messages issued. Two of the most active days of the entire season were the 12th and 19th which combined for fifty-nine issued statements of which fifty-two verified. On the 19th, moisture from a deep gulf surge out of Baja California interacted with an early season upper-level trough and produced a widespread heavy rain and flooding across northcentral portions of the county.

September saw a slight rise in overall forecast accuracy to 80.0%. There were eight operationally significant days that spanned the length of the month including the other two events (8th and 27th) with twenty or more messages issued. Seventy-six of the Ninety messages were issued during these two event days with seventy-three verifying. On the 8th, remnants from Tropical System Norbert interacted with a fall disturbance to produce torrential rain and widespread flooding over Phoenix's urban corridor. The 27th was a classic severe weather event which also brought widespread heavy rain to much of the county. Ten of the eighteen misses were a result of Flash Flood Watches for null events (Odile accounted for 5).

TABLE 4: MSP Issued Statements Verification, broken down by month and Forecast Zone - Monsoon Season 2014

	June		July		August		September		Season Totals	
Forecast Zone	Correct Statements	AOF (%)	Correct Statements	AOF (%)	Correct Statements	AOF (%)	Correct Statements	AOF (%)	Correct Statements	AOF (%)
Gila Bend	0/0	n/a	2/4	50.0%	4/4	100%	2/4	50.0%	8/12	66.7%
Palo Verde	0/0	n/a	3/3	100%	5/7	71.4%	3/4	75.0%	11/14	78.6%
Rainbow Valley	0/0	n/a	2/3	66.7%	3/5	60.0%	5/7	71.4%	10/15	66.7%
West Valley	0/0	n/a	4/4	100%	8/10	80.0%	8/9	88.9%	20/23	87.0%
Northwest Valley	0/0	n/a	4/5	80.0%	6/8	75.0%	4/6	66.7%	14/19	73.7%
Upper Centennial	0/0	n/a	3/3	100%	3/6	50.0%	3/4	75.0%	9/13	69.2%
Wickenburg	0/0	n/a	6/7	85.7%	12/14	85.7%	4/6	66.7%	22/27	81.5%
New River/Cave Creek	0/0	n/a	4/4	100%	10/10	100%	5/5	100%	19/19	100%
Sycamore Creek	0/0	n/a	2/2	100%	3/5	60.0%	2/3	66.7%	7/10	70.0%
Phoenix North	0/0	n/a	1/1	100%	9/10	90.0%	5/5	100%	15/16	93.8%
Phoenix South	0/0	n/a	2/3	66.7%	8/10	80.0%	7/8	87.5%	17/21	81.0%
Scottsdale North	0/0	n/a	6/8	75.0%	7/9	77.8%	5/6	83.3%	18/23	78.3%
Scottsdale South	0/0	n/a	3/3	100%	6/9	66.7%	5/5	100%	14/17	82.4%
Southeast Valley	0/0	n/a	1/2	50.0%	5/6	83.3%	8/10	80.0%	14/18	77.8%
Lower Salt River Lakes	0/0	n/a	1/1	100%	0/1	0.0%	0/1	0.0%	1/3	33.3%
Superstition	0/0	n/a	1/1	100%	5/5	100%	6/7	85.7%	12/13	92.3%
All Zones	0/0	n/a	45/54	83.3%	94/119	79.0%	72/90	80.0%	211/263	80.2%

LAKE ALERT VERIFICATION

Weather guidance is provided to Maricopa County lakes/reservoirs and the recreational zones which encompass them in the form of lake alerts. These statements are issued as needed to inform staff/personnel of approaching adverse weather conditions with an emphasis on wind gusts and lightning activity and then to a lesser degree hail/heavy rainfall. A high level of accuracy is required when forecasting these types of events as lake alerts are considered warnings to the recreational community (staff, boaters, hikers, and campers).

Table 5 below shows the issued lake alert verification broken down by recreational zone and month. Complete data tables for each recreational zone can be viewed in [Appendix C](#): Table C-1. There were 57 lake alerts issued over the length of the season with the majority of the events occurring in July and August (50 of 57). No statements were issued for the Horseshoe Lake recreational zone due to a lack of water in the reservoir. Forecast accuracy for all recreational zones combined, over the length of the season, was 84.2%. Four out of five zones met or exceeded the 75% accuracy threshold with the lowest forecast accuracy of 66.7% recorded at Bartlett Lake. As stated earlier, 50% accuracy is considered sufficient and 75% and above is considered excellent within the forecast community. Lead time was a new metric included for Lake Alert verification this year. The average lead time (not shown) for all lakes/reservoirs combined over the length of the Monsoon season was 12 minutes.

TABLE 5: MSP Lake Alerts Issued - 2014 Monsoon Season										
	June		July		August		September		Season Totals	
Recreational Zone	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)
Lake Pleasant	0/0	n/a	4/4	100%	2/3	66.7%	0/0	n/a	6/7	85.7%
Horseshoe Lake	0/0	n/a	0/0	n/a	0/0	n/a	0/0	n/a	0/0	n/a
Bartlett Lake	0/0	n/a	2/3	66.7%	3/5	60.0%	1/1	100%	6/9	66.7%
Saguaro Lake	0/0	n/a	4/4	100%	5/6	66.7%	2/2	100%	11/12	91.7%
Canyon Lake	0/0	n/a	5/5	100%	5/6	66.7%	2/2	100%	12/13	92.3%
Apache Lake	0/0	n/a	5/7	71.4%	6/7	71.4%	2/2	100%	13/16	81.3%
All Zones	0/0	n/a	20/23	87.0%	21/27	77.7%	7/7	100%	48/57	84.2%

QPF PEAK RAINFALL INTENSITY VERIFICATION

The MSP has recently placed added emphasis on including QPF information within message statements, specifically M-1 Alerts. These messages are normally issued before the onset of rain events and precede warning issuance in order to maximize lead time for affected locations. Providing rainfall intensity that will likely accompany thunderstorms moving through a FZ is intended to help clients make well-informed and proactive decisions.

Figure 7 below is a scatter plot depicting forecast versus observed rainfall intensity for all qualifying events during the length of the monsoon season. An accurate forecast will have points on or near the solid black diagonal line. Two black dashed lines were also included that show the “+/-” 25 percent error thresholds used in the verification process (discussed in the [MSP Verification Metrics and Criteria](#) section). All events that fall between the upper and lower thresholds were considered hits. These plots are commonly used within the forecast community to visually inspect how well forecast values correspond to the observed values. There were 118 qualifying message events that counted towards the verification of the QPF peak rainfall intensity and sixty-eight events fell within the error threshold.

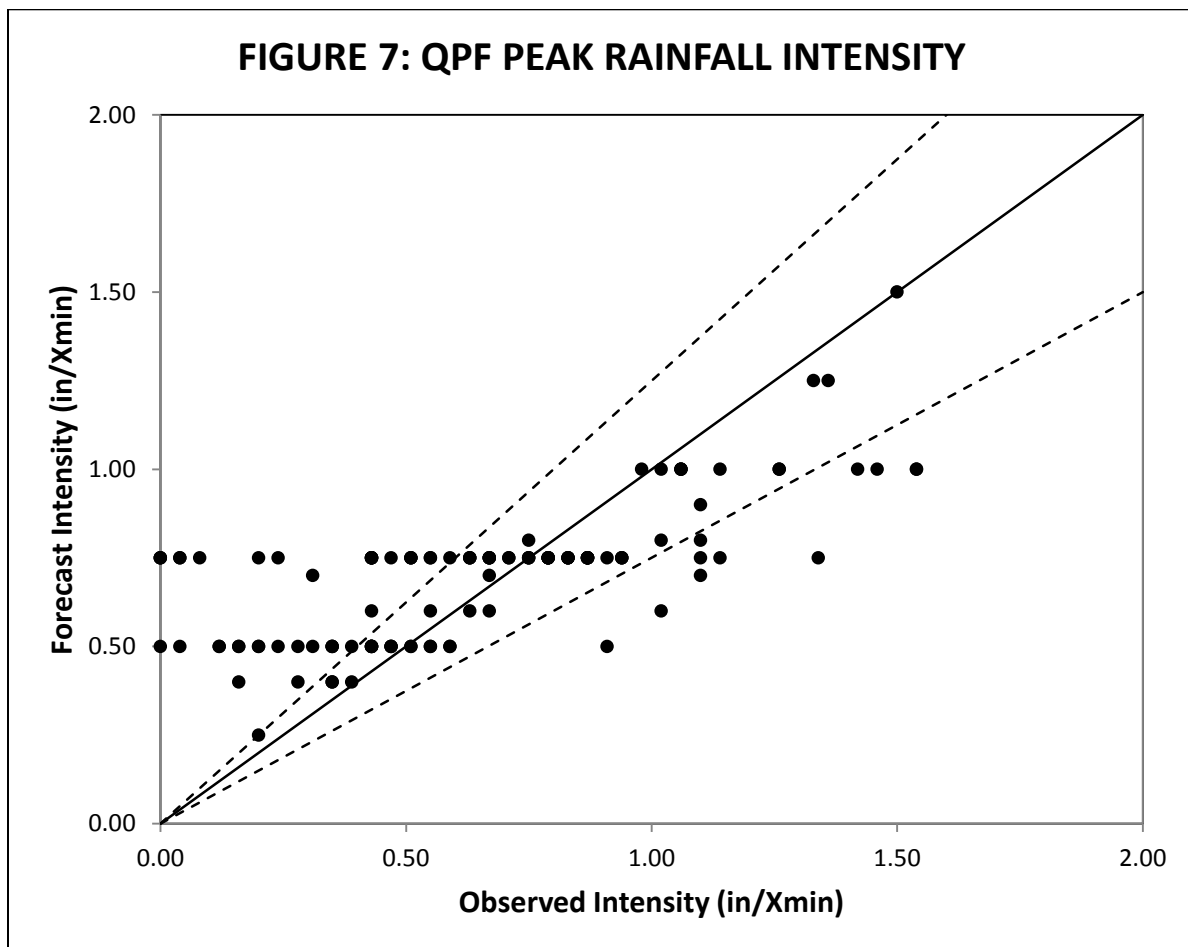


Table 6 below shows the issued message verification broken down by FZ and month. Complete data tables for each FZ can be viewed in [Appendix D](#): Table D-1. Forecast accuracy for all FZs combined, over the length of the season, was at 57.6%. July was the month with the lowest forecast skill and this was directly attributable to the over forecasting of rainfall rates spanning the first four operationally significant days to start the month. Ten out the first eighteen qualifying message events were misses. When looking at the forecast accuracy from month to month, forecast skill improved throughout the summer: 54.8% in July, 55.1% in August, and 66.7% in September. This is a typical trend within the forecast community in areas with distinct rainy and dry seasons as forecaster skill improves with confidence.

TABLE 6: QPF Peak Rainfall Intensity Verification - Monsoon Season 2014										
	June		July		August		September		Season Totals	
Forecast Zone	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)
Gila Bend	0/0	n/a	1/2	50.0%	0/1	0.0%	1/1	100%	2/4	50.0%
Palo Verde	0/0	n/a	2/3	66.7%	2/3	66.7%	2/2	100%	6/8	75.0%
Rainbow Valley	0/0	n/a	2/3	66.7%	1/2	50.0%	1/1	100%	4/6	66.7%
West Valley	0/0	n/a	2/4	50.0%	4/5	80.0%	2/4	50.0%	8/13	61.5%
NW Valley	0/0	n/a	2/4	50.0%	0/3	0.0%	0/1	0.0%	2/8	25.0%
Upper Centennial	0/0	n/a	2/3	66.7%	1/3	33.3%	0/0	n/a	3/6	50.0%
Wickenburg	0/0	n/a	2/3	66.7%	1/5	20.0%	1/2	50.0%	4/10	40.0%
New River/Cave Creek	0/0	n/a	2/3	66.7%	3/4	75.0%	0/1	0.0%	5/8	62.5%
Sycamore Creek	0/0	n/a	0/1	0.0%	1/1	100%	1/1	100%	2/3	66.7%
Phoenix North	0/0	n/a	1/1	100%	4/5	80.0%	2/2	100%	7/8	87.5%
Phoenix South	0/0	n/a	1/3	33.3%	3/3	100%	1/2	50.0%	5/8	62.5%
Scottsdale North	0/0	n/a	3/7	42.9%	3/4	75.0%	2/3	66.7%	8/14	57.1%
Scottsdale South	0/0	n/a	1/2	50.0%	0/3	0.0%	2/3	66.7%	3/8	37.5%
Southeast Valley	0/0	n/a	1/1	100%	2/4	50.0%	2/3	66.7%	5/8	62.5%
Lower Salt River Lakes	0/0	n/a	1/1	100%	0/0	n/a	0/0	n/a	1/1	100%
Superstition	0/0	n/a	0/1	0.0%	2/3	66.7%	1/1	100%	3/5	60.0%
All Zones	0/0	n/a	23/42	54.8%	27/49	55.1%	18/27	66.7%	68/118	57.6%

It is important to remember observed rainfall intensity data is gathered from either ALERT rain gages or provided from local storm reports. In either case, accurate measurements of peak rainfall intensity are contingent upon a thunderstorm rain core directly passing over a gage site. Often times the main rain core will move in between or only partially clip a gage site. This can be a noteworthy source of error especially over FZs with greater spatial gaps in between gage sites. This source of error may help explain some of the lower forecast accuracy for FZs with a poor spatial distribution of gage sites (ex. Gila Bend, Northwest Valley, Upper Centennial, etc).

QPF STORM TOTAL PRECIPITATION VERIFICATION

The MSP has recently placed added emphasis on including QPF information within message statements, specifically M-1 Alerts. These messages are normally issued before the onset of rain events and precede warning issuance in order to maximize lead time for affected locations. Providing STP that will likely accompany thunderstorms moving through a FZ is intended to help clients make well-informed and proactive decisions.

Figure 8 below is a scatter plot depicting forecast versus observed storm total precipitation. An accurate forecast will have points on or near the solid black diagonal line. Two black dashed lines were also included that show the “+/-” 25 percent error thresholds used in the verification process (discussed in the [MSP Verification Metrics and Criteria](#) section). All events that fall between the upper and lower thresholds were considered hits. There were seventy-six qualifying message events that counted towards the verification of the STP forecasts and fifty-five events fell within the error threshold.

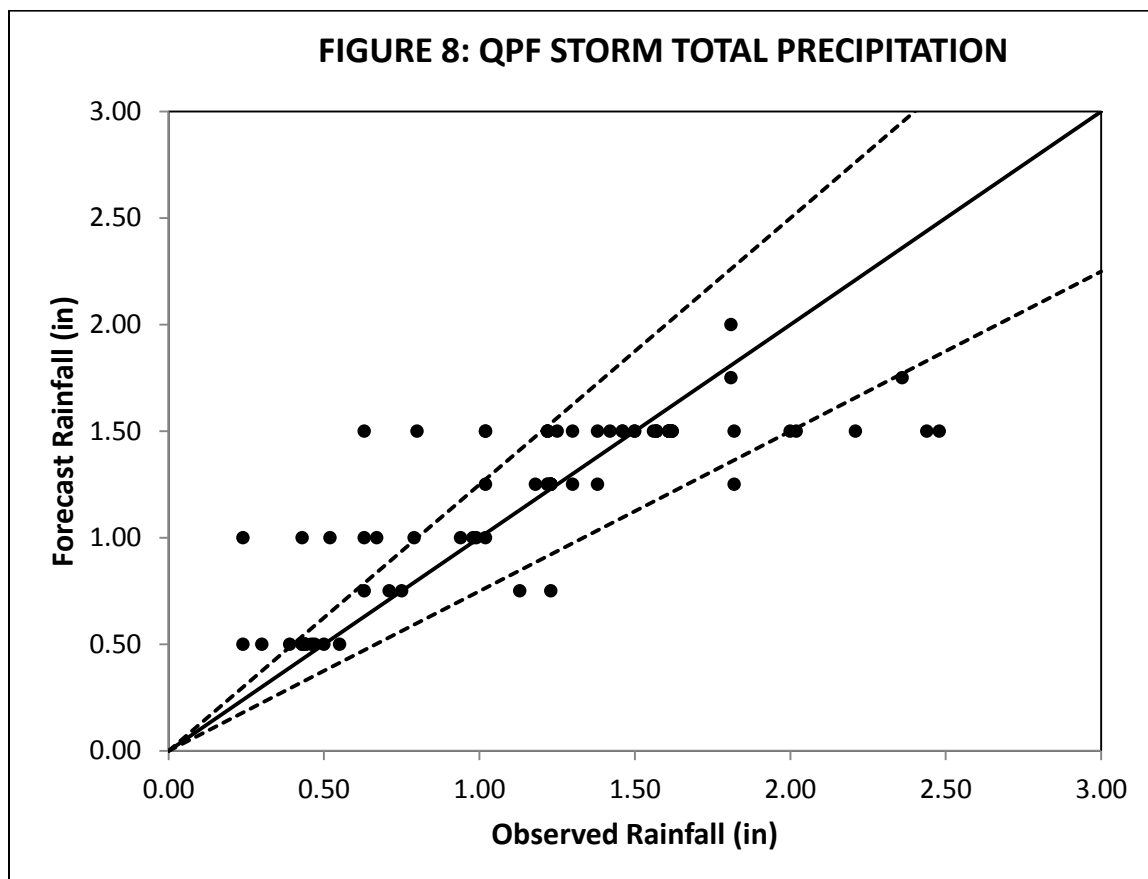


Figure 5 clearly shows that the majority of missed events over the course of the monsoon season tended to be over-forecasted (forecast rainfall value > observed rainfall value) by the MSP intimating a forecast bias towards conservatism.

Table 7 below shows the issued message verification broken down by FZ and month. Complete data tables for each FZ can be viewed in [Appendix E](#): Table E-1. Forecast accuracy for all FZs combined, over the length of the season, was 72.4%. When looking at the forecast accuracy broken down by month, July and August were the same (75%) in terms of forecast skill. On the other hand, forecast skill was worse during the month of September coming in just shy of 70%.

The end of the previous section covered possible sources of error in peak rainfall intensity due to spatial gaps in reporting gages within certain FZs. In this case, observed storm total precipitation data was gathered from ALERT rain gages, local storm reports, and gage corrected radar rainfall estimation (e.g. GAQPE). Radar rainfall estimates were able to fill in the gaps that would otherwise be missed in the aforementioned FZs. Forecast accuracy over the length of the monsoon season for all of the high terrain FZs (Upper Centennial, Wickenburg, New River/Cave Creek, Sycamore Creek, Lower Salt River Lakes, and Superstition) was exceptional at 88.2% (15/17, correct STP-QPFs).

TABLE 7: QPF Storm Total Precipitation Verification - Monsoon Season 2014										
	June		July		August		September		Season Totals	
Forecast Zone	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)
Gila Bend	0/0	n/a	1/1	100%	0/0	n/a	1/2	50.0%	2/3	66.7%
Palo Verde	0/0	n/a	1/2	50.0%	3/3	100%	2/2	100%	6/7	85.7%
Rainbow Valley	0/0	n/a	1/1	100%	1/1	100%	3/4	75.0%	5/6	83.3%
West Valley	0/0	n/a	1/1	100%	1/2	50.0%	3/4	75.0%	5/7	71.4%
NW Valley	0/0	n/a	1/3	33.3%	0/1	0.0%	0/1	0.0%	1/5	20.0%
Upper Centennial	0/0	n/a	0/1	0.0	0/0	n/a	2/2	100%	2/3	66.7%
Wickenburg	0/0	n/a	1/1	100%	1/2	50.0%	0/0	n/a	2/3	66.7%
New River/Cave Creek	0/0	n/a	1/1	100%	2/2	100%	2/2	100%	5/5	100%
Sycamore Creek	0/0	n/a	0/0	n/a	0/0	n/a	1/1	100%	1/1	100%
Phoenix North	0/0	n/a	1/1	100%	1/1	100%	2/2	100%	4/4	100%
Phoenix South	0/0	n/a	0/0	n/a	1/2	50.0%	1/4	25.0%	2/6	33.3%
Scottsdale North	0/0	n/a	1/1	100%	2/2	100%	2/2	100%	5/5	100%
Scottsdale South	0/0	n/a	1/1	100%	2/4	50.0%	1/2	50.0%	4/7	57.1%
Southeast Valley	0/0	n/a	1/1	100%	2/2	100%	2/5	40.0%	5/8	62.5%
Lower Salt River Lakes	0/0	n/a	1/1	100%	0/0	n/a	0/0	n/a	1/1	100%
Superstition	0/0	n/a	0/0	n/a	2/2	100%	3/3	100%	5/5	100%
All Zones	0/0	n/a	12/16	75.0%	18/24	75.0%	25/36	69.4%	55/76	72.4%

SUMMARY

The Flood Warning Branch of the FCDMC operates a year round Meteorological Services Program (MSP) that's purpose is to provide detailed weather forecasts and support to county, city, and other local agencies encompassing Maricopa County and its contributing watersheds. In particular, during the length of the monsoon season, it is the specific the goal of the MSP to reduce response time for emergency managers by providing timely and accurate weather information, primarily regarding the potential for flood-producing rainfall. This report provides a compiled set of verification statistics based on products issued by the MSP during the length of the 2014 monsoon season. Outlooks, Messages, Lake Alerts, QPF Peak Intensity, and QPF Storm Total Precipitation were the five products analyzed in this report.

Verification of daily outlooks was conducted using four metrics: forecast accuracy, probability of detection, false alarm rate, and Threat Score (new this year). When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 77.7%, probability of detection was 76.9%, the false alarm rate was 7.1%, and the Threat Score was 67.4%. The first three metrics fell into the “excellent” category when equating these results with accepted values within the forecast community. Threat Score or a measure of forecast accuracy after removing non-important forecasts before and after the operational season came in below the 75% threshold for all FZs combined, but each zone remained well above the 50% threshold.

Verification of messages was conducted using forecast accuracy. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 80.2%. Any value of over 75% is considered “excellent” within the forecast community. Forecast skill was highest in July at 83.3% before dipping to 79% in August and rebounding back to 80% for September. Some of this degradation in forecast skill is a direct result of null events in FZs during Flash Flood Watches in August and September.

Verification of lake alerts was conducted using forecast accuracy. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 78.9%. Any value over 75% is considered “excellent” within the forecast community. It's worth noting again that no lake alerts were issued for Horseshoe Lake this monsoon season as the reservoir remained mostly empty through the summer months.

Verification of QPF peak rainfall intensity was conducted using forecast accuracy. Forecast accuracy was determined using computed percent error when looking at forecasts versus observational data sets. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 57.6%. It is worth noting forecast skill improved each month throughout the season after a difficult start to the season.

Verification of QPF storm total precipitation was conducted using forecast accuracy. Forecast accuracy was determined using computed percent error when looking at forecasts versus

observational data sets. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 72.4%. The addition of gage corrected radar rainfall estimation and cooperative rain gage sites in the verification process has proved to be critical for FZs with greater spatial gaps between gage sites.

TABLE 8: Historic Monsoon Season Verification Comparison

	Outlooks			Messages		Lake Alerts		QPF Intensity		QPF STP	
Year	AOF	POD	FAR	Events	AOF	Events	AOF	Events	AOF	Events	AOF
2012	79.1%	79.6%	8.9%	102	86.3%	n/a	n/a	n/a	n/a	n/a	n/a
2013	79.8%	78.7%	6.2%	137	88.0%	56	89.3%	69	58.0%	54	72.2%
2014	77.7%	76.9%	7.1%	263	80.2%	57	84.2%	118	57.6%	76	72.4%

Table 8, above, was included to add more historical perspective in the verification process. Verification metrics for Outlooks, Messages, Lake Alerts, and QPF products were included for all previous years. When comparing to previous years' Outlook verification, forecast accuracy in 2014 was lower by 2.1% and 1.4% respectively. Probability of detection was also slightly lower than previous years. False alarm rate increased by 0.9% from last year but remained below the 8.9% from 2012. Forecast skill for issued messages dropped from the previous two years but remained well above the 75% threshold, even with more than double the number of products from 2013 and over triple from 2012. The main reason for this drop, discussed in the messages verification section, was due to missed zones (false alarms) during Flash Flood Watches. Forecast accuracy for Lake Alerts dropped 5.1% in 2014 when compared to 2013. QPF intensity and storm total precipitation products remained nearly the same when compared to last year even with the large increase in qualifying events.

When all was said and done, the 2014 monsoon season ended up being the wettest on record when season rain was averaged across all FCD ALERT rain gages. A significantly larger number of message statements were issued this season to account for the widespread rain and flooding events in August and September. In fact, more statements were issued on 8/12, 8/19, and 9/8 combined than the entire 2012 season and taking into account the events on 8/2 and 9/27 more than the entire 2013 season.

It is hoped that this report serves as quantifiable tool used to evaluate forecast performance on a year to year basis. This report will be continued in subsequent years focusing not only the present year's statistical data, but will also serve as a historical comparison to measure future year's performance. In addition, future MSP Verification Reports will be expanded to include lead time as a metric for determining verification for issued message statements.

APPENDIX A: MSP OUTLOOKS - VERIFICATION TABLES

TABLE A-1: This table shows the raw verification data of MSP issued precipitation forecasts contained in the daily Outlooks for the 2014 monsoon season. The valid period for rainfall each day is from 2PM same day through 12PM the following day. The table is broken down by date and MSP Forecast Zone. For brevity two Forecast Zones are included for each day. The columns from left to right are defined as follows:

Prob. – Percent probability of measureable rain within the Forecast Zone from 0% to 100% over the period.

QPF – Total forecast rainfall in inches within the Forecast Zone over the period.

ALERT – Peak total observed ALERT gage rainfall value in inches within the Forecast Zone over the period.

GAQPE – Radar rainfall estimate (see [Verification Metrics and Criteria](#) section for more details).

AOF – Forecast accuracy, assigned an “h” for a hit and “m” for a miss.

POD – Probability of detection, assigned an “h” for a hit, “m” for a miss, or “-” for non-significant rainfall.

FA – False alarms, assigned an “x”.

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014														
Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
	GILA BEND							PALO VERDE						
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
06/26/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/27/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
16 days					16/16*	0	0							
07/01/14	0	0.00	0.00	0.04-0.24	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/02/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/03/14	30	0.40	0.04	1.23-1.61	m	m	-	30	0.30	0.59	0.44-0.63	30	0.40	0.04
07/04/14	30	0.50	0.00	0.04-0.24	m	-	-	20	0.50	0.04	0.00	30	0.50	0.00
07/05/14	20	0.50	0.04	0.25-0.43	h	-	-	20	0.30	0.00	0.04-0.24	20	0.50	0.04
07/06/14	20	0.50	0.00	0.00	m	-	-	20	0.30	0.20	0.84-1.02	20	0.50	0.00
07/07/14	20	0.50	0.12	0.64-0.83	h	h	-	20	0.30	0.63	1.62-1.81	20	0.50	0.12
07/08/14	40	1.00	0.51	0.44-0.63	h	h	-	40	1.00	0.67	1.62-1.81	40	1.00	0.51
07/09/14	20	0.40	0.04	0.04-0.24	h	-	-	20	0.40	0.04	0.00	20	0.40	0.04
07/10/14	30	1.00	0.00	0.25-0.43	m	-	x	30	1.00	0.00	0.00	30	1.00	0.00
07/11/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/12/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/13/14	20	0.30	0.04	0.84-1.02	m	m	-	20	0.30	1.38	0.84-1.02	20	0.30	0.04
07/14/14	40	1.00	0.08	1.03-1.22	h	h	-	30	1.00	0.28	0.04-0.24	40	1.00	0.08
07/15/14	20	0.50	0.00	0.25-0.43	h	-	-	20	0.50	0.00	0.00	20	0.50	0.00
07/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/20/12	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/23/14	20	0.35	0.00	0.00	m	-	-	07/23/14	20	0.35	0.00	0.04-0.24	20	0.35	0.00
07/24/14	10	0.25	0.00	0.44-0.63	h	-	-	07/24/14	10	0.25	0.00	0.04-0.24	10	0.25	0.00
07/25/14	20	0.75	0.00	2.61-2.80	m	m	-	07/25/14	20	0.75	0.00	0.04-0.24	20	0.75	0.00
07/26/14	0	0.00	1.02	1.62-1.81	m	m	-	07/26/14	0	0.00	0.00	0.25-0.43	0	0.00	1.02
07/27/14	30	0.40	0.31	0.25-0.43	h	-	-	07/27/14	20	0.40	0.00	0.04-0.24	30	0.40	0.31
07/28/14	20	0.30	0.00	0.04-0.24	h	-	-	07/28/14	20	0.25	0.00	0.00	20	0.30	0.00
07/29/14	0	0.00	0.00	0.00	h	-	-	07/29/14	0	0.00	0.00	0.00	0	0.00	0.00
07/30/14	0	0.00	0.00	0.00	h	-	-	07/30/14	0	0.00	0.00	0.00	0	0.00	0.00
07/31/14	10	0.10	0.24	1.03-1.22	m	m	-	07/31/14	20	0.25	0.00	0.64-0.83	10	0.10	0.24
31 days					23/31*	3/8*	1								
08/01/14	40	1.00	0.00	0.04-0.24	m	-	x	08/01/14	30	1.00	0.63	0.44-0.63	40	1.00	0.00
08/02/14	40	1.00	0.00	0.04-0.24	m	-	x	08/02/14	40	1.25	0.00	0.44-0.63	40	1.00	0.00
08/03/14	50	1.00	0.16	0.44-0.63	h	h	-	08/03/14	50	0.75	0.16	0.25-0.43	50	1.00	0.16
08/04/14	0	0.00	0.00	0.00	h	-	-	08/04/14	0	0.00	0.00	0.00	0	0.00	0.00
08/05/14	0	0.00	0.00	0.00	h	-	-	08/05/14	0	0.00	0.00	0.00	0	0.00	0.00
08/06/14	0	0.00	0.00	0.00	h	-	-	08/06/14	0	0.00	0.00	0.00	0	0.00	0.00
08/07/14	0	0.00	0.00	0.00	h	-	-	08/07/14	0	0.00	0.00	0.00	0	0.00	0.00
08/08/14	10	0.10	0.00	0.00	h	-	-	08/08/14	0	0.00	0.00	0.00	10	0.10	0.00
08/09/14	10	0.25	0.00	0.00	h	-	-	08/09/14	10	0.15	0.00	0.04-0.24	10	0.25	0.00
08/10/14	10	0.15	0.00	0.00	h	-	-	08/10/14	0	0.00	0.00	0.00	10	0.15	0.00
08/11/14	20	0.50	0.00	1.03-1.22	m	h	-	08/11/14	30	0.50	0.43	1.03-1.22	20	0.50	0.00
08/12/14	40	1.00	1.57	2.81+	h	h	-	08/12/14	50	1.25	0.12	1.03-1.22	40	1.00	1.57
08/13/14	30	0.75	0.28	1.03-1.22	h	h	-	08/13/14	10	0.50	0.08	0.04-0.24	30	0.75	0.28
08/14/14	20	0.25	0.00	0.44-0.63	h	-	-	08/14/14	0	0.00	0.04	0.04-0.24	20	0.25	0.00
08/15/14	0	0.00	0.00	0.00	h	-	-	08/15/14	0	0.00	0.00	0.00	0	0.00	0.00
08/16/14	10	0.50	0.00	0.00	m	-	-	08/16/14	0	0.00	0.00	0.00	10	0.50	0.00
08/17/14	10	0.40	0.24	0.44-0.63	h	-	-	08/17/14	10	0.40	0.55	1.03-1.22	10	0.40	0.24
08/18/14	30	1.00	0.16	0.25-0.43	m	-	x	08/18/14	30	1.00	0.00	0.00	30	1.00	0.16

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/19/14	30	1.00	0.04	0.04-0.24	m	-	x	08/19/14	30	1.00	0.55	0.64-0.83	30	1.00	0.04
08/20/14	20	0.25	0.00	0.04-0.24	h	-	-	08/20/14	20	0.25	0.55	1.62-1.81	20	0.25	0.00
08/21/14	50	0.80	0.98	2.02-2.20	h	h	-	08/21/14	50	0.80	0.47	0.64-0.83	50	0.80	0.98
08/22/14	0	0.00	0.00	0.04-0.24	m	-	-	08/22/14	0	0.00	0.00	0.04-0.24	0	0.00	0.00
08/23/14	0	0.00	0.00	0.00	h	-	-	08/23/14	0	0.00	0.00	0.00	0	0.00	0.00
08/24/14	0	0.00	0.00	0.00	h	-	-	08/24/14	0	0.00	0.00	0.00	0	0.00	0.00
08/25/14	40	1.25	0.00	0.44-0.63	h	h	-	08/25/14	40	1.25	0.39	1.23-1.61	40	1.25	0.00
08/26/14	40	0.75	0.00	0.04-0.24	m	-	x	08/26/14	40	0.75	0.00	0.04-0.24	40	0.75	0.00
08/27/14	0	0.00	0.00	0.00	h	-	-	08/27/14	0	0.00	0.00	0.00	0	0.00	0.00
08/28/14	0	0.00	0.00	0.00	h	-	-	08/28/14	0	0.00	0.00	0.00	0	0.00	0.00
08/29/14	0	0.00	0.00	0.00	h	-	-	08/29/14	0	0.00	0.00	0.00	0	0.00	0.00
08/30/14	0	0.00	0.00	0.00	h	-	-	08/30/14	0	0.00	0.00	0.00	0	0.00	0.00
08/31/14	0	0.00	0.00	0.00	h	-	-	08/31/14	0	0.00	0.00	0.00	0	0.00	0.00
31 days					23/31*	6/6*	5								
09/01/14	0	0.00	0.00	0.00	h	-	-	09/01/14	0	0.00	0.00	0.00	0	0.00	0.00
09/02/14	0	0.00	0.00	0.00	h	-	-	09/02/14	0	0.00	0.00	0.00	0	0.00	0.00
09/03/14	0	0.00	0.00	0.00	h	-	-	09/03/14	0	0.00	0.12	0.04-0.24	0	0.00	0.00
09/04/14	20	0.25	0.20	2.21-2.60	m	m	-	09/04/14	10	0.25	0.75	1.23-1.61	20	0.25	0.20
09/05/14	0	0.00	0.00	0.00	h	-	-	09/05/14	0	0.00	0.00	0.00	0	0.00	0.00
09/06/14	30	1.00	0.20	0.64-0.83	h	h	-	09/06/14	40	1.00	0.28	0.25-0.43	30	1.00	0.20
09/07/14	50	1.25	0.12	0.25-0.43	m	-	x	09/07/14	50	1.25	1.34	0.84-1.02	50	1.25	0.12
09/08/14	60	0.75	0.08	0.44-0.63	h	h	-	09/08/14	60	0.75	0.91	0.84-1.02	60	0.75	0.08
09/09/14	60	1.00	0.08	0.04-0.24	m	-	x	09/09/14	50	1.00	1.02	1.03-1.22	60	1.00	0.08
09/10/14	0	0.00	0.00	0.00	h	-	-	09/10/14	0	0.00	0.00	0.00	0	0.00	0.00
09/11/14	0	0.00	0.00	0.00	h	-	-	09/11/14	0	0.00	0.00	0.00	0	0.00	0.00
09/12/14	0	0.00	0.00	0.00	h	-	-	09/12/14	0	0.00	0.00	0.00	0	0.00	0.00
09/13/14	0	0.00	0.00	0.00	h	-	-	09/13/14	0	0.00	0.00	0.00	0	0.00	0.00
09/14/14	0	0.00	0.00	0.00	h	-	-	09/14/14	0	0.00	0.00	0.00	0	0.00	0.00

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/15/14	10	0.25	0.91	0.84-1.02	m	m	-	0	0.00	0.31	1.23-1.61	10	0.25	0.91
09/16/14	70	0.75	0.04	0.04-0.24	m	-	x	70	0.75	0.79	1.03-1.22	70	0.75	0.04
09/17/14	60	0.50	0.04	0.04-0.24	m	-	x	40	0.35	0.24	0.04-0.24	60	0.50	0.04
09/18/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.00	20	0.15	0.00
09/19/14	10	0.30	0.00	0.00	h	-	-	0	0.00	0.00	0.00	10	0.30	0.00
09/20/14	30	0.35	0.00	0.00	m	-	-	0	0.00	0.00	0.00	30	0.35	0.00
09/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/25/14	10	0.20	0.04	0.04-0.24	h	-	-	0	0.00	0.00	0.00	10	0.20	0.04
09/26/14	30	1.00	0.00	2.81+	m	h	-	20	1.25	0.08	0.64-0.83	30	1.00	0.00
09/27/14	70	1.00	1.38	2.02-2.20	h	h	-	80	1.50	0.75	1.23-1.61	70	1.00	1.38
09/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
30 days	10	0.25	0.91	0.84-1.02	m	m	-	0	0.00	0.31	1.23-1.61	10	0.25	0.91
Date	Rainbow Valley							West Valley						
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
06/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
06/24/14	0	0.00	0.00	0.00	h	-	-	06/24/14	0	0.00	0.00	0.00	0	0.00	0.00
06/25/14	0	0.00	0.00	0.00	h	-	-	06/25/14	0	0.00	0.00	0.00	0	0.00	0.00
06/26/14	0	0.00	0.00	0.00	h	-	-	06/26/14	0	0.00	0.00	0.00	0	0.00	0.00
06/27/14	0	0.00	0.00	0.00	h	-	-	06/27/14	0	0.00	0.00	0.00	0	0.00	0.00
06/28/14	0	0.00	0.00	0.00	h	-	-	06/28/14	0	0.00	0.00	0.00	0	0.00	0.00
06/29/14	0	0.00	0.00	0.00	h	-	-	06/29/14	0	0.00	0.00	0.00	0	0.00	0.00
06/30/14	0	0.00	0.00	0.00	h	-	-	06/30/14	0	0.00	0.00	0.00	0	0.00	0.00
16 days					16/16*	0	0								
07/01/14	0	0.00	0.00	0.00	h	-	-	07/01/14	0	0.00	0.00	0.00	0	0.00	0.00
07/02/14	0	0.00	0.00	0.00	h	-	-	07/02/14	0	0.00	0.00	0.00	0	0.00	0.00
07/03/14	30	0.30	0.31	0.44-0.63	h	-	-	07/03/14	30	0.30	0.87	2.41-2.60	30	0.30	0.31
07/04/14	20	0.50	0.04	0.04-0.24	m	-	-	07/04/14	20	0.50	0.20	0.04-0.24	20	0.50	0.04
07/05/14	20	0.30	0.04	0.04-0.24	h	-	-	07/05/14	20	0.50	0.28	0.25-0.43	20	0.30	0.04
07/06/14	20	0.30	0.00	0.00	m	-	-	07/06/14	20	0.30	0.00	0.00	20	0.30	0.00
07/07/14	20	0.30	0.00	0.04-0.24	h	-	-	07/07/14	20	0.30	0.00	0.04-0.24	20	0.30	0.00
07/08/14	40	1.00	0.55	0.64-0.83	h	h	-	07/08/14	40	1.00	0.59	1.23-1.61	40	1.00	0.55
07/09/14	10	0.25	0.04	0.04-0.24	h	-	-	07/09/14	0	0.00	0.00	0.00	10	0.25	0.04
07/10/14	30	1.00	0.00	0.00	m	-	x	07/10/14	40	0.75	0.00	0.04-0.24	30	1.00	0.00
07/11/14	0	0.00	0.00	0.00	h	-	-	07/11/14	0	0.00	0.00	0.00	0	0.00	0.00
07/12/14	0	0.00	0.00	0.00	h	-	-	07/12/14	0	0.00	0.00	0.00	0	0.00	0.00
07/13/14	30	0.30	0.63	0.84-1.02	m	m	x	07/13/14	20	0.30	0.87	0.84-1.02	30	0.30	0.63
07/14/14	30	0.75	1.38	0.64-0.83	h	h	-	07/14/14	30	0.75	0.00	0.00	30	0.75	1.38
07/15/14	20	0.50	0.00	0.04-0.24	m	-	-	07/15/14	20	0.75	0.00	0.04-0.24	20	0.50	0.00
07/16/14	0	0.00	0.00	0.00	h	-	-	07/16/14	0	0.00	0.00	0.04-0.24	0	0.00	0.00
07/17/14	0	0.00	0.00	0.00	h	-	-	07/17/14	0	0.00	0.00	0.00	0	0.00	0.00
07/18/14	0	0.00	0.00	0.00	h	-	-	07/18/14	0	0.00	0.00	0.00	0	0.00	0.00
07/19/14	0	0.00	0.00	0.00	h	-	-	07/19/14	0	0.00	0.00	0.00	0	0.00	0.00
07/20/14	0	0.00	0.00	0.00	h	-	-	07/20/14	0	0.00	0.00	0.00	0	0.00	0.00

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/23/14	20	0.35	0.00	0.04-0.24	h	-	-	20	0.25	0.12	0.04-0.24	20	0.35	0.00
07/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/25/14	30	0.75	0.00	0.04-0.24	m	-	-	30	0.75	0.00	0.04-0.24	30	0.75	0.00
07/26/14	0	0.00	0.04	0.04-0.24	m	-	-	0	0.00	0.12	0.44-0.63	0	0.00	0.04
07/27/14	10	0.30	0.31	0.04-0.24	h	-	-	0	0.00	0.04	0.00	10	0.30	0.31
07/28/14	20	0.25	0.00	0.25-0.43	h	-	-	10	0.20	0.00	0.00	20	0.25	0.00
07/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
07/31/14	0	0.00	0.51	1.23-1.61	m	m	-	0	0.00	1.42	2.61-2.80	0	0.00	0.51
31 days					23/31*	2/4*	2							
08/01/14	30	1.00	0.20	0.04-0.24	m	-	x	30	0.75	1.38	1.23-1.61	30	1.00	0.20
08/02/14	40	1.00	0.00	0.04-0.24	m	-	x	40	1.00	0.12	1.23-1.61	40	1.00	0.00
08/03/14	50	0.75	0.59	0.44-0.63	h	h	-	40	0.75	0.59	0.64-0.83	50	0.75	0.59
08/04/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
08/05/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
08/06/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
08/07/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
08/08/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
08/09/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
08/10/14	0	0.00	0.00	0.04-0.24	m	-	-	0	0.00	0.00	0.04-0.24	0	0.00	0.00
08/11/14	20	0.50	0.04	0.25-0.43	h	-	-	30	0.50	0.51	0.84-1.02	20	0.50	0.04
08/12/14	50	1.25	0.83	2.81+	m	h	-	50	1.25	1.06	1.23-1.61	50	1.25	0.83
08/13/14	20	0.50	0.16	0.25-0.43	h	-	-	10	0.50	0.12	0.04-0.24	20	0.50	0.16
08/14/14	10	0.25	0.00	0.04-0.24	h	-	-	0	0.00	0.00	0.04-0.24	10	0.25	0.00
08/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
08/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/17/14	10	0.50	0.55	1.23-1.61	h	h	-	08/17/14	10	0.50	0.51	0.84-1.02	10	0.50	0.55
08/18/14	30	1.00	0.00	0.04-0.24	m	-	x	08/18/14	30	1.00	0.00	0.00	30	1.00	0.00
08/19/14	30	1.00	0.28	0.25-0.43	m	-	x	08/19/14	70	1.00	1.10	1.03-1.22	30	1.00	0.28
08/20/14	20	0.25	0.08	0.04-0.24	h	-	-	08/20/14	10	0.15	0.16	0.44-0.63	20	0.25	0.08
08/21/14	40	0.80	0.87	1.23-1.61	h	h	-	08/21/14	40	0.80	0.87	1.03-1.22	40	0.80	0.87
08/22/14	0	0.00	0.00	0.00	h	-	-	08/22/14	0	0.00	0.00	0.00	0	0.00	0.00
08/23/14	0	0.00	0.00	0.00	h	-	-	08/23/14	0	0.00	0.00	0.00	0	0.00	0.00
08/24/14	0	0.00	0.00	0.00	h	-	-	08/24/14	0	0.00	0.00	0.00	0	0.00	0.00
08/25/14	50	1.25	0.75	0.84-1.02	h	h	-	08/25/14	50	1.25	0.91	1.03-1.22	50	1.25	0.75
08/26/14	40	0.75	0.00	0.00	m	-	x	08/26/14	40	0.75	0.00	0.04-0.24	40	0.75	0.00
08/27/14	0	0.00	0.00	0.00	h	-	-	08/27/14	0	0.00	0.00	0.00	0	0.00	0.00
08/28/14	0	0.00	0.00	0.00	h	-	-	08/28/14	0	0.00	0.00	0.00	0	0.00	0.00
08/29/14	0	0.00	0.00	0.00	h	-	-	08/29/14	0	0.00	0.00	0.00	0	0.00	0.00
08/30/14	0	0.00	0.00	0.00	h	-	-	08/30/14	0	0.00	0.00	0.00	0	0.00	0.00
08/31/14	0	0.00	0.00	0.00	h	-	-	08/31/14	0	0.00	0.00	0.00	0	0.00	0.00
31 days					24/31*	5/5*	5								
09/01/14	0	0.00	0.00	0.00	h	-	-	09/01/14	0	0.00	0.00	0.00	0	0.00	0.00
09/02/14	0	0.00	0.00	0.00	h	-	-	09/02/14	0	0.00	0.00	0.00	0	0.00	0.00
09/03/14	0	0.00	0.00	0.00	h	-	-	09/03/14	0	0.00	0.00	0.04-0.24	0	0.00	0.00
09/04/14	0	0.00	0.35	0.84-1.02	m	m	-	09/04/14	0	0.00	0.51	1.23-1.61	0	0.00	0.35
09/05/14	0	0.00	0.00	0.00	h	-	-	09/05/14	0	0.00	0.00	0.00	0	0.00	0.00
09/06/14	40	1.00	0.04	1.23-1.61	h	h	-	09/06/14	40	0.75	0.43	1.03-1.22	40	1.00	0.04
09/07/14	50	1.50	3.78	2.81+	m	h	-	09/07/14	60	1.50	2.32	2.81+	50	1.50	3.78
09/08/14	100	1.00	1.73	1.23-1.61	h	h	-	09/08/14	100	1.00	2.01	2.02-2.20	100	1.00	1.73
09/09/14	40	1.00	0.00	0.04-0.24	m	-	x	09/09/14	40	1.00	1.61	1.23-1.61	40	1.00	0.00
09/10/14	0	0.00	0.00	0.00	h	-	-	09/10/14	0	0.00	0.00	0.00	0	0.00	0.00
09/11/14	0	0.00	0.00	0.00	h	-	-	09/11/14	0	0.00	0.00	0.00	0	0.00	0.00
09/12/14	0	0.00	0.00	0.00	h	-	-	09/12/14	0	0.00	0.00	0.00	0	0.00	0.00

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/13/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/14/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/15/14	0	0.00	0.00	0.25-0.43	m	-	-	0	0.00	0.00	0.04-0.24	0	0.00	0.00
09/16/14	60	0.75	0.04	0.04-0.24	m	-	x	50	0.50	0.43	0.25-0.43	60	0.75	0.04
09/17/14	50	0.75	0.31	0.44-0.63	h	h	-	40	0.50	0.43	0.25-0.43	50	0.75	0.31
09/18/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.00	20	0.15	0.00
09/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/20/14	20	0.15	0.00	0.00	m	-	-	0	0.00	0.00	0.00	20	0.15	0.00
09/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/26/14	30	1.25	0.67	0.84-1.02	h	h	-	20	1.00	0.04	0.25-0.43	30	1.25	0.67
09/27/14	80	1.50	1.26	1.62-1.81	h	h	-	80	1.75	2.09	2.21-2.40	80	1.50	1.26
09/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
09/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	0	0.00	0.00
30 days					23/30*	6/7*	2							
	Northwest Valley							Upper Centennial						
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
06/22/14	0	0.00	0.00	0.00	h	-	-	06/22/14	0	0.00	0.00	0.00	h	-	-
06/23/14	0	0.00	0.00	0.00	h	-	-	06/23/14	0	0.00	0.00	0.00	h	-	-
06/24/14	0	0.00	0.00	0.00	h	-	-	06/24/14	0	0.00	0.00	0.00	h	-	-
06/25/14	0	0.00	0.00	0.00	h	-	-	06/25/14	0	0.00	0.00	0.00	h	-	-
06/26/14	0	0.00	0.00	0.00	h	-	-	06/26/14	0	0.00	0.00	0.00	h	-	-
06/27/14	0	0.00	0.00	0.00	h	-	-	06/27/14	0	0.00	0.00	0.00	h	-	-
06/28/14	0	0.00	0.00	0.00	h	-	-	06/28/14	0	0.00	0.00	0.00	h	-	-
06/29/14	0	0.00	0.00	0.00	h	-	-	06/29/14	0	0.00	0.00	0.00	h	-	-
06/30/14	0	0.00	0.00	0.00	h	-	-	06/30/14	0	0.00	0.00	0.00	h	-	-
16 days					16/16*	0	0						16/16*	0	0
07/01/14	0	0.00	0.00	0.00	h	-	-	07/01/14	0	0.00	0.00	0.00	h	-	-
07/02/14	0	0.00	0.00	0.00	h	-	-	07/02/14	0	0.00	0.00	0.04-0.24	m	-	-
07/03/14	30	0.30	1.26	2.41-2.60	m	m	-	07/03/14	30	0.40	0.98	1.82-2.01	m	m	-
07/04/14	30	0.50	0.20	0.04-0.24	m	-	-	07/04/14	30	0.50	0.04	0.04-0.24	m	-	-
07/05/14	20	0.50	0.12	0.44-0.63	h	h	-	07/05/14	10	0.50	0.83	0.44-0.63	h	h	-
07/06/14	30	0.75	0.00	0.00	m	-	-	07/06/14	40	0.75	0.79	1.82-2.01	h	h	-
07/07/14	30	0.75	0.20	0.84-1.02	h	h	-	07/07/14	30	0.75	0.00	0.04-0.24	m	-	-
07/08/14	40	1.00	0.28	1.23-1.61	h	h	-	07/08/14	30	1.00	0.20	0.44-0.63	h	h	-
07/09/14	10	0.10	0.00	0.04-0.24	h	-	-	07/09/14	20	0.35	0.43	0.64-0.83	h	m	-
07/10/14	40	0.75	0.00	0.00	m	-	x	07/10/14	40	0.75	0.12	0.04-0.24	m	-	x
07/11/14	0	0.00	0.00	0.00	h	-	-	07/11/14	0	0.00	0.00	0.00	h	-	-
07/12/14	0	0.00	0.00	0.00	h	-	-	07/12/14	0	0.00	0.00	0.00	h	-	-
07/13/14	30	0.40	0.83	0.84-1.02	m	m	-	07/13/14	30	0.40	0.47	0.84-1.02	m	m	-
07/14/14	40	1.00	0.00	0.00	m	-	x	07/14/14	40	1.50	0.00	0.25-0.43	m	-	x
07/15/14	30	0.75	0.00	0.44-0.63	h	h	-	07/15/14	40	1.25	0.00	0.25-0.43	m	-	x
07/16/14	0	0.00	0.00	0.00	h	-	-	07/16/14	0	0.00	0.00	0.00	h	-	-
07/17/14	0	0.00	0.00	0.00	h	-	-	07/17/14	0	0.00	0.00	0.00	h	-	-
07/18/14	0	0.00	0.00	0.00	h	-	-	07/18/14	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/19/14	0	0.00	0.00	0.00	h	-	-	07/19/14	0	0.00	0.00	0.00	h	-	-
07/20/14	0	0.00	0.00	0.00	h	-	-	07/20/14	0	0.00	0.00	0.00	h	-	-
07/21/14	0	0.00	0.00	0.00	h	-	-	07/21/14	0	0.00	0.00	0.00	h	-	-
07/22/14	0	0.00	0.00	0.00	h	-	-	07/22/14	0	0.00	0.00	0.00	h	-	-
07/23/14	20	0.35	0.00	0.25-0.43	h	-	-	07/23/14	20	0.25	0.00	0.00	m	-	-
07/24/14	0	0.00	0.00	0.00	h	-	-	07/24/14	10	0.25	1.02	1.03-1.22	m	m	-
07/25/14	30	0.50	0.04	0.25-0.43	h	-	-	07/25/14	20	0.50	1.18	2.41-2.60	m	m	-
07/26/14	0	0.00	0.35	0.44-0.63	m	m	-	07/26/14	0	0.00	0.55	0.44-0.63	m	m	-
07/27/14	0	0.00	0.00	0.00	h	-	-	07/27/14	20	0.60	0.00	0.04-0.24	m	-	-
07/28/14	20	0.40	0.00	0.00	m	-	-	07/28/14	30	0.40	0.00	0.04-0.24	h	-	-
07/29/14	0	0.00	0.00	0.00	h	-	-	07/29/14	0	0.00	0.00	0.00	h	-	-
07/30/14	0	0.00	0.00	0.00	h	-	-	07/30/14	0	0.00	0.00	0.00	h	-	-
07/31/14	20	0.25	0.39	2.02-2.20	m	m	-	07/31/14	20	0.25	0.43	1.03-1.22	m	m	-
31 days					23/31*	4/8*	2						17/31*	3/10*	3
08/01/14	30	1.25	0.04	0.25-0.43	m	-	x	08/01/14	30	1.00	0.51	1.03-1.22	h	h	-
08/02/14	50	1.25	0.67	0.25-0.43	h	h	-	08/02/14	50	1.50	0.63	0.64-0.83	m	h	-
08/03/14	40	0.75	0.04	0.44-0.63	h	h	-	08/03/14	40	0.75	0.28	0.84-1.02	h	h	-
08/04/14	0	0.00	0.00	0.00	h	-	-	08/04/14	0	0.00	0.00	0.00	h	-	-
08/05/14	0	0.00	0.00	0.00	h	-	-	08/05/14	0	0.00	0.00	0.00	h	-	-
08/06/14	0	0.00	0.00	0.00	h	-	-	08/06/14	0	0.00	0.00	0.00	h	-	-
08/07/14	0	0.00	0.00	0.00	h	-	-	08/07/14	0	0.00	0.00	0.00	h	-	-
08/08/14	0	0.00	0.00	0.00	h	-	-	08/08/14	0	0.00	0.00	0.00	h	-	-
08/09/14	0	0.00	0.00	0.04-0.24	h	-	-	08/09/14	0	0.00	0.00	0.04-0.24	h	-	-
08/10/14	0	0.00	0.00	0.04-0.24	h	-	-	08/10/14	0	0.00	0.00	0.00	h	-	-
08/11/14	30	0.60	0.12	1.03-1.22	h	h	-	08/11/14	30	0.60	0.71	2.02-2.20	m	h	-
08/12/14	60	1.25	1.46	2.81+	h	h	-	08/12/14	70	1.75	1.02	2.61-2.80	h	h	-
08/13/14	20	0.75	0.12	0.04-0.24	m	-	-	08/13/14	10	0.50	0.08	0.04-0.24	m	-	-
08/14/14	0	0.00	0.04	0.04-0.24	m	-	-	08/14/14	0	0.00	1.38	1.03-1.22	m	m	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/15/14	0	0.00	0.00	0.00	h	-	-	10	0.40	0.00	0.00	h	-	-
08/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/17/14	20	0.40	1.18	2.02-2.20	m	m	-	10	0.50	0.28	1.03-1.22	m	h	-
08/18/14	40	1.50	0.39	0.04-0.24	m	-	x	40	1.50	0.59	0.64-0.83	m	h	-
08/19/14	90	1.50	2.52	2.81+	h	h	-	70	1.50	2.68	2.81+	h	h	-
08/20/14	0	0.00	0.00	0.04-0.24	h	-	-	0	0.00	0.16	0.64-0.83	m	m	-
08/21/14	50	0.80	0.35	0.84-1.02	h	h	-	60	1.20	0.24	0.44-0.63	m	h	-
08/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/25/14	50	1.25	0.00	0.04-0.24	m	-	x	60	1.75	1.26	2.02-2.20	h	h	-
08/26/14	50	0.75	0.04	0.04-0.24	m	-	x	60	1.25	0.55	0.25-0.43	m	h	-
08/27/14	10	0.10	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
08/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					24/31*	6/7*	4					22/31*	11/13*	0
09/01/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/02/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/03/14	10	0.10	0.12	0.25-0.43	h	-	-	10	0.15	0.20	0.84-1.02	m	m	-
09/04/14	0	0.00	0.24	1.03-1.22	m	m	-	0	0.00	0.35	1.82-2.01	m	m	-
09/05/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/14	30	0.50	0.39	1.03-1.22	m	m	-	30	0.50	0.00	0.44-0.63	h	h	-
09/07/14	70	1.75	2.32	2.41-2.60	h	h	-	70	2.00	1.14	1.23-1.61	h	h	-
09/08/14	100	1.50	2.09	2.02-2.20	h	h	-	60	1.00	1.18	2.21-2.40	h	h	-
09/09/14	40	1.00	0.12	0.04-0.24	m	-	x	50	1.25	0.51	0.64-0.83	h	h	-
09/10/14	10	0.10	0.00	0.00	h	-	-	10	0.15	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/11/14	10	0.10	0.00	0.00	h	-	-	10	0.15	0.00	0.00	h	-	-
09/12/14	10	0.10	0.00	0.00	h	-	-	10	0.15	0.00	0.00	h	-	-
09/13/14	10	0.10	0.00	0.00	h	-	-	10	0.15	0.00	0.04-0.24	h	-	-
09/14/14	10	0.10	0.00	0.00	h	-	-	10	0.15	0.00	0.00	h	-	-
09/15/14	0	0.00	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
09/16/14	50	0.50	0.00	0.04-0.24	m	-	x	60	0.50	0.00	0.04-0.24	m	-	x
09/17/14	40	0.50	0.08	0.04-0.24	m	-	x	40	0.35	0.28	0.64-0.83	m	m	-
09/18/14	20	0.25	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
09/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/20/14	20	0.15	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
09/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/14	30	1.00	0.00	0.04-0.24	m	-	x	20	1.25	0.00	0.00	m	-	-
09/27/14	90	2.00	0.79	1.03-1.22	h	h	-	90	2.00	0.87	2.02-2.20	h	h	-
09/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					22/30*	3/5*	4					24/30*	5/8*	1
	Wickenburg							New River Cave Creek						
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
06/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/26/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/27/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
16 days					16/16*	0	0					16/16*	0	0
07/01/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/02/14	0	0.00	0.00	0.04-0.24	m	-	-	0	0.00	0.00	0.00	h	-	-
07/03/14	30	0.40	1.22	1.03-1.22	m	m	-	30	0.25	0.43	1.03-1.22	m	m	-
07/04/14	30	0.50	0.00	0.00	m	-	-	30	0.75	0.00	0.00	m	-	-
07/05/14	10	0.50	0.04	0.44-0.63	h	h	-	30	0.75	0.00	0.00	m	-	-
07/06/14	40	0.75	1.61	1.23-1.61	m	h	-	40	1.00	0.20	0.84-1.02	h	h	-
07/07/14	30	0.75	0.04	0.04-0.24	m	-	-	30	0.75	0.31	1.03-1.22	h	h	-
07/08/14	40	1.25	0.04	0.00	m	-	x	40	1.25	0.51	0.64-0.83	h	h	-
07/09/14	20	0.30	0.55	0.44-0.63	m	m	-	10	0.25	0.04	0.04-0.24	h	-	-
07/10/14	40	0.75	0.00	0.00	m	-	x	20	0.50	0.00	0.00	m	-	-
07/11/14	0	0.00	0.00	0.00	h	-	-	10	0.50	0.00	0.00	h	-	-
07/12/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/13/14	30	0.40	0.51	0.64-0.83	m	m	-	30	0.50	0.55	0.64-0.83	h	h	-
07/14/14	50	1.50	0.00	0.00	m	-	x	40	1.50	0.87	1.62-1.81	h	h	-
07/15/14	40	1.25	0.00	0.00	m	-	x	40	1.25	1.46	1.03-1.22	h	h	-
07/16/14	10	0.25	0.00	0.00	h	-	-	10	0.25	0.24	0.25-0.43	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/17/14	0	0.00	0.00	0.00	h	-	-	07/17/14	0	0.00	0.00	0.00	h	-	-
07/18/14	0	0.00	0.00	0.00	h	-	-	07/18/14	0	0.00	0.00	0.00	h	-	-
07/19/14	0	0.00	0.00	0.00	h	-	-	07/19/14	0	0.00	0.00	0.00	h	-	-
07/20/14	0	0.00	0.00	0.00	h	-	-	07/20/14	0	0.00	0.00	0.00	h	-	-
07/21/14	0	0.00	0.00	0.00	h	-	-	07/21/14	0	0.00	0.00	0.00	h	-	-
07/22/14	0	0.00	0.00	0.00	h	-	-	07/22/14	0	0.00	0.00	0.00	h	-	-
07/23/14	20	0.25	0.00	0.00	m	-	-	07/23/14	30	0.35	0.28	1.03-1.22	m	m	-
07/24/14	0	0.00	0.00	0.00	h	-	-	07/24/14	0	0.00	0.04	0.04-0.24	h	-	-
07/25/14	20	0.50	1.10	1.62-1.81	m	h	-	07/25/14	40	1.25	0.00	0.00	m	-	x
07/26/14	0	0.00	0.63	N/A	m	m	-	07/26/14	10	0.75	0.71	1.03-1.22	h	h	-
07/27/14	20	0.70	0.00	0.00	m	-	-	07/27/14	30	0.80	0.00	0.00	m	-	-
07/28/14	30	0.50	0.00	0.25-0.43	h	-	-	07/28/14	20	0.50	0.00	0.00	m	-	-
07/29/14	0	0.00	0.00	0.00	h	-	-	07/29/14	0	0.00	0.00	0.00	h	-	-
07/30/14	0	0.00	0.00	0.00	h	-	-	07/30/14	0	0.00	0.00	0.00	h	-	-
07/31/14	20	0.25	0.47	1.82-2.01	m	m	-	07/31/14	20	0.25	0.12	0.25-0.43	h	-	-
31 days					16/31*	3/8*	4						23/31*	7/9*	1
08/01/14	30	1.25	0.75	1.03-1.22	h	h		08/01/14	40	1.25	1.10	1.03-1.22	h	h	
08/02/14	50	1.50	0.87	0.84-1.02	h	h		08/02/14	60	1.75	0.87	1.23-1.61	h	h	
08/03/14	40	0.75	1.10	0.64-0.83	h	h		08/03/14	30	0.50	0.20	0.04-0.24	m		
08/04/14	0	0.00	0.00	0.00	h	-	-	08/04/14	10	0.15	0.00	0.00	h		
08/05/14	0	0.00	0.00	0.00	h	-	-	08/05/14	0	0.00	0.00	0.00	h	-	-
08/06/14	0	0.00	0.00	0.00	h	-	-	08/06/14	0	0.00	0.00	0.00	h	-	-
08/07/14	0	0.00	0.00	0.00	h	-	-	08/07/14	0	0.00	0.00	0.00	h	-	-
08/08/14	0	0.00	0.00	0.00	h	-	-	08/08/14	0	0.00	0.00	0.00	h		
08/09/14	0	0.00	0.00	0.00	h	-	-	08/09/14	10	0.15	0.00	0.00	h		
08/10/14	10	0.10	0.00	0.00	h	-	-	08/10/14	10	0.15	0.00	0.04-0.24	h		
08/11/14	30	0.60	0.08	0.25-0.43	h	-	-	08/11/14	30	0.75	0.67	1.03-1.22	h	h	
08/12/14	70	1.75	1.65	2.81+	h	h	-	08/12/14	70	1.75	1.69	2.81+	h	h	

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/13/14	20	0.75	0.04	0.00	m	-	-	08/13/14	30	0.75	0.55	0.44-0.63	h	h	
08/14/14	0	0.00	0.00	0.04-0.24	h	-	-	08/14/14	0	0.00	0.00	0.00	h		
08/15/14	10	0.40	0.00	0.00	h	-	-	08/15/14	20	0.50	0.04	0.44-0.63	h	h	
08/16/14	0	0.00	0.00	0.00	h	-	-	08/16/14	10	0.75	0.00	0.00	h		
08/17/14	10	0.50	0.20	0.84-1.02	h	h	-	08/17/14	20	0.80	0.71	1.03-1.22	h	h	
08/18/14	40	1.50	0.67	0.44-0.63	m	h	-	08/18/14	40	1.50	0.16	0.44-0.63	m	h	
08/19/14	70	1.50	1.26	1.23-1.61	h	h	-	08/19/14	90	1.50	5.28	2.81+	m	h	
08/20/14	0	0.00	0.00	0.04-0.24	h	-	-	08/20/14	0	0.00	0.00	0.00	h		
08/21/14	60	1.20	0.79	0.44-0.63	h	h	-	08/21/14	70	0.70	0.91	0.84-1.02	h	h	
08/22/14	0	0.00	0.00	0.00	h	-	-	08/22/14	0	0.00	0.00	0.00	h	-	-
08/23/14	0	0.00	0.00	0.00	h	-	-	08/23/14	0	0.00	0.00	0.00	h	-	-
08/24/14	0	0.00	0.00	0.00	h	-	-	08/24/14	0	0.00	0.00	0.00	h	-	-
08/25/14	60	1.50	1.77	1.62-1.81	h	h	-	08/25/14	50	1.50	0.00	0.00	m		x
08/26/14	60	1.25	0.00	0.25-0.43	m	-	x	08/26/14	40	0.75	0.04	0.04-0.24	m		x
08/27/14	10	0.25	0.00	0.00	h	-	-	08/27/14	20	0.25	0.04	0.04-0.24	h		
08/28/14	0	0.00	0.00	0.00	h	-	-	08/28/14	0	0.00	0.00	0.00	h	-	-
08/29/14	0	0.00	0.00	0.00	h	-	-	08/29/14	0	0.00	0.00	0.00	h	-	-
08/30/14	0	0.00	0.00	0.00	h	-	-	08/30/14	0	0.00	0.00	0.00	h	-	-
08/31/14	0	0.00	0.00	0.00	h	-	-	08/31/14	0	0.00	0.00	0.00	h	-	-
31 days					28/31*	9/9*	1						26/31*	10/10*	2
09/01/14	0	0.00	0.00	0.00	h	-	-	09/01/14	0	0.00	0.00	0.00	h	-	-
09/02/14	0	0.00	0.00	0.00	h	-	-	09/02/14	0	0.00	0.00	0.00	h	-	-
09/03/14	20	0.15	0.39	1.03-1.22	m	m	-	09/03/14	20	0.15	0.00	0.04-0.24	h	-	-
09/04/14	0	0.00	0.31	0.25-0.43	m	-	-	09/04/14	20	0.50	0.00	0.04-0.24	m	-	-
09/05/14	0	0.00	0.00	0.00	h	-	-	09/05/14	0	0.00	0.00	0.00	h	-	-
09/06/14	30	0.50	0.00	0.64-0.83	h	h	-	09/06/14	40	0.75	1.10	1.03-1.22	h	h	-
09/07/14	70	2.00	1.02	0.64-0.83	m	h	-	09/07/14	70	1.50	2.17	1.82-2.01	h	h	-
09/08/14	80	1.00	1.34	1.23-1.61	h	h	-	09/08/14	100	1.50	1.61	1.62-1.81	h	h	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/09/14	40	1.25	0.28	0.25-0.43	m	-	x	40	1.00	0.24	0.04-0.24	m	-	x
09/10/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.00	m	-	-
09/11/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.00	m	-	-
09/12/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.04-0.24	h	-	-
09/13/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.00	m	-	-
09/14/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.00	m	-	-
09/15/14	20	0.35	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
09/16/14	60	0.50	0.08	0.04-0.24	m	-	x	60	0.50	0.31	0.04-0.24	h	-	x
09/17/14	50	0.35	0.20	0.25-0.43	h	-	-	50	0.50	0.08	0.44-0.63	h	h	-
09/18/14	20	0.25	0.00	0.00	m	-	-	30	0.50	0.00	0.00	m	-	-
09/19/14	0	0.00	0.00	0.00	h	-	-	20	0.40	0.00	0.00	m	-	-
09/20/14	20	0.25	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
09/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/14	20	1.25	0.00	0.00	m	-	-	40	1.50	0.12	0.25-0.43	m	-	x
09/27/14	90	2.00	1.30	1.23-1.61	h	h	-	90	2.50	1.34	1.23-1.61	h	h	-
09/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.04-0.24	h	-	-
09/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					16/30*	4/5*	2					19/30*	5/5*	3
	Sycamore Creek							Phoenix North						
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
06/18/14	0	0.00	0.00	0.00	h	-	-	06/18/14	0	0.00	0.00	0.00	h	-	-
06/19/14	0	0.00	0.00	0.00	h	-	-	06/19/14	0	0.00	0.00	0.00	h	-	-
06/20/14	0	0.00	0.00	0.00	h	-	-	06/20/14	0	0.00	0.00	0.00	h	-	-
06/21/14	0	0.00	0.00	0.00	h	-	-	06/21/14	0	0.00	0.00	0.00	h	-	-
06/22/14	0	0.00	0.00	0.00	h	-	-	06/22/14	0	0.00	0.00	0.00	h	-	-
06/23/14	0	0.00	0.00	0.00	h	-	-	06/23/14	0	0.00	0.00	0.00	h	-	-
06/24/14	0	0.00	0.00	0.00	h	-	-	06/24/14	0	0.00	0.00	0.00	h	-	-
06/25/14	0	0.00	0.00	0.00	h	-	-	06/25/14	0	0.00	0.00	0.00	h	-	-
06/26/14	0	0.00	0.00	0.00	h	-	-	06/26/14	0	0.00	0.00	0.00	h	-	-
06/27/14	0	0.00	0.00	0.00	h	-	-	06/27/14	0	0.00	0.00	0.00	h	-	-
06/28/14	0	0.00	0.00	0.00	h	-	-	06/28/14	0	0.00	0.00	0.00	h	-	-
06/29/14	0	0.00	0.00	0.00	h	-	-	06/29/14	0	0.00	0.00	0.00	h	-	-
06/30/14	0	0.00	0.00	0.00	h	-	-	06/30/14	0	0.00	0.00	0.00	h	-	-
16 days					16/16*	0	0						16/16*	0	0
07/01/14	0	0.00	0.00	0.00	h	-	-	07/01/14	0	0.00	0.00	0.00	h	-	-
07/02/14	0	0.00	0.00	0.00	h	-	-	07/02/14	0	0.00	0.00	0.00	h	-	-
07/03/14	40	0.25	0.00	0.00	m	-	-	07/03/14	20	0.25	0.51	0.44-0.63	m	m	-
07/04/14	30	0.75	0.00	0.00	m	-	-	07/04/14	20	0.30	0.00	0.04-0.24	h	-	-
07/05/14	40	0.75	1.73	2.21-2.40	m	h	-	07/05/14	30	0.30	0.00	0.04-0.24	h	-	-
07/06/14	40	1.00	0.00	0.00	m	-	x	07/06/14	30	0.50	0.00	0.00	m	-	-
07/07/14	30	0.75	0.16	0.84-1.02	h	h	-	07/07/14	30	0.50	0.00	0.00	m	-	-
07/08/14	40	1.00	0.04	0.04-0.24	m	-	x	07/08/14	30	0.50	0.00	0.64-0.83	h	h	-
07/09/14	10	0.20	0.00	0.00	h	-	-	07/09/14	0	0.00	0.00	0.00	h	-	-
07/10/14	20	0.50	0.00	0.00	m	-	-	07/10/14	10	0.40	0.00	0.00	h	-	-
07/11/14	10	0.50	0.00	0.00	h	-	-	07/11/14	0	0.00	0.00	0.00	h	-	-
07/12/14	10	0.25	0.04	0.04-0.24	h	-	-	07/12/14	0	0.00	0.00	0.00	h	-	-
07/13/14	30	0.50	0.00	0.00	m	-	-	07/13/14	30	0.30	0.00	0.04-0.24	h	-	-
07/14/14	40	1.50	0.16	0.25-0.43	m	-	x	07/14/14	30	1.00	1.22	1.23-1.61	h	h	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/15/14	40	1.25	0.00	0.00	m	-	x	20	0.50	0.08	0.25-0.43	h	-	-
07/16/14	10	0.25	0.35	0.64-0.83	m	m	-	0	0.00	0.00	0.04-0.24	h	-	-
07/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/23/14	30	0.35	0.04	0.25-0.43	h	-	-	20	0.20	0.04	0.25-0.43	h	-	-
07/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.04-0.24	h	-	-
07/25/14	50	1.25	0.00	0.04-0.24	m	-	x	40	1.00	0.00	0.00	m	-	x
07/26/14	20	0.75	0.08	0.25-0.43	h	-	-	0	0.00	1.10	0.64-0.83	m	m	-
07/27/14	30	0.70	0.00	0.00	m	-	-	20	0.60	0.04	0.00	m	-	-
07/28/14	20	0.35	0.00	0.04-0.24	h	-	-	20	0.20	0.00	0.00	m	-	-
07/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/31/14	20	0.25	0.00	0.04-0.24	h	-	-	10	0.10	0.00	0.04-0.24	h	-	-
31 days					19/31*	2/3*	5					24/31*	2/4*	1
08/01/14	40	1.25	0.00	0.25-0.43	m	-	x	30	1.00	1.18	1.23-1.61	h	h	-
08/02/14	50	1.50	1.14	0.64-0.83	h	h	-	50	1.25	1.38	1.03-1.22	h	h	-
08/03/14	30	0.50	0.04	0.04-0.24	m	-	-	30	0.60	0.16	0.04-0.24	m	-	-
08/04/14	20	0.25	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
08/05/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/06/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/07/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/08/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/09/14	10	0.15	0.00	0.00	h	-	-	0	0.00	0.00	0.04-0.24	h	-	-
08/10/14	10	0.15	0.04	0.04-0.24	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/11/14	30	0.40	0.00	0.04-0.24	h	-	-	20	0.60	0.16	0.04-0.24	m	-	-
08/12/14	60	1.50	0.39	0.64-0.83	h	h	-	60	1.50	1.06	1.62-1.81	h	-	-
08/13/14	30	0.75	0.24	0.25-0.43	h	-	-	20	0.50	0.16	0.04-0.24	m	-	-
08/14/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.04-0.24	h	-	-
08/15/14	20	0.30	0.00	0.04-0.24	h	-	-	0	0.00	0.00	0.00	h	-	-
08/16/14	20	0.75	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
08/17/14	30	1.00	0.47	0.25-0.43	m	-	x	20	0.50	1.18	1.03-1.22	m	h	-
08/18/14	40	1.50	0.08	0.04-0.24	m	-	x	30	1.25	0.12	0.04-0.24	m	-	x
08/19/14	80	1.50	1.77	1.82-2.01	h	h	-	90	1.75	2.32	2.02-2.20	h	h	-
08/20/14	10	0.15	0.00	0.00	h	-	-	0	0.00	0.00	0.04-0.24	h	-	-
08/21/14	60	0.70	0.08	0.04-0.24	m	-	x	50	0.60	0.16	0.04-0.24	m	-	x
08/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/25/14	50	1.50	0.00	0.00	m	-	x	50	1.25	0.00	0.00	m	-	x
08/26/14	40	1.00	0.00	0.00	m	-	x	40	0.50	0.00	0.00	m	-	x
08/27/14	20	0.25	0.31	0.25-0.43	h	-	-	10	0.15	0.04	0.04-0.24	h	-	-
08/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					22/31*	3/3*	6					23/31*	4/4*	4
09/01/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/02/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/03/14	10	0.10	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/14	20	0.50	0.16	0.04-0.24	m	-	-	20	0.50	0.04	0.04-0.24	m	-	-
09/05/14	0	0.00	0.59	1.23-1.61	m	m	-	0	0.00	0.00	0.00	h	-	-
09/06/14	40	0.75	0.24	0.84-1.02	h	h	-	30	0.50	0.91	1.23-1.61	h	h	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/07/14	50	0.75	0.12	0.04-0.24	m	-	x	70	1.50	2.95	2.41-2.60	h	h	-
09/08/14	100	1.50	1.22	1.03-1.22	h	h	-	100	1.25	1.46	1.23-1.61	h	h	-
09/09/14	40	0.75	0.00	0.00	m	-	x	40	0.75	0.35	0.25-0.43	m	-	x
09/10/14	10	0.10	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/11/14	10	0.10	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/12/14	10	0.10	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/13/14	10	0.10	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/14/14	10	0.10	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/14	20	0.35	0.00	0.64-0.83	m	m	-	0	0.00	0.00	0.00	h	-	-
09/16/14	60	0.50	0.28	0.25-0.43	h	-	x	50	0.40	0.00	0.04-0.24	m	-	x
09/17/14	70	0.75	0.08	0.25-0.43	m	-	x	60	0.50	0.12	0.04-0.24	m	-	x
09/18/14	30	0.50	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
09/19/14	20	0.40	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
09/20/14	20	0.35	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
09/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/14	10	0.20	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/14	40	1.50	0.55	0.64-0.83	h	h	-	40	1.25	0.04	0.04-0.24	m	-	x
09/27/14	90	2.50	3.15	2.81+	h	h	-	80	2.00	1.38	1.23-1.61	h	h	-
09/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					21/30*	4/6*	4					24/30*	4/4*	4
	Phoenix South							Scottsdale North						
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
06/16/14	0	0.00	0.00	0.00	h	-	-	06/16/14	0	0.00	0.00	0.00	h	-	-
06/17/14	0	0.00	0.00	0.00	h	-	-	06/17/14	0	0.00	0.00	0.00	h	-	-
06/18/14	0	0.00	0.00	0.00	h	-	-	06/18/14	0	0.00	0.00	0.00	h	-	-
06/19/14	0	0.00	0.00	0.00	h	-	-	06/19/14	0	0.00	0.00	0.00	h	-	-
06/20/14	0	0.00	0.00	0.00	h	-	-	06/20/14	0	0.00	0.00	0.00	h	-	-
06/21/14	0	0.00	0.00	0.00	h	-	-	06/21/14	0	0.00	0.00	0.00	h	-	-
06/22/14	0	0.00	0.00	0.00	h	-	-	06/22/14	0	0.00	0.00	0.00	h	-	-
06/23/14	0	0.00	0.00	0.00	h	-	-	06/23/14	0	0.00	0.00	0.00	h	-	-
06/24/14	0	0.00	0.00	0.00	h	-	-	06/24/14	0	0.00	0.00	0.00	h	-	-
06/25/14	0	0.00	0.00	0.00	h	-	-	06/25/14	0	0.00	0.00	0.00	h	-	-
06/26/14	0	0.00	0.00	0.00	h	-	-	06/26/14	0	0.00	0.00	0.00	h	-	-
06/27/14	0	0.00	0.00	0.00	h	-	-	06/27/14	0	0.00	0.00	0.00	h	-	-
06/28/14	0	0.00	0.00	0.00	h	-	-	06/28/14	0	0.00	0.00	0.00	h	-	-
06/29/14	0	0.00	0.00	0.00	h	-	-	06/29/14	0	0.00	0.00	0.00	h	-	-
06/30/14	0	0.00	0.00	0.00	h	-	-	06/30/14	0	0.00	0.00	0.00	h	-	-
16 days					16/16*	0	0						16/16*	0	0
07/01/14	0	0.00	0.00	0.00	h	-	-	07/01/14	0	0.00	0.00	0.00	h	-	-
07/02/14	0	0.00	0.00	0.00	h	-	-	07/02/14	0	0.00	0.00	0.00	h	-	-
07/03/14	20	0.25	0.47	0.64-0.83	m	m	-	07/03/14	30	0.25	0.12	0.24-0.43	h	-	-
07/04/14	20	0.30	0.12	0.04-0.24	h	-	-	07/04/14	20	0.50	0.00	0.00	m	-	-
07/05/14	30	0.30	0.00	0.00	m	-	-	07/05/14	30	0.50	0.00	0.25-0.43	h	-	-
07/06/14	20	0.50	0.04	0.00	m	-	-	07/06/14	30	0.50	0.24	0.00	m	-	-
07/07/14	30	0.50	0.00	0.04-0.24	m	-	-	07/07/14	30	0.50	0.00	0.00	m	-	-
07/08/14	30	0.50	0.08	0.25-0.43	h	-	-	07/08/14	40	0.50	1.26	0.84-1.02	m	h	-
07/09/14	0	0.00	0.00	0.00	h	-	-	07/09/14	0	0.00	0.00	0.00	h	-	-
07/10/14	10	0.40	0.00	0.04-0.24	h	-	-	07/10/14	10	0.40	0.00	0.00	h	-	-
07/11/14	0	0.00	0.00	0.00	h	-	-	07/11/14	0	0.00	0.00	0.00	h	-	-
07/12/14	0	0.00	0.00	0.00	h	-	-	07/12/14	0	0.00	0.00	0.04-0.24	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/13/14	20	0.30	0.31	0.25-0.43	h	-	-	30	0.40	0.12	0.44-0.63	h	-	-
07/14/14	30	0.75	0.55	1.03-1.22	h	h	-	40	1.25	1.57	1.23-1.61	h	h	-
07/15/14	20	0.50	0.12	0.25-0.43	h	-	-	30	1.25	1.06	1.03-1.22	h	h	-
07/16/14	0	0.00	0.00	0.04-0.24	h	-	-	0	0.00	0.00	0.00	h	-	-
07/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/23/14	20	0.20	0.12	0.04-0.24	h	-	-	20	0.40	0.43	0.44-0.63	h	-	-
07/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/25/14	30	0.75	0.00	0.00	m	-	-	40	1.00	0.00	0.04-0.24	m	-	x
07/26/14	0	0.00	0.08	0.04-0.24	m	-	-	0	0.00	1.26	1.03-1.22	m	-	x
07/27/14	0	0.00	0.00	0.00	h	-	-	20	0.60	0.00	0.00	m	-	-
07/28/14	10	0.20	0.00	0.00	h	-	-	20	0.30	0.00	0.00	m	-	-
07/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/31/14	10	0.10	0.28	0.25-0.43	h	-	-	20	0.25	0.20	0.04-0.24	h	-	-
31 days					25/31*	1/2*	0					23/31*	3/3*	2
08/01/14	20	0.75	1.73	1.23-1.61	h	h	-	30	1.25	0.00	0.00	m	-	x
08/02/14	40	1.25	0.67	1.23-1.61	h	h	-	50	1.50	1.69	1.03-1.22	h	h	-
08/03/14	30	0.50	0.12	0.04-0.24	m	-	-	30	0.60	0.08	0.04-0.24	m	-	-
08/04/14	0	0.00	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
08/05/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/06/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/07/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/08/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/09/14	0	0.00	0.00	0.00	h	-	-	08/09/14	0	0.00	0.00	0.00	h	-	-
08/10/14	0	0.00	0.00	0.00	h	-	-	08/10/14	10	0.05	0.00	0.00	h	-	-
08/11/14	20	0.40	0.16	0.04-0.24	h	-	-	08/11/14	30	0.75	0.87	0.64-0.83	h	h	-
08/12/14	50	1.25	2.51	2.81+	m	h	-	08/12/14	60	1.50	0.28	1.23-1.61	h	h	-
08/13/14	20	0.50	0.20	0.04-0.24	m	-	-	08/13/14	30	0.75	0.28	0.25-0.43	h	-	-
08/14/14	0	0.00	0.04	0.04-0.24	m	-	-	08/14/14	0	0.00	0.00	0.00	h	-	-
08/15/14	0	0.00	0.00	0.00	h	-	-	08/15/14	10	0.30	0.00	0.00	h	-	-
08/16/14	0	0.00	0.00	0.04-0.24	h	-	-	08/16/14	0	0.00	0.00	0.00	h	-	-
08/17/14	20	0.50	0.04	0.25-0.43	h	-	-	08/17/14	20	0.50	0.51	0.44-0.63	h	h	-
08/18/14	30	1.00	0.00	0.00	m	-	x	08/18/14	40	1.50	0.04	0.04-0.24	m	-	x
08/19/14	90	1.75	1.30	1.62-1.81	h	h	-	08/19/14	90	1.75	3.70	2.81+	m	h	-
08/20/14	10	0.15	0.00	0.00	h	-	-	08/20/14	0	0.00	0.00	0.00	h	-	-
08/21/14	40	0.50	0.94	0.64-0.83	h	h	-	08/21/14	50	0.60	0.20	0.25-0.43	m	-	x
08/22/14	0	0.00	0.00	0.00	h	-	-	08/22/14	0	0.00	0.00	0.00	h	-	-
08/23/14	0	0.00	0.00	0.00	h	-	-	08/23/14	0	0.00	0.00	0.00	h	-	-
08/24/14	0	0.00	0.00	0.00	h	-	-	08/24/14	0	0.00	0.00	0.00	h	-	-
08/25/14	50	1.00	0.00	0.00	m	-	x	08/25/14	50	1.50	0.00	0.00	m	-	x
08/26/14	30	0.50	0.00	0.00	m	-	-	08/26/14	50	0.75	0.00	0.00	m	-	x
08/27/14	0	0.00	0.00	0.00	h	-	-	08/27/14	10	0.15	0.12	0.04-0.24	h	-	-
08/28/14	0	0.00	0.00	0.00	h	-	-	08/28/14	0	0.00	0.00	0.00	h	-	-
08/29/14	0	0.00	0.00	0.00	h	-	-	08/29/14	0	0.00	0.00	0.00	h	-	-
08/30/14	0	0.00	0.00	0.00	h	-	-	08/30/14	0	0.00	0.00	0.00	h	-	-
08/31/14	0	0.00	0.00	0.00	h	-	-	08/31/14	0	0.00	0.00	0.00	h	-	-
31 days					24/31*	5/5*	2						24/31*	5/5*	5
09/01/14	0	0.00	0.00	0.00	h	-	-	09/01/14	0	0.00	0.00	0.00	h	-	-
09/02/14	0	0.00	0.00	0.00	h	-	-	09/02/14	0	0.00	0.00	0.00	h	-	-
09/03/14	0	0.00	0.00	0.00	h	-	-	09/03/14	10	0.10	0.00	0.00	h	-	-
09/04/14	10	0.25	0.43	0.25-0.43	h	-	-	09/04/14	20	0.50	0.04	0.04-0.24	m	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/05/14	0	0.00	0.00	0.00	h	-	-	09/05/14	0	0.00	0.00	0.00	h	-	-
09/06/14	30	0.50	0.39	0.25-0.43	h	-	-	09/06/14	40	0.75	0.55	0.84-1.02	h	h	-
09/07/14	60	1.50	3.07	2.81+	m	h	-	09/07/14	70	1.50	1.57	1.23-1.61	h	h	-
09/08/14	100	1.25	3.11	2.02-2.20	m	h	-	09/08/14	100	1.50	1.57	1.82-2.01	h	h	-
09/09/14	30	0.75	0.00	0.04-0.24	m	-	-	09/09/14	40	1.00	0.35	0.25-0.43	m	-	x
09/10/14	0	0.00	0.00	0.00	h	-	-	09/10/14	10	0.10	0.00	0.00	h	-	-
09/11/14	0	0.00	0.00	0.00	h	-	-	09/11/14	10	0.10	0.00	0.00	h	-	-
09/12/14	0	0.00	0.00	0.00	h	-	-	09/12/14	10	0.10	0.00	0.00	h	-	-
09/13/14	0	0.00	0.00	0.00	h	-	-	09/13/14	10	0.10	0.00	0.00	h	-	-
09/14/14	0	0.00	0.00	0.00	h	-	-	09/14/14	10	0.10	0.00	0.00	h	-	-
09/15/14	0	0.00	0.00	0.04-0.24	h	-	-	09/15/14	20	0.15	0.00	0.00	m	-	-
09/16/14	60	0.75	0.04	0.04-0.24	m	-	x	09/16/14	50	0.40	0.08	0.04-0.24	h	-	-
09/17/14	60	0.75	0.67	0.44-0.63	h	h	-	09/17/14	60	0.90	0.04	0.04-0.24	m	-	x
09/18/14	20	0.15	0.00	0.00	m	-	-	09/18/14	20	0.50	0.00	0.00	m	-	-
09/19/14	0	0.00	0.00	0.00	h	-	-	09/19/14	0	0.00	0.00	0.00	h	-	-
09/20/14	0	0.00	0.00	0.00	h	-	-	09/20/14	0	0.00	0.00	0.00	h	-	-
09/21/14	0	0.00	0.00	0.00	h	-	-	09/21/14	0	0.00	0.00	0.00	h	-	-
09/22/14	0	0.00	0.00	0.00	h	-	-	09/22/14	0	0.00	0.00	0.00	h	-	-
09/23/14	0	0.00	0.00	0.00	h	-	-	09/23/14	0	0.00	0.00	0.00	h	-	-
09/24/14	0	0.00	0.00	0.00	h	-	-	09/24/14	0	0.00	0.00	0.00	h	-	-
09/25/14	0	0.00	0.00	0.00	h	-	-	09/25/14	0	0.00	0.00	0.00	h	-	-
09/26/14	30	1.00	0.20	0.25-0.43	m	-	x	09/26/14	40	1.25	0.67	0.44-0.63	m	h	-
09/27/14	80	1.50	2.01	1.23-1.61	h	h	-	09/27/14	90	2.00	1.93	1.82-2.01	h	h	-
09/28/14	0	0.00	0.00	0.00	h	-	-	09/28/14	0	0.00	0.00	0.04-0.24	h	-	-
09/29/14	0	0.00	0.00	0.00	h	-	-	09/29/14	0	0.00	0.00	0.00	h	-	-
09/30/14	0	0.00	0.00	0.00	h	-	-	09/30/14	0	0.00	0.00	0.00	h	-	-
30 days					24/30*	4/4*	2						24/30*	5/5*	2

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
	Scottsdale South							Southeast Valley						
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/26/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/27/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
16 days					16/16*	0	0					16/16*	0	0
07/01/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/02/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/14	30	0.25	0.12	0.04-0.24	h	-	-	40	0.40	0.12	0.25-0.43	h	-	-
07/04/14	20	0.50	0.04	0.00	m	-	-	20	0.50	0.28	0.04-0.24	m	-	-
07/05/14	30	0.50	0.04	0.04-0.24	m	-	-	30	0.50	0.08	0.04-0.24	m	-	-
07/06/14	20	0.50	0.00	0.00	m	-	-	30	0.50	0.04	0.00	m	-	-
07/07/14	30	0.50	0.00	0.00	m	-	-	30	0.50	0.00	0.04-0.24	m	-	-
07/08/14	30	0.50	0.24	0.04-0.24	m	-	-	30	0.50	0.39	1.03-1.22	m	h	-
07/09/14	0	0.00	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
07/10/14	10	0.40	0.00	0.00	h	-	-	20	0.50	0.00	0.00	m	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/11/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/12/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.04-0.24	h	-	-
07/13/14	20	0.30	0.04	0.04-0.24	h	-	-	30	0.40	0.87	1.03-1.22	m	m	-
07/14/14	30	0.75	0.55	0.84-1.02	h	h	-	40	1.00	0.39	0.25-0.43	m	-	x
07/15/14	20	0.50	0.91	0.84-1.02	h	h	-	30	0.75	0.04	0.25-0.43	h	-	-
07/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/23/14	20	0.20	0.20	0.25-0.43	h	-	-	20	0.35	0.00	0.25-0.43	h	-	-
07/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/25/14	30	0.75	0.00	0.00	m	-	-	40	1.00	0.20	0.25-0.43	m	-	x
07/26/14	0	0.00	0.28	0.25-0.43	m	-	-	0	0.00	0.31	0.25-0.43	m	-	-
07/27/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.43	0.25-0.43	m	-	-
07/28/14	10	0.20	0.00	0.00	h	-	-	10	0.20	0.00	0.04-0.24	h	-	-
07/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/31/14	10	0.10	0.04	0.04-0.24	h	-	-	10	0.20	0.24	0.25-0.43	h	-	-
31 days					24/31*	2/2*	0					19/31*	1/2*	2
08/01/14	20	0.75	0.12	0.04-0.24	m	-	-	30	1.00	0.04	0.04-0.24	m	-	x
08/02/14	40	1.00	0.43	0.25-0.43	m	-	x	40	1.25	0.08	0.04-0.24	m	-	x
08/03/14	30	0.50	0.31	0.25-0.43	h	-	-	30	0.50	0.43	0.25-0.43	h	-	-
08/04/14	0	0.00	0.00	0.00	h	-	-	10	0.15	0.00	0.00	h	-	-
08/05/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/06/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/07/14	0	0.00	0.00	0.00	h	-	-	08/07/14	0	0.00	0.00	0.00	h	-	-
08/08/14	0	0.00	0.00	0.00	h	-	-	08/08/14	0	0.00	0.00	0.00	h	-	-
08/09/14	0	0.00	0.00	0.00	h	-	-	08/09/14	0	0.00	0.00	0.00	h	-	-
08/10/14	0	0.00	0.00	0.00	h	-	-	08/10/14	0	0.00	0.12	0.25-0.43	m	-	-
08/11/14	20	0.50	0.12	0.04-0.24	m	-	-	08/11/14	30	0.50	0.12	0.25-0.43	h	-	-
08/12/14	50	1.00	0.39	1.03-1.22	h	h	-	08/12/14	50	1.25	1.18	1.62-1.81	h	h	-
08/13/14	20	0.50	0.20	0.04-0.24	m	-	-	08/13/14	20	0.75	0.55	0.64-0.83	h	h	-
08/14/14	0	0.00	0.00	0.00	h	-	-	08/14/14	10	0.15	0.16	0.25-0.43	h	-	-
08/15/14	0	0.00	0.00	0.00	h	-	-	08/15/14	0	0.00	0.00	0.00	h	-	-
08/16/14	0	0.00	0.00	0.00	h	-	-	08/16/14	0	0.00	0.00	0.04-0.24	h	-	-
08/17/14	20	0.50	0.16	0.04-0.24	m	-	-	08/17/14	20	0.50	0.43	0.44-0.63	h	h	-
08/18/14	30	1.00	0.00	0.00	m	-	x	08/18/14	40	1.25	0.04	0.00	m	-	x
08/19/14	80	1.75	1.77	1.62-1.81	h	h	-	08/19/14	70	1.75	1.02	1.03-1.22	h	h	-
08/20/14	0	0.00	0.00	0.00	h	-	-	08/20/14	10	0.15	0.00	0.00	h	-	-
08/21/14	40	0.50	0.35	0.25-0.43	h	-	-	08/21/14	30	0.40	0.35	0.25-0.43	h	-	-
08/22/14	0	0.00	0.00	0.00	h	-	-	08/22/14	0	0.00	0.00	0.00	h	-	-
08/23/14	0	0.00	0.00	0.00	h	-	-	08/23/14	0	0.00	0.00	0.00	h	-	-
08/24/14	0	0.00	0.00	0.00	h	-	-	08/24/14	0	0.00	0.00	0.00	h	-	-
08/25/14	50	1.00	0.00	0.00	m	-	x	08/25/14	50	1.50	0.35	0.25-0.43	m	-	x
08/26/14	30	0.50	0.00	0.00	m	-	-	08/26/14	40	0.50	0.00	0.00	m	-	x
08/27/14	0	0.00	0.12	0.04-0.24	m	-	-	08/27/14	0	0.00	0.12	0.04-0.24	m	-	-
08/28/14	0	0.00	0.00	0.00	h	-	-	08/28/14	0	0.00	0.00	0.00	h	-	-
08/29/14	0	0.00	0.00	0.00	h	-	-	08/29/14	0	0.00	0.00	0.00	h	-	-
08/30/14	0	0.00	0.00	0.00	h	-	-	08/30/14	0	0.00	0.00	0.00	h	-	-
08/31/14	0	0.00	0.00	0.00	h	-	-	08/31/14	0	0.00	0.00	0.00	h	-	-
31 days					22/31*	2/2*	2						24/31*	4/4*	3
09/01/14	0	0.00	0.00	0.00	h	-	-	09/01/14	0	0.00	0.00	0.00	h	-	-
09/02/14	0	0.00	0.00	0.00	h	-	-	09/02/14	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/03/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/14	10	0.25	0.31	0.25-0.43	h	-	-	10	0.25	0.16	0.25-0.43	h	-	-
09/05/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/14	30	0.50	0.24	0.25-0.43	h	-	-	30	0.50	0.39	0.44-0.63	h	h	-
09/07/14	60	1.50	3.31	2.61-2.80	m	h	-	50	1.25	3.03	2.81+	m	h	-
09/08/14	100	1.25	1.22	1.23-1.61	h	h	-	100	1.50	3.11	2.21-2.40	m	h	-
09/09/14	30	0.75	0.71	0.25-0.43	h	h	-	40	0.75	0.16	0.04-0.24	m	-	x
09/10/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/11/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/12/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/13/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/14/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/14	60	0.60	0.12	0.04-0.24	m	-	x	70	0.75	0.08	0.44-0.83	h	h	-
09/17/14	70	0.90	0.35	0.25-0.43	m	-	x	80	1.25	1.97	1.23-1.61	h	h	-
09/18/14	20	0.15	0.00	0.00	m	-	-	20	0.15	0.00	0.00	m	-	-
09/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/20/14	0	0.00	0.00	0.00	h	-	-	20	0.15	0.00	0.00	m	-	-
09/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/14	30	1.00	0.28	0.04-0.24	m	-	x	30	1.00	0.31	0.25-0.43	m	-	x
09/27/14	80	1.50	2.01	1.82-2.01	h	h	-	70	2.00	2.32	2.02-2.20	h	h	-
09/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
30 days					25/30*	4/4*	3					24/30*	6/6*	2
	Lower Salt River Lakes							Superstition						
06/15/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/25/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/26/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/27/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/28/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
16 days					16/16*	0	0					16/16*	0	0
07/01/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/02/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/14	40	0.40	0.00	0.04-0.24	h	-	-	40	0.40	0.04	0.04-0.24	h	-	-
07/04/14	30	0.75	0.00	0.00	m	-	-	30	0.75	0.00	0.00	m	-	-
07/05/14	30	0.75	0.00	0.04-0.24	m	-	-	30	0.75	0.55	1.03-1.22	h	h	-
07/06/14	30	0.75	0.00	0.00	m	-	-	30	0.75	0.00	0.00	m	-	-
07/07/14	30	0.75	0.00	1.03-1.22	h	h	-	30	0.75	0.00	1.03-1.22	h	h	-
07/08/14	30	0.75	0.39	1.23-1.61	h	h	-	30	0.75	0.63	1.23-1.61	h	h	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
07/09/14	20	0.10	0.00	0.00	m	-	-	10	0.10	0.04	0.04-0.24	h	-	-
07/10/14	30	0.75	0.00	0.00	m	-	-	30	0.75	0.00	0.00	m	-	-
07/11/14	10	0.30	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/12/14	10	0.25	0.00	0.04-0.24	h	-	-	10	0.10	0.00	0.04-0.24	h	-	-
07/13/14	40	0.50	0.00	0.44-0.63	h	h	-	30	0.40	0.20	1.03-1.22	m	m	-
07/14/14	40	1.50	0.00	0.00	m	-	x	40	1.50	0.00	0.00	m	-	x
07/15/14	40	1.25	1.06	1.03-1.22	h	h	-	30	1.25	1.10	0.84-1.02	h	h	-
07/16/14	10	0.25	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/17/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/18/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/21/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/23/14	30	0.50	0.00	0.04-0.24	m	-	-	30	0.50	0.00	0.04-0.24	m	-	-
07/24/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.04	0.04-0.24	m	-	-
07/25/14	40	1.25	0.00	1.23-1.61	h	h	-	40	1.00	0.51	1.03-1.22	h	h	-
07/26/14	0	0.00	0.16	0.64-0.83	m	m	-	0	0.00	0.31	0.84-1.02	m	m	-
07/27/14	20	1.00	0.31	0.25-0.43	m	-	x	20	0.80	0.24	0.04-0.24	m	-	-
07/28/14	20	0.30	0.00	0.00	m	-	-	20	0.30	0.00	0.00	m	-	-
07/29/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/31/14	20	0.25	0.00	0.25-0.43	h	-	-	20	0.25	0.00	0.44-0.63	m	-	-
31 days					21/31*	5/6*	2					19/31*	5/7*	1
08/01/14	40	1.25	0.00	0.84-1.02	h	h	-	40	1.25	0.00	0.04-0.24	m	-	x
08/02/14	60	1.50	0.94	0.25-0.43	m	-	x	50	1.50	0.16	0.04-0.24	m	-	x
08/03/14	30	0.50	0.00	0.25-0.43	h	-	-	30	0.50	0.00	0.25-0.43	h	-	-
08/04/14	20	0.35	0.00	0.00	m	-	-	10	0.25	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
08/05/14	0	0.00	0.00	0.00	h	-	-	08/05/14	0	0.00	0.00	0.00	h	-	-
08/06/14	0	0.00	0.00	0.00	h	-	-	08/06/14	0	0.00	0.00	0.00	h	-	-
08/07/14	0	0.00	0.00	0.00	h	-	-	08/07/14	0	0.00	0.00	0.00	h	-	-
08/08/14	0	0.00	0.00	0.00	h	-	-	08/08/14	0	0.00	0.00	0.00	h	-	-
08/09/14	0	0.00	0.00	0.00	h	-	-	08/09/14	0	0.00	0.00	0.00	h	-	-
08/10/14	0	0.00	0.00	0.04-0.24	h	-	-	08/10/14	0	0.00	0.20	0.64-0.83	m	m	-
08/11/14	20	0.40	0.12	0.64-0.83	m	m	-	08/11/14	30	0.40	0.35	0.44-0.63	h	-	-
08/12/14	50	1.25	0.24	1.23-1.61	h	h	-	08/12/14	50	1.25	0.94	1.62-1.81	h	h	-
08/13/14	30	0.75	0.59	0.64-0.83	h	h	-	08/13/14	20	0.50	0.51	0.25-0.43	h	h	-
08/14/14	20	0.25	0.00	0.00	m	-	-	08/14/14	10	0.15	0.04	0.00	h	-	-
08/15/14	10	0.50	0.00	0.00	h	-	-	08/15/14	0	0.00	0.00	0.00	h	-	-
08/16/14	10	0.50	0.00	0.00	h	-	-	08/16/14	0	0.00	0.00	0.00	h	-	-
08/17/14	20	0.70	0.00	1.23-1.61	h	h	-	08/17/14	20	0.60	0.47	1.23-1.61	h	h	-
08/18/14	40	1.50	0.00	0.64-0.83	h	h	-	08/18/14	40	1.50	0.00	0.04-0.24	m	-	x
08/19/14	80	1.50	0.20	1.03-1.22	h	h	-	08/19/14	80	1.50	0.94	1.23-1.61	h	h	-
08/20/14	20	0.15	0.00	0.00	m	-	-	08/20/14	20	0.15	0.00	0.00	m	-	-
08/21/14	20	0.40	0.00	0.04-0.24	h	-	-	08/21/14	20	0.40	0.04	0.04-0.24	h	-	-
08/22/14	0	0.00	0.00	0.00	h	-	-	08/22/14	0	0.00	0.00	0.00	h	-	-
08/23/14	0	0.00	0.00	0.00	h	-	-	08/23/14	0	0.00	0.00	0.00	h	-	-
08/24/14	0	0.00	0.00	0.00	h	-	-	08/24/14	0	0.00	0.00	0.00	h	-	-
08/25/14	60	1.50	0.00	0.00	m	-	x	08/25/14	60	1.50	0.16	0.04-0.24	m	-	x
08/26/14	40	0.50	0.00	0.04-0.24	m	-	x	08/26/14	40	0.50	0.00	0.00	m	-	x
08/27/14	10	0.10	0.00	0.00	h	-	-	08/27/14	0	0.00	0.00	0.00	h	-	-
08/28/14	0	0.00	0.00	0.00	h	-	-	08/28/14	0	0.00	0.00	0.00	h	-	-
08/29/14	0	0.00	0.00	0.00	h	-	-	08/29/14	0	0.00	0.00	0.00	h	-	-
08/30/14	0	0.00	0.00	0.00	h	-	-	08/30/14	0	0.00	0.00	0.00	h	-	-
08/31/14	0	0.00	0.00	0.00	h	-	-	08/31/14	0	0.00	0.00	0.00	h	-	-
31 days					24/31*	5/6*	3						24/31*	4/5*	5

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

Date	Forecast Zone Data				Verification			Date	Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/01/14	0	0.00	0.00	0.00	h	-	-	09/01/14	0	0.00	0.00	0.00	h	-	-
09/02/14	0	0.00	0.00	0.00	h	-	-	09/02/14	0	0.00	0.00	0.00	h	-	-
09/03/14	10	0.10	0.00	0.00	h	-	-	09/03/14	0	0.00	0.00	0.00	h	-	-
09/04/14	20	0.50	0.04	0.25-0.43	h	-	-	09/04/14	20	0.50	0.00	0.04-0.24	m	-	-
09/05/14	0	0.00	0.00	0.00	h	-	-	09/05/14	0	0.00	0.00	0.00	h	-	-
09/06/14	40	0.75	0.00	0.84-1.02	h	h	-	09/06/14	40	0.75	0.28	0.25-0.43	m	-	x
09/07/14	60	0.75	0.39	0.84-1.02	h	h	-	09/07/14	60	0.75	1.69	1.23-1.61	m	h	-
09/08/14	100	1.50	1.06	1.62-1.81	h	h	-	09/08/14	100	1.50	2.56	2.02-2.20	h	h	-
09/09/14	30	0.75	0.04	0.04-0.24	m	-	-	09/09/14	30	0.75	0.71	0.25-0.43	h	h	-
09/10/14	10	0.10	0.00	0.00	h	-	-	09/10/14	0	0.00	0.00	0.00	h	-	-
09/11/14	10	0.10	0.00	0.00	h	-	-	09/11/14	0	0.00	0.00	0.00	h	-	-
09/12/14	10	0.10	0.00	0.04-0.24	h	-	-	09/12/14	0	0.00	0.00	0.00	h	-	-
09/13/14	10	0.10	0.00	0.00	h	-	-	09/13/14	0	0.00	0.00	0.00	h	-	-
09/14/14	10	0.10	0.00	0.00	h	-	-	09/14/14	0	0.00	0.00	0.00	h	-	-
09/15/14	20	0.10	0.00	0.00	m	-	-	09/15/14	20	0.10	0.00	0.44-0.63	m	m	-
09/16/14	70	0.75	0.04	0.04-0.24	m	-	x	09/16/14	70	0.75	0.08	0.04-0.24	m	-	x
09/17/14	80	1.50	0.08	0.64-0.83	m	h	-	09/17/14	80	1.50	0.51	0.84-1.02	h	h	-
09/18/14	30	0.50	0.00	0.00	m	-	-	09/18/14	30	0.35	0.00	0.00	m	-	-
09/19/14	0	0.00	0.00	0.00	h	-	-	09/19/14	0	0.00	0.00	0.00	h	-	-
09/20/14	20	0.25	0.00	0.00	m	-	-	09/20/14	20	0.15	0.00	0.00	m	-	-
09/21/14	0	0.00	0.00	0.00	h	-	-	09/21/14	0	0.00	0.00	0.00	h	-	-
09/22/14	0	0.00	0.00	0.00	h	-	-	09/22/14	0	0.00	0.00	0.00	h	-	-
09/23/14	0	0.00	0.00	0.00	h	-	-	09/23/14	0	0.00	0.00	0.00	h	-	-
09/24/14	0	0.00	0.00	0.00	h	-	-	09/24/14	0	0.00	0.00	0.00	h	-	-
09/25/14	10	0.20	0.00	0.00	h	-	-	09/25/14	10	0.20	0.00	0.00	h	-	-
09/26/14	40	1.50	0.00	0.44-0.63	m	h	-	09/26/14	40	1.25	0.31	0.04-0.24	m	-	x
09/27/14	90	2.50	2.48	2.81+	h	h	-	09/27/14	90	2.50	2.32	2.41-2.60	h	h	-
09/28/14	0	0.00	0.00	0.00	h	-	-	09/28/14	0	0.00	0.00	0.04-0.24	h	-	-
09/29/14	0	0.00	0.00	0.00	h	-	-	09/29/14	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2014

	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FAR
09/30/14	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					23/30*	6/6*	1					22/30*	5/6*	3

TABLE A-2: This table shows the verification data of MSP issued precipitation forecasts contained in the daily Outlooks for the 2014 Monsoon Season. It is a monthly tally of the data contained in Table A-1. The table is broken down by month and MSP Forecast Zone. The columns from left to right are defined as follows:

Accurate Forecasts – Number of correct forecasts days out of total days in the month.

Accuracy – Accuracy of forecasts in percent.

Op. Sig. Events Detected – Number of operationally significant days detected correctly.

POD – Probability of detection in percent.

False Alarms – Number of false alarms that month.

FAR – False alarm rate in percent.

TABLE A-2: MSP Weather Outlook Verification – Monsoon Season 2014						
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)
JUNE						
Gila Bend	16/16	100.0%	0/0	n/a	0	0.0%
Palo Verde	16/16	100.0%	0/0	n/a	0	0.0%
Rainbow Valley	16/16	100.0%	0/0	n/a	0	0.0%
West Valley	16/16	100.0%	0/0	n/a	0	0.0%
Northwest Valley	16/16	100.0%	0/0	n/a	0	0.0%
Upper Centennial	16/16	100.0%	0/0	n/a	0	0.0%
Wickenburg	16/16	100.0%	0/0	n/a	0	0.0%
New River/Cave Creek	16/16	100.0%	0/0	n/a	0	0.0%
Sycamore Creek	16/16	100.0%	0/0	n/a	0	0.0%
Phoenix North	16/16	100.0%	0/0	n/a	0	0.0%
Phoenix South	16/16	100.0%	0/0	n/a	0	0.0%
Scottsdale North	16/16	100.0%	0/0	n/a	0	0.0%
Scottsdale South	16/16	100.0%	0/0	n/a	0	0.0%
Southeast Valley	16/16	100.0%	0/0	n/a	0	0.0%
Lower Salt River Lakes	16/16	100.0%	0/0	n/a	0	0.0%
Superstition	16/16	100.0%	0/0	n/a	0	0.0%

TABLE A-2: MSP Weather Outlook Verification – Monsoon Season 2014						
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)
All Zones	256/256	100.0%	0/0	n/a	0	0.0%
JULY						
Gila Bend	23/31	74.2%	3/8	37.5%	1	3.2%
Palo Verde	18/31	58.1%	1/6	16.7%	2	6.5%
Rainbow Valley	23/31	74.2%	2/4	50.0%	2	6.5%
West Valley	21/31	67.7%	1/5	20.0%	1	3.2%
Northwest Valley	23/31	74.2%	4/8	50.0%	2	6.5%
Upper Centennial	17/31	54.8%	3/10	30.0%	3	9.7%
Wickenburg	16/31	51.6%	3/8	37.5%	4	12.9%
New River/Cave Creek	23/31	74.2%	7/9	77.8%	1	3.2%
Sycamore Creek	19/31	61.3%	2/3	66.7%	5	16.1%
Phoenix North	24/31	77.4%	2/4	50.0%	1	3.2%
Phoenix South	25/31	80.6%	1/2	50.0%	0	0.0%
Scottsdale North	23/31	74.2%	3/3	100%	2	6.5%
Scottsdale South	24/31	77.4%	2/2	100%	0	0.0%
Southeast Valley	19/31	61.3%	1/2	50.0%	2	6.5%
Lower Salt River Lakes	21/31	67.7%	5/6	83.3%	2	6.5%
Superstition	19/31	61.3%	5/7	71.4%	1	3.2%
All Zones	338/496	68.1%	45/87	51.7%	29	5.8%
AUGUST						
Gila Bend	23/31	74.2%	6/6	100%	5	16.1%
Palo Verde	23/31	74.2%	7/9	77.8%	3	9.7%
Rainbow Valley	24/31	77.4%	5/5	100%	5	16.1%
West Valley	27/31	87.1%	9/10	90.0%	4	12.9%
Northwest Valley	24/31	77.4%	6/7	85.7%	4	12.9%
Upper Centennial	22/31	71.0%	11/13	84.6%	0	0.0%
Wickenburg	28/31	90.3%	9/9	100%	1	3.2%
New River/Cave Creek	26/31	83.9%	10/10	100%	2	6.5%
Sycamore Creek	22/31	71.0%	3/3	100%	6	19.3%

TABLE A-2: MSP Weather Outlook Verification – Monsoon Season 2014						
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)
Phoenix North	23/31	74.2%	4/4	100%	4	12.9%
Phoenix South	24/31	77.4%	5/5	100%	2	6.5%
Scottsdale North	24/31	77.4%	5/5	100%	5	16.1%
Scottsdale South	22/31	71.0%	2/2	100%	2	6.5%
Southeast Valley	24/31	77.4%	4/4	100%	3	9.7%
Lower Salt River Lakes	24/31	77.4%	5/6	83.3%	3	9.7%
Superstition	24/31	77.4%	4/5	80.0%	5	16.1%
All Zones	384/496	77.4%	95/103	92.2%	54/496	10.9%
SEPTEMBER						
Gila Bend	21/30	70.0%	4/6	66.7%	4	13.3%
Palo Verde	26/30	86.7%	6/8	75.0%	1	3.3%
Rainbow Valley	23/30	76.7%	6/7	85.7%	2	6.7%
West Valley	26/30	86.7%	5/6	83.3%	3	10.0%
Northwest Valley	22/30	73.3%	3/5	60.0%	4	13.3%
Upper Centennial	24/30	80.0%	5/8	62.5%	1	3.3%
Wickenburg	16/30	53.3%	4/5	80.0%	2	6.7%
New River/Cave Creek	19/30	63.3%	5/5	100%	3	10.0%
Sycamore Creek	21/30	70.0%	4/6	66.7%	4	13.3%
Phoenix North	24/30	80.0%	4/4	100%	4	13.3%
Phoenix South	24/30	80.0%	4/4	100%	2	6.7%
Scottsdale North	24/30	80.0%	5/5	100%	2	6.7%
Scottsdale South	25/30	83.3%	4/4	100%	3	10.0%
Southeast Valley	24/30	80.0%	6/6	100%	2	6.7%
Lower Salt River Lakes	23/30	76.7%	6/6	100%	1	3.3%
Superstition	22/30	73.3%	5/6	83.3%	3	10.0%
All Zones	364/480	75.8%	76/91	83.5%	41/480	8.5%

APPENDIX B: MSP MESSAGES - VERIFICATION TABLES

TABLE B-1: This table shows each of the individual MSP Statements issued during the 2014 Monsoon season including the detailed forecast rainfall information. The table is broken down by date and MSP Message. The columns from left to right are defined as follows:

Statement Details – Message information including date, time issued in local standard time, Forecast Zone, Message type, and issuing forecaster. Data is pulled directly from issued Message.

Forecast Rain – Rain information including forecast rainfall intensity and storm total precipitation where applicable. Data is pulled directly from issued Message. It is important to note that not all issued Messages contain forecast rainfall information (noted by an “N/A” in the table).

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
07/03/14	20:21	Rainbow Valley	1	Waters	Now-930pm	0.50/30min	-
07/03/14	20:48	West Valley	1	Waters	Now-930pm	0.50-0.75/30min	-
07/03/14	20:48	NW Valley	1	Waters	Now-930pm	0.50-0.75/30min	-
07/03/14	20:48	Upper Centennial	1	Waters	9pm-10pm	0.50-0.75/30min	-
07/03/14	20:48	Wickenburg	1	Waters	9pm-10pm	0.50-0.75/30min	-
07/03/14	20:48	NR/CC	1	Waters	Now-930pm	0.50-0.75/30min	-
07/03/14	20:48	Phoenix South	1	Waters	Now-930pm	0.50-0.75/30min	-
07/03/14	20:48	Scottsdale North	1	Waters	Now-930pm	0.50-0.75/30min	-
07/05/14	18:12	Sycamore Creek	1	Henz	Now-715pm	0.60/20-30min	-
07/05/14	19:00	Sycamore Creek	1U	Henz	Extd until 8pm	-	-
07/05/14	19:08	Sycamore Creek	3	Henz	Now-10pm	-	-
07/05/14	19:31	Sycamore Creek	3U	Henz	Now-10pm	-	-
07/05/14	20:10	Scottsdale North	1	Henz	Now-915pm	0.50-0.75/20-30min	-
07/06/14	14:17	Wickenburg	1	Henz	Now-345pm	0.75-1.00/30min	1.50
07/06/14	14:58	Upper Centennial	1	Henz	Now-415pm	0.75/30min	1.25
07/06/14	15:11	Wickenburg	1U	Henz	Extd until 430pm	-	-
07/06/14	16:26	Palo Verde	1	Henz	Now-545pm	0.75-1.00/30min	1.50

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
07/08/14	18:15	West Valley	1	Waters	Now-7pm	0.75/30min	1.25
07/08/14	18:15	NW Valley	1	Waters	Now-7pm	0.75/30min	1.25
07/08/14	19:01	Palo Verde	1	Henz	Now-830pm	0.75/30min	1.50
07/08/14	19:10	West Valley	1U	Henz	Extd until 830pm	-	-
07/08/14	20:27	Gila Bend	1	Henz	Now-10pm	0.75/30min	1.25-1.75
07/08/14	22:48	Scottsdale North	1	Henz	Now-12am	0.50-0.75/30min	-
07/08/14	23:11	Scottsdale North	1U	Henz	Now-1am	-	-
07/09/14	17:01	Wickenburg	1	Waters	Now-6pm	-	-
07/13/14	15:47	Scottsdale North	1	Henz	Now-5pm	0.50/20-30min	-
07/13/14	16:13	SE Valley	1	Henz	Now-545pm	0.50-0.75/20-30min	-
07/13/14	16:21	NR/CC	1	Henz	Now-545pm	0.50-0.75/20-30min	-
07/13/14	16:51	SE Valley	1U	Henz	Now-545pm	-	-
07/13/14	17:11	Phoenix South	1	Henz	Now-645pm	0.50-0.75/30min	-
07/13/14	17:55	Phoenix South	4	Henz	Cancel	-	-
07/13/14	22:51	West Valley	1	Henz	Now-1145pm	0.50-0.75/30min	-
07/13/14	23:48	Palo Verde	1	Henz	Now-1245am	0.50-0.75/30min	-
07/13/14	23:48	Rainbow Valley	1	Henz	Now-1245am	0.50-0.75/30min	-
07/14/14	0:32	NW Valley	1	Henz	Now-130am	0.50-0.75/30min	-
07/14/14	17:00	Rainbow Valley	1	Henz	Now-630pm	0.60-0.80/30min	1.25
07/14/14	17:08	Phoenix South	1	Henz	Now-630pm	0.75-1.00/30min	-
07/14/14	17:48	NR/CC	1	Henz	Now-7pm	0.75-1.00/30min	1.50
07/14/14	17:48	Scottsdale North	1	Henz	Now-7pm	0.75-1.00/30min	1.50
07/14/14	18:01	Phoenix South	1U	Henz	Extd until 730pm	-	-
07/14/14	18:30	Phoenix North	1	Henz	Now-8pm	0.75-1.00/30min	1.50
07/14/14	18:30	Scottsdale South	1	Henz	Now-8pm	0.75-1.00/30min	1.50
07/14/14	18:35	NR/CC	1U	Henz	Extd until 8pm	-	-
07/14/14	19:07	Phoenix North	1U	Henz	Now-8pm	-	-
07/14/14	19:14	Scottsdale South	1U	Henz	Extd until 930pm	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
07/15/14	9:12	NR/CC	1	Waters	Now-11am	-	-
07/15/14	14:10	NW Valley	1	Waters	Now-3pm	0.75-1.00/30min	1.50
07/15/14	14:23	LSRL	1	Henz	Now-345pm	0.75-1.00/30min	1.50
07/15/14	14:52	Scottsdale North	1	Henz	Now-415pm	0.75-1.00/30min	-
07/15/14	15:23	Scottsdale North	3	Henz	Now-5pm	-	-
07/15/14	15:32	Scottsdale South	1	Henz	Now-5pm	0.75-1.00/30min	-
07/23/14	19:01	Scottsdale North	1	Waters	Now-745pm	0.25-0.50/30min	-
07/25/14	15:56	Gila Bend	1	Waters	Now-6pm	1.25/60min	-
07/25/14	18:25	Superstition	1	Waters	Now-7pm	0.75/30min	-
07/25/14	18:50	SE Valley	1	Waters	Now-730pm	-	0.50-0.75
07/25/14	19:58	Upper Centennial	1	Waters	Now-9pm	0.50-0.75/30min	-
07/25/14	19:58	Wickenburg	1	Waters	Now-9pm	0.50-0.75/30min	-
07/25/14	21:28	Wickenburg	1	Waters	Now-11pm	-	-
07/25/14	22:22	Wickenburg	3	Waters	Now-12am	-	-
07/27/14	0:23	Wickenburg	1	Waters	Now-130am	-	-
07/27/14	0:23	Scottsdale South	1	Waters	Now-2am	-	-
07/27/14	10:14	Gila Bend	3	Waters	Now-12pm	-	-
07/27/14	13:06	Gila Bend	4	Waters	Cancel	-	-
07/31/14	20:51	NW Valley	1	Henz	Now-10pm		0.50-1.00
07/31/14	20:56	West Valley	1	Henz	Now-10pm	0.50/20-30min	-
07/31/14	21:55	West Valley	1U	Henz	Extd until 11pm	-	-
07/31/14	23:30	West Valley	3	Henz	Now-115am	-	-
07/31/14	23:40	Gila Bend	1	Henz	Now-115am	0.50-0.75	1.25
08/01/14	20:02	NR/CC	1	Waters	Now-830pm	-	-
08/01/14	21:25	Palo Verde	1	Waters	Now-1030pm	-	0.50-0.75
08/01/14	21:25	Rainbow Valley	1	Waters	Now-1030pm	-	0.50-0.75
08/01/14	21:25	West Valley	1	Waters	Now-1030pm	-	0.50-0.75
08/01/14	21:25	Phoenix South	1	Waters	Now-10pm	-	0.50-0.75

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/01/14	21:25	Scottsdale South	1	Waters	Now-10pm	-	0.50-0.75
08/02/14	12:04	Palo Verde	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	Rainbow Valley	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	West Valley	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	NW Valley	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	Upper Centennial	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	Wickenburg	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	NR/CC	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	Sycamore Creek	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	Phoenix North	2	Henz	12pm-12am 8/3	-	-
08/02/14	12:04	Phoenix South	2	Henz	12pm-12am 8/3	-	-
08/02/14	15:27	NR/CC	1	Henz	Now-445pm	0.50-0.80/20-30min	-
08/02/14	15:27	Scottsdale North	1	Henz	Now-445pm	0.50-0.80/20-30min	-
08/02/14	16:04	Scottsdale North	1U	Henz	Now-445pm	-	-
08/02/14	16:32	Phoenix North	1	Henz	Now-6pm	0.50-0.80/20-30min	-
08/02/14	16:44	Scottsdale North	3	Henz	Now-630pm	-	-
08/02/14	16:46	Wickenburg	1	Henz	Now-630pm	0.75-1.00/30min	1.50
08/02/14	17:00	Phoenix North	1U	Henz	Now-6pm	0.75-1.00/30min	1.50
08/02/14	17:16	Wickenburg	3	Henz	Now-7pm	-	-
08/02/14	17:23	Phoenix North	3	Henz	Now-730pm	-	-
08/02/14	17:37	NW Valley	3	Henz	Now-730pm	0.75-1.00/30min	1.50
08/02/14	18:21	Scottsdale North	3U	Henz	Extnd until 8pm	-	-
08/03/14	16:20	West Valley	1	Henz	Now-515pm	0.40-0.70/20-30min	-
08/03/14	16:55	Wickenburg	1	Henz	Now-615pm	0.40-0.70/20-30min	-
08/03/14	16:59	Upper Centennial	1	Henz	Now-630pm	0.40-0.70/20-30min	-
08/03/14	17:34	Wickenburg	3	Henz	Now-7pm	-	-
08/03/14	18:20	Scottsdale North	1	Henz	Now-730pm	-	0.50-1.00
08/03/14	18:20	Scottsdale South	1	Henz	Now-730pm	-	0.50-1.00

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/11/14	15:10	Scottsdale North	1	Henz	Now-445pm	0.50-0.75/20-30min	-
08/11/14	15:54	Scottsdale North	1U	Henz	Now-445pm	-	-
08/11/14	18:16	Palo Verde	1	Henz	Now-730pm	0.50-0.75/20-30min	-
08/11/14	20:28	NR/CC	1	Henz	Now-10pm	0.60-0.80/20-30min	1.25
08/12/14	11:41	NW Valley	2	Henz	2pm-8am 8/13	-	-
08/12/14	11:41	Upper Centennial	2	Henz	2pm-8am 8/13	-	-
08/12/14	11:41	Wickenburg	2	Henz	2pm-8am 8/13	-	-
08/12/14	11:41	NR/CC	2	Henz	2pm-8am 8/13	-	-
08/12/14	11:41	Sycamore Creek	2	Henz	2pm-8am 8/13	-	-
08/12/14	11:41	Phoenix North	2	Henz	2pm-8am 8/13	-	-
08/12/14	11:41	Scottsdale North	2	Henz	2pm-8am 8/13	-	-
08/12/14	15:56	SE Valley	1	Henz	Now-530pm	0.75-1.00/20-30min	1.50
08/12/14	16:28	SE Valley	1U	Henz	Now-530pm	-	-
08/12/14	16:49	Phoenix South	2	Henz	Now-8am 8/13	-	-
08/12/14	16:49	Scottsdale South	2	Henz	Now-8am 8/13	-	-
08/12/14	16:49	SE Valley	2	Henz	Now-8am 8/13	-	-
08/12/14	16:49	LSRL	2	Henz	Now-8am 8/13	-	-
08/12/14	16:49	Superstition	2	Henz	Now-8am 8/13	-	-
08/12/14	16:58	Superstition	1	Henz	Now-630pm	1.00-1.50/30	2.00
08/12/14	17:09	Scottsdale South	1	Henz	Now-630pm	0.50-0.75/20-30min	-
08/12/14	17:14	Phoenix South	1	Henz	Now-645pm	1.00-1.25/20-30min	-
08/12/14	17:50	SE Valley	1U	Henz	Extd until 7pm	-	-
08/12/14	17:56	Phoenix North	1	Henz	Now-730pm	0.60-0.90/20-30min	-
08/12/14	17:59	Phoenix South	3	Henz	Now-8pm	-	-
08/12/14	18:03	NR/CC	1	Henz	Now-730pm	-	1.00-1.50
08/12/14	18:17	NR/CC	3	Henz	Now-830pm	-	-
08/12/14	18:27	West Valley	1	Henz	Now-8pm	0.75-1.00/20-30min	-
08/12/14	18:34	NR/CC	3U	Henz	Now-830pm	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/12/14	20:02	Wickenburg	3	Henz	Now-10pm	-	-
08/13/14	5:43	SE Valley	1	Henz	Now-7am	0.50-0.75/20-30min	-
08/13/14	6:05	SE Valley	1U	Henz	Now-7am	-	-
08/13/14	6:29	Superstition	1	Henz	Now-8am	0.50-0.75/20-30min	-
08/13/14	6:52	Gila Bend	1	Henz	Now-830am	-	-
08/17/14	17:35	Sycamore Creek	1	Henz	Now-615pm	-	-
08/17/14	17:47	Scottsdale North	1	Waters	6pm-630pm	-	0.50-0.75
08/17/14	17:47	Scottsdale South	1	Waters	620pm-7pm	-	0.50-0.75
08/17/14	18:30	SE Valley	1	Waters	630pm-715pm	0.50-0.75/20-40min	-
08/17/14	18:30	Superstition	1	Waters	630pm-715pm	0.50-0.75/20-40min	-
08/17/14	19:01	NR/CC	1	Waters	7pm-745pm	0.75/30min	-
08/17/14	19:01	Phoenix North	1	Waters	7pm-745pm	0.75/30min	-
08/17/14	19:27	NW Valley	1	Waters	730pm-830pm	0.75/30min	-
08/17/14	20:02	Gila Bend	1	Waters	830pm-915pm	0.50-0.75/30min	-
08/17/14	20:02	Rainbow Valley	1	Waters	Now-845pm	0.50-0.75/30min	-
08/17/14	20:13	NW Valley	3	Waters	Now-9pm	-	-
08/17/14	20:48	Palo Verde	1	Waters	9pm-10pm	0.75/30min	-
08/17/14	20:48	Upper Centennial	1	Waters	9pm-10pm	0.75/30min	-
08/17/14	20:48	Wickenburg	1	Waters	Now-930pm	0.75/30min	-
08/17/14	21:03	NW Valley	4	Waters	Now	-	-
08/19/14	5:24	Wickenburg	3	Waters	7am-7pm	-	-
08/19/14	5:50	West Valley	1	Waters	6am-7am	0.75-1.00/60min	-
08/19/14	5:50	NW Valley	1	Waters	Now-7am	0.75-1.00/60min	-
08/19/14	5:50	NR/CC	1	Waters	Now-7am	0.75-1.00/60min	-
08/19/14	5:50	Phoenix North	1	Waters	630am-730am	0.75-1.00/60min	-
08/19/14	5:50	Phoenix South	1	Waters	6am-7am	0.75-1.00/60min	-
08/19/14	5:50	SE Valley	1	Waters	6am-7am	0.75-1.00/60min	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/19/14	6:59	NR/CC	3	Waters	7am-10am	-	-
08/19/14	6:59	Phoenix North	3	Waters	7am-10am	-	-
08/19/14	6:59	Scottsdale North	3	Waters	7am-10am	-	-
08/19/14	6:59	Scottsdale South	3	Waters	7am-10am	-	-
08/19/14	7:18	Sycamore Creek	1	Waters	730am-10am	1.00-2.00/60min	-
08/19/14	9:04	Sycamore Creek	3	Henz	Now-12pm	-	-
08/19/14	9:43	NW Valley	3	Henz	Now-3pm	-	-
08/19/14	9:49	NR/CC	3U	Henz	Extd until 3pm	-	-
08/19/14	10:02	Phoenix North	3U	Henz	Extd until 3pm	-	-
08/19/14	10:13	Wickenburg	3U	Henz	7am-7pm	-	-
08/19/14	11:19	Scottsdale North	3U	Henz	Extd until 3pm	-	-
08/19/14	11:30	Phoenix South	1	Henz	Now-130pm	-	1.00-1.50
08/19/14	12:05	Phoenix South	3	Henz	Now-3pm	-	-
08/19/14	12:12	Scottsdale South	3	Henz	Now-3pm	-	1.00-1.50
08/19/14	12:36	SE Valley	3	Henz	Now-3pm	-	1.00-1.50
08/19/14	13:01	Wickenburg	3U	Henz	7am-7pm	-	-
08/19/14	13:10	Superstition	3	Henz	Now-3pm	-	1.00-1.50
08/19/14	14:37	NW Valley	3U	Henz	Extd until 9pm	-	-
08/19/14	14:37	Wickenburg	3U	Henz	Extd until 9pm	-	-
08/19/14	14:37	NR/CC	3U	Henz	Extd until 9pm	-	-
08/19/14	14:37	Phoenix North	3U	Henz	Extd until 9pm	-	-
08/19/14	14:37	Scottsdale North	3U	Henz	Extd until 6pm	-	-
08/19/14	14:37	Scottsdale South	3U	Henz	Extd until 6pm	-	-
08/19/14	19:04	West Valley	1	Henz	Now-8pm	0.50-0.75/20-30min	-
08/19/14	19:04	Phoenix South	1	Henz	715pm-830pm	0.50-0.75/20-30min	-
08/21/14	12:31	Upper Centennial	2	Waters	2pm-12am 8/22	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/21/14	12:31	Wickenburg	2	Waters	2pm-12am 8/22	-	-
08/21/14	18:22	Gila Bend	1	Waters	630pm-830pm	1.00/60min	-
08/21/14	18:22	Palo Verde	1	Waters	630pm-830pm	1.00/60min	-
08/21/14	19:15	Rainbow Valley	1	Waters	Now-830pm	-	-
08/21/14	19:15	West Valley	1	Waters	730pm-830pm	-	-
08/21/14	20:00	NW Valley	1	Waters	Now-845pm	-	-
08/21/14	20:00	Phoenix North	1	Waters	815pm-915pm	-	-
08/21/14	20:00	Phoenix South	1	Waters	Now-845pm	-	-
08/21/14	20:31	Scottsdale North	1	Waters	845pm-930pm	0.50/20min	-
08/21/14	20:31	Scottsdale South	1	Waters	Now-915pm	0.50/20min	-
08/21/14	20:37	Wickenburg	1	Waters	Now-9pm	-	0.50
08/25/14	17:21	Upper Centennial	1	Henz	Now-7pm	0.75-1.00/20-30min	-
08/25/14	18:31	Wickenburg	1	Henz	Now-8pm	0.60-0.90/20-30min	-
08/25/14	18:55	Wickenburg	1U	Henz	Now-8pm	-	-
08/25/14	20:07	Wickenburg	1U	Henz	Extd until 930pm	-	-
08/25/14	20:11	Palo Verde	1	Henz	Now-930pm	0.50-0.75/20-30min	1.25
08/25/14	21:28	Rainbow Valley	1	Henz	Now-11pm	0.75-1.00/20-30min	-
08/25/14	21:28	West Valley	1	Henz	Now-11pm	0.75-1.00/20-30min	-
08/26/14	11:35	Wickenburg	2	Henz	12pm-8pm	-	-
08/26/14	14:34	Wickenburg	1	Henz	Now-4pm	0.50-0.75/20-30min	-
08/26/14	15:23	Wickenburg	4	Henz	Now	-	-
09/04/14	16:12	Gila Bend	1	Waters	Now-530pm	-	-
09/04/14	17:58	West Valley	1	Waters	Now-645pm	0.75/30min	-
09/06/14	18:37	Phoenix South	1	Henz	Now-8pm	0.40-0.70/20-30min	1.00-1.50
09/06/14	18:37	SE Valley	1	Henz	Now-8pm	0.40-0.70/20-30min	1.00-1.50
09/08/14	1:01	West Valley	2	Henz	Now-12am 9/9	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
09/08/14	1:01	NW Valley	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Upper Centennial	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Wickenburg	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	NR/CC	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Sycamore Creek	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Phoenix North	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Phoenix South	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Scottsdale North	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Scottsdale South	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	SE Valley	2	Henz	Now-12am 9/9	-	-
09/08/14	1:01	Superstition	2	Henz	Now-12am 9/9	-	-
09/08/14	1:23	Upper Centennial	1	Henz	Now-3am	-	0.75-1.25
09/08/14	1:28	SE Valley	1	Henz	Now-3am	-	1.00-1.50
09/08/14	1:28	Superstition	1	Henz	Now-3am	-	1.00-1.50
09/08/14	2:13	Phoenix South	1	Henz	Now-345am	-	1.00-1.50
09/08/14	2:18	SE Valley	3	Henz	Now-4am	-	-
09/08/14	2:28	Scottsdale North	1	Henz	Now-4am	1.00-1.50/60min	1.00-1.50
09/08/14	2:28	Scottsdale South	1	Henz	Now-4am	1.00-1.50/60min	1.00-1.50
09/08/14	2:35	West Valley	1	Henz	Now-4am	-	1.00-1.50
09/08/14	2:41	Phoenix South	3	Henz	Now-430am	-	-
09/08/14	2:45	Scottsdale South	3	Henz	Now-430am	-	-
09/08/14	2:56	Scottsdale North	3	Henz	Now-5am	-	-
09/08/14	3:03	Phoenix North	3	Henz	Now-530am	-	-
09/08/14	3:11	NR/CC	1	Henz	Now-430am	-	1.50-2.50
09/08/14	3:16	NW Valley	1	Henz	Now-5am	-	1.00-1.50
09/08/14	3:55	NW Valley	3	Henz	Now-6am	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
09/08/14	4:06	SE Valley	3U	Henz	Extd until 8am	-	-
09/08/14	4:13	Phoenix South	3U	Henz	Now-430am	-	-
09/08/14	4:21	Scottsdale South	3U	Henz	Extd until 8am	-	-
09/08/14	4:28	Scottsdale North	3U	Henz	Extd until 8am	-	-
09/08/14	4:46	Rainbow Valley	3	Henz	Now-8am	-	-
09/08/14	4:46	West Valley	3	Henz	Now-8am	-	-
09/08/14	5:05	Phoenix North	3U	Henz	Extd until 8am	-	-
09/08/14	5:08	NW Valley	3U	Henz	Extd until 8am	-	-
09/08/14	5:20	Superstition	3	Henz	Now-8am	-	-
09/08/14	5:51	NR/CC	3U	Henz	Extd until 8am	-	-
09/08/14	6:07	Wickenburg	1	Henz	Now-8am	-	-
09/08/14	7:51	Rainbow Valley	3U	Henz	Now-12pm	-	-
09/08/14	7:51	West Valley	3U	Henz	Now-12pm	-	-
09/08/14	7:51	NW Valley	3U	Henz	Now-12pm	-	-
09/08/14	7:51	NR/CC	3U	Henz	Now-12pm	-	-
09/08/14	7:51	Phoenix North	3U	Henz	Now-12pm	-	-
09/08/14	7:51	Phoenix South	3U	Henz	Now-12pm	-	-
09/08/14	7:51	Scottsdale North	3U	Henz	Now-12pm	-	-
09/08/14	7:51	Scottsdale South	3U	Henz	Now-12pm	-	-
09/08/14	7:51	SE Valley	3U	Henz	Now-12pm	-	-
09/08/14	7:51	Superstition	3U	Henz	Now-12pm	-	-
09/08/14	21:45	Upper Centennial	1	Henz	Now-11pm	-	0.75-1.00
09/08/14	22:36	Wickenburg	1	Henz	Now-12am	0.75-1.00/20-30min	-
09/08/14	22:56	NW Valley	1	Henz	Now-12am	0.60-0.80/20-30min	-
09/08/14	23:59	Wickenburg	1U	Henz	Now-1am	-	-
09/09/14	12:43	Palo Verde	2	Henz	Now-10pm	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
09/09/14	12:43	Rainbow Valley	2	Henz	Now-10pm	-	-
09/09/14	12:43	West Valley	2	Henz	Now-10pm	-	-
09/09/14	12:43	NW Valley	2	Henz	Now-10pm	-	-
09/09/14	12:43	Upper Centennial	2	Henz	Now-10pm	-	-
09/09/14	12:43	Wickenburg	2	Henz	Now-10pm	-	-
09/09/14	13:37	Palo Verde	1	Henz	Now-3pm	0.50-0.75/20-30min	1.00
09/09/14	13:51	West Valley	1	Henz	Now-315pm	0.50-0.75/20-30min	1.00-1.50
09/09/14	14:22	West Valley	3	Henz	Now-4pm	-	-
09/09/14	16:08	SE Valley	1	Henz	Now-515pm	0.50-0.75/20-30min	1.00-1.50
09/09/14	17:17	Superstition	1	Henz	Now-615pm	-	0.75-1.00
09/17/14	17:00	Gila Bend	2	Henz	12am 9/17-5pm 9/18	-	-
09/17/14	17:00	Palo Verde	2	Henz	12am 9/17-5pm 9/18	-	-
09/17/14	17:00	Rainbow Valley	2	Henz	12am 9/17-5pm 9/18	-	-
09/17/14	17:00	Phoenix South	2	Henz	12am 9/17-5pm 9/18	-	-
09/17/14	17:00	SE Valley	2	Henz	12am 9/17-5pm 9/18	-	-
09/17/14	17:00	LSRL	2	Henz	12am 9/17-5pm 9/18	-	-
09/17/14	17:00	Superstition	2	Henz	12am 9/17-5pm 9/18	-	-
09/17/14	11:48	SE Valley	1	Henz	Now-130pm	-	1.00-1.50
09/17/14	12:21	SE Valley	3	Henz	Now-230pm	-	-
09/17/14	12:34	Phoenix South	1	Henz	Now-230pm	-	1.00-1.50
09/18/14	7:11	Gila Bend	4	Henz	Now	-	-
09/18/14	7:11	Palo Verde	4	Henz	Now	-	-
09/18/14	7:11	Rainbow Valley	4	Henz	Now	-	-
09/18/14	7:11	Phoenix South	4	Henz	Now	-	-
09/18/14	7:11	SE Valley	4	Henz	Now	-	-
09/18/14	7:11	LSRL	4	Henz	Now	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
09/18/14	7:11	Superstition	4	Henz	Now	-	-
09/26/14	13:33	NW Valley	2	Waters	4pm-9pm 9/27	-	-
09/26/14	13:33	NR/CC	2	Waters	4pm-9pm 9/27	-	-
09/26/14	13:33	Sycamore Creek	2	Waters	4pm-9pm 9/27	-	-
09/26/14	13:33	Phoenix North	2	Waters	4pm-9pm 9/27	-	-
09/26/14	13:33	Scottsdale North	2	Waters	4pm-9pm 9/27	-	-
09/26/14	14:47	Gila Bend	1	Waters	Now-330pm	-	1.00-1.50
09/26/14	14:47	Rainbow Valley	1	Waters	3pm-4pm	-	1.00-1.50
09/27/14	11:52	West Valley	1	Henz	Now-1245pm	0.40-0.75/20-30min	1.00-1.50
09/27/14	12:47	Palo Verde	1	Henz	Now-2pm	0.50-0.75/20-30min	1.00-1.50
09/27/14	12:58	West Valley	1	Henz	Now-215pm	0.50-0.75/15-30min	1.00-1.50
09/27/14	13:26	Rainbow Valley	1	Henz	Now-3pm	0.50-0.75/15-30min	1.25-1.75
09/27/14	13:37	West Valley	1U	Henz	Extd until 3pm	-	-
09/27/14	13:47	Phoenix North	1	Henz	Now-330pm	0.50-0.75/15-30min	1.00-1.50
09/27/14	13:47	Phoenix South	1	Henz	Now-330pm	0.50-0.75/15-30min	1.00-1.50
09/27/14	14:02	Wickenburg	1	Henz	Now-330pm	0.50-0.85/20-30min	-
09/27/14	14:16	Scottsdale North	1	Henz	Now-330pm	0.50-0.75/15-30min	1.25-1.50
09/27/14	14:16	Scottsdale South	1	Henz	Now-330pm	0.50-0.75/15-30min	1.25-1.50
09/27/14	14:16	SE Valley	1	Henz	Now-330pm	0.50-0.75/15-30min	1.25-1.50
09/27/14	14:24	Gila Bend	1	Henz	Now-4pm	0.50-0.75/15-30min	1.25-1.50
09/27/14	14:29	Wickenburg	3	Henz	Now-5pm	-	-
09/27/14	14:50	NR/CC	1	Henz	Now-430pm	0.50-0.75/15-30min	1.25-1.50
09/27/14	14:55	Scottsdale South	1U	Henz	Now-5pm	-	-
09/27/14	15:02	Superstition	1	Henz	Now-5pm	0.50-0.75/15-30min	1.25-1.50
09/27/14	15:21	Scottsdale North	1U	Henz	Now-5pm	-	-
09/27/14	15:34	SE Valley	3	Henz	Now-6pm	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2014							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
09/27/14	16:09	Superstition	3	Henz	Now-630pm	-	-
09/27/14	16:59	Sycamore Creek	1	Henz	Now-7pm	0.50-0.75/20-30min	1.25

TABLE B-2: This table shows the raw verification data of MSP issued Messages for the 2014 Monsoon Season. The valid period for rainfall for each Message can be found in Table B-1. The table is broken down by date and MSP Message. The columns from left to right are defined as follows:

Statement Details – Statement information including date, Forecast Zone, and Message type.

Forecast Rain – Rain information including forecast rainfall intensity and forecast storm total precipitation where applicable. It is important to note that not all issued statements contain forecast rainfall information (noted by an “n/a” in the table).

Rain Observations – Observed rainfall amounts within the forecast zone including ALERT rain gages, gage adjusted radar rainfall totals, and local storm reports submitted to NWS Phoenix WFO.

Alarms – Triggered alarms on ALERT gage sensors. These alarms are broken down by alarm type including rain, stream, and dam.

Verification – The verification was broken down by rain and by alarm. Hits and misses were assigned based on thresholds previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

TABLE B-2: MSP Statements Issued - Monsoon Season 2014											
Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
07/03/14	Rainbow Valley	1	0.50/30min	-	0.31	0.44-0.63	0.11	-	-	-	Miss
07/03/14	West Valley	1	0.50-0.75/30min	-	0.83	2.41-2.60	1.51	X	X	-	Hit
07/03/14	NW Valley	1	0.50-0.75/30min	-	1.14	2.41-2.60	2.10	-	X	-	Hit
07/03/14	Upper Centennial	1	0.50-0.75/30min	-	0.98	1.82-2.02	-	-	-	-	Hit
07/03/14	Wickenburg	1	0.50-0.75/30min	-	1.06	1.03-1.22	-	X	X	-	Hit
07/03/14	NR/CC	1	0.50-0.75/30min	-	0.43	1.03-1.22	0.28	-	-	-	Hit
07/03/14	Phoenix South	1	0.50-0.75/30min	-	0.47	0.64-0.83	0.50	-	-	-	Hit
07/03/14	Scottsdale North	1	0.50-0.75/30min	-	0.12	0.24-0.43	0.20	-	-	-	Miss
07/05/14	Sycamore Creek	1	0.60/20-30min	-	1.42-1.73	2.21-2.40	-	X	X	-	Hit
07/05/14	Sycamore Creek	3	-	-	1.42-1.73	2.21-2.40	-	X	X	-	Hit
07/05/14	Scottsdale North	1	0.50-0.75/20-30min	-	0.00	0.25-0.43	-	-	-	-	Miss
07/06/14	Wickenburg	1	0.75-1.00/30min	1.50	1.06-1.57	1.23-1.61	-	X	X	X	Hit
07/06/14	Upper Centennial	1	0.75/30min	1.25	0.59	1.82-2.01	-	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
07/06/14	Palo Verde	1	0.75-1.00/30min	1.50	0.12	0.84-1.02	-	-	-	-	Hit
07/08/14	West Valley	1	0.75/30min	1.25	0.47	1.23-1.61	0.82	-	-	-	Hit
07/08/14	NW Valley	1	0.75/30min	1.25	0.28	1.23-1.61	-	-	-	-	Hit
07/08/14	Palo Verde	1	0.75/30min	1.50	0.67	1.62-1.81	-	X	X	-	Hit
07/08/14	Gila Bend	1	0.75/30min	1.25-1.75	0.00	0.44-0.63	-	-	-	-	Miss
07/08/14	Scottsdale North	1	0.50-0.75/30min	-	0.63-1.22	0.84-1.02	0.67	-	-	-	Hit
07/09/14	Wickenburg	1	-	-	0.55	0.44-0.63	-	-	-	-	Miss
07/13/14	Scottsdale North	1	0.50/20-30min	-	0.12	0.44-0.63	-	-	-	-	Hit
07/13/14	SE Valley	1	0.50-0.75/20-30min	-	0.63-0.83	1.03-1.22	1.50	-	-	-	Hit
07/13/14	NR/CC	1	0.50-0.75/20-30min	-	0.55	0.64-0.83	0.46	-	-	-	Hit
07/13/14	Phoenix South	1	0.50-0.75/30min	-	0.28	0.25-0.43	-	-	-	-	Miss
07/13/14	West Valley	1	0.50-0.75/30min	-	0.87	0.84-1.02	0.48	-	-	-	Hit
07/13/14	Palo Verde	1	0.50-0.75/30min	-	1.38	0.84-1.02	-	X	X	-	Hit
07/13/14	Rainbow Valley	1	0.50-0.75/30min	-	0.63	0.84-1.02	-	X	-	-	Hit
07/14/14	NW Valley	1	0.50-0.75/30min	-	0.79	0.84-1.02	-	X	-	-	Hit
07/14/14	Rainbow Valley	1	0.60-0.80/30min	1.25	1.38	0.64-0.83	-	-	-	-	Hit
07/14/14	Phoenix South	1	0.75-1.00/30min	-	0.55	1.03-1.22	1.25	-	-	X	Hit
07/14/14	NR/CC	1	0.75-1.00/30min	1.50	0.87	1.62-1.81	0.45	X	-	-	Hit
07/14/14	Scottsdale North	1	0.75-1.00/30min	1.50	1.57	0.25-0.43	-	X	-	-	Hit
07/14/14	Phoenix North	1	0.75-1.00/30min	1.50	0.79-1.18	1.23-1.61	0.90	-	-	-	Hit
07/14/14	Scottsdale South	1	0.75-1.00/30min	1.50	0.55	0.84-1.02	1.25	-	-	-	Hit
07/15/14	NR/CC	1	-	-	1.46	1.03-1.22	0.39	X	-	-	Hit
07/15/14	NW Valley	1	0.75-1.00/30min	1.50	0.00	0.44-0.63	-	-	-	-	Miss
07/15/14	LSRL	1	0.75-1.00/30min	1.50	0.94	1.03-1.22	-	-	-	-	Hit
07/15/14	Scottsdale North	1	0.75-1.00/30min	-	0.83-1.06	1.03-1.22	1.50	X	-	-	Hit
07/15/14	Scottsdale North	3	-	-	0.83-1.06	1.03-1.22	-	X	-	-	Hit
07/15/14	Scottsdale South	1	0.75-1.00/30min	-	0.91	0.84-1.02	1.50	X	-	-	Hit
07/23/14	Scottsdale North	1	0.25-0.50/30min	-	0.28	0.44-0.63	0.76	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
07/25/14	Gila Bend	1	1.25/60min	-	1.46	2.61-2.80	-	-	-	-	Hit
07/25/14	Superstition	1	0.75/30min	-	0.51	1.03-1.22	0.50	-	-	-	Hit
07/25/14	SE Valley	1	-	0.50-0.75	0.20	0.25-0.43	-	-	-	-	Miss
07/25/14	Upper Centennial	1	0.50-0.75/30min	-	1.18	2.41-2.60	-	-	-	-	Hit
07/25/14	Wickenburg	1	0.50-0.75/30min	-	0.75	1.62-1.81	-	X	-	-	Hit
07/25/14	Wickenburg	1	-	-	1.10	1.62-1.81	-	-	-	-	Hit
07/25/14	Wickenburg	3	-	-	1.10	1.62-1.81	-	X	X	-	Hit
07/27/14	Wickenburg	1	-	-	0.63	0.04-0.24	-	X	-	-	Hit
07/27/14	Scottsdale South	1	-	-	0.24	0.00	-	-	X	-	Hit
07/27/14	Gila Bend	3	-	-	-	-	-	-	X	-	Miss
07/31/14	NW Valley	1	-	0.50-1.00	0.24-0.39	2.02-2.20	-	-	X	-	Hit
07/31/14	West Valley	1	0.50/20-30min	-	1.30-1.42	2.61-2.80	-	-	-	-	Hit
07/31/14	Gila Bend	1	0.50-0.75	1.25	0.24	1.03-1.22	-	-	-	-	Hit
08/01/14	NR/CC	1	-	-	0.98	1.03-1.22	1.00	X	-	-	Hit
08/01/14	Palo Verde	1	-	0.50-0.75	0.63	0.44-0.63	-	X	-	-	Hit
08/01/14	Rainbow Valley	1	-	0.50-0.75	0.16	0.04-0.24	0.46	-	-	-	Miss
08/01/14	West Valley	1	-	0.50-0.75	1.38	1.23-1.61	1.13	-	X	-	Hit
08/01/14	Phoenix South	1	-	0.50-0.75	1.73	1.23-1.61	-	-	X	-	Hit
08/01/14	Scottsdale South	1	-	0.50-0.75	0.12	0.04-0.24	0.30	-	-	-	Miss
08/02/14	Palo Verde	2	-	-	-	-	-	-	-	-	Miss
08/02/14	Rainbow Valley	2	-	-	-	-	-	-	-	-	Miss
08/02/14	West Valley	2	-	-	-	-	-	-	-	-	Miss
08/02/14	NW Valley	2	-	-	-	-	-	-	-	-	Hit
08/02/14	Upper Centennial	2	-	-	-	-	-	-	-	-	Miss
08/02/14	Wickenburg	2	-	-	-	-	-	-	-	-	Hit
08/02/14	NR/CC	2	-	-	-	-	-	-	-	-	Hit
08/02/14	Sycamore Creek	2	-	-	-	-	-	-	-	-	Miss
08/02/14	Phoenix North	2	-	-	-	-	-	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/02/14	Phoenix South	2	-	-	-	-	-	-	-	-	Miss
08/02/14	NR/CC	1	0.50-0.80/20-30min	-	0.98	1.23-1.61	1.55	-	-	-	Hit
08/02/14	Scottsdale North	1	0.50-0.80/20-30min	-	1.22	1.03-1.22	1.55	X	-	-	Hit
08/02/14	Phoenix North	1	0.50-0.80/20-30min	-	1.38	1.03-1.22	1.30	-	X	X	Hit
08/02/14	Scottsdale North	3	-	-	1.22	-	-	X	-	-	Hit
08/02/14	Wickenburg	1	0.75-1.00/30min	1.50	0.83	0.84-1.02	-	-	X	-	Hit
08/02/14	Phoenix North	1U	0.75-1.00/30min	1.50	1.38	1.03-1.22	1.30	-	-	-	Hit
08/02/14	Wickenburg	3	-	-	0.83	0.84-1.02	-	-	X	-	Hit
08/02/14	Phoenix North	3	-	-	1.38	1.03-1.22	1.30	-	X	X	Hit
08/02/14	NW Valley	3	0.75-1.00/30min	1.50	0.67	0.25-0.43	0.80	-	-	-	Hit
08/03/14	West Valley	1	0.40-0.70/20-30min	-	0.59	0.64-0.83	-	-	-	-	Hit
08/03/14	Wickenburg	1	0.40-0.70/20-30min	-	1.10	0.64-0.83	-	X	X	-	Hit
08/03/14	Upper Centennial	1	0.40-0.70/20-30min	-	0.24	0.84-1.02	-	-	-	-	Hit
08/03/14	Wickenburg	3	-	-	1.10	0.64-0.83	-	X	X	-	Hit
08/03/14	Scottsdale North	1	-	0.50-1.00	0.12	0.04-0.24	0.50	-	-	-	Hit
08/03/14	Scottsdale South	1	-	0.50-1.00	0.43	0.25-0.43	0.40	-	X	-	Hit
08/11/14	Scottsdale North	1	0.50-0.75/20-30min	-	0.87	0.64-0.83	1.51	-	-	-	Hit
08/11/14	Palo Verde	1	0.50-0.75/20-30min	-	0.63	1.03-1.02	-	X	-	-	Hit
08/11/14	NR/CC	1	0.60-0.80/20-30min	1.25	0.55	1.03-1.22	1.05	-	-	-	Hit
08/12/14	NW Valley	2	-	-	-	-	-	-	-	-	Miss
08/12/14	Upper Centennial	2	-	-	-	-	-	-	-	-	Miss
08/12/14	Wickenburg	2	-	-	-	-	-	-	-	-	Hit
08/12/14	NR/CC	2	-	-	-	-	-	-	-	-	Hit
08/12/14	Sycamore Creek	2	-	-	-	-	-	-	-	-	Miss
08/12/14	Phoenix North	2	-	-	-	-	-	-	-	-	Hit
08/12/14	Scottsdale North	2	-	-	-	-	-	-	-	-	Miss
08/12/14	SE Valley	1	0.75-1.00/20-30min	1.50	1.46	1.62-1.81	1.38	X	-	-	Hit
08/12/14	Phoenix South	2	-	-	-	-	-	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/12/14	Scottsdale South	2	-	-	-	-	-	-	-	-	Hit
08/12/14	SE Valley	2	-	-	-	-	-	-	-	-	Hit
08/12/14	LSRL	2	-	-	-	-	-	-	-	-	Miss
08/12/14	Superstition	2	-	-	-	-	-	-	-	-	Hit
08/12/14	Superstition	1	1.00-1.50/30	2.00	1.34	1.62-1.81	1.10	-	-	-	Hit
08/12/14	Scottsdale South	1	0.50-0.75/20-30min	-	0.35	1.03-1.22	-	-	-	-	Hit
08/12/14	Phoenix South	1	1.00-1.25/20-30min	-	2.46	2.81+	3.55	X	X	X	Hit
08/12/14	Phoenix North	1	0.60-0.90/20-30min	-	0.71	1.62-1.81	1.65	X	X	-	Hit
08/12/14	Phoenix South	3	-	-	2.46	2.81+	3.55	X	X	X	Hit
08/12/14	NR/CC	1	-	1.00-1.50	1.42	2.81+	1.60	X	-	-	Hit
08/12/14	NR/CC	3	-	-	1.42	2.81+	1.60	X	-	-	Hit
08/12/14	West Valley	1	0.75-1.00/20-30min	-	0.71	1.23-1.61	0.57	-	X	-	Hit
08/12/14	Wickenburg	3	-	-	1.34	2.81+	1.55	X	X	X	Hit
08/13/14	SE Valley	1	0.50-0.75/20-30min	-	0.55	0.64-0.83	0.58	-	-	-	Hit
08/13/14	Superstition	1	0.50-0.75/20-30min	-	0.51	0.25-0.43	-	-	-	-	Hit
08/13/14	Gila Bend	1	-	-	0.16	1.03-1.22	-	-	X	-	Hit
08/17/14	Sycamore Creek	1	-	-	0.47	0.25-0.43	-	-	X	-	Hit
08/17/14	Scottsdale North	1	-	0.50-0.75	0.47	0.44-0.63	0.70	-	-	-	Hit
08/17/14	Scottsdale South	1	-	0.50-0.75	0.04	0.04-0.24	-	-	-	-	Miss
08/17/14	SE Valley	1	0.50-0.75/20-40min	-	0.35	0.44-0.63	0.73	-	X	-	Hit
08/17/14	Superstition	1	0.50-0.75/20-40min	-	0.39	1.23-1.61	0.80	-	-	-	Hit
08/17/14	NR/CC	1	0.75/30min	-	0.71	1.03-1.22	-	X	-	-	Hit
08/17/14	Phoenix North	1	0.75/30min	-	0.79	1.03-1.22	1.50	-	-	-	Hit
08/17/14	NW Valley	1	0.75/30min	-	0.43	2.02-2.20	1.02	-	-	-	Hit
08/17/14	Gila Bend	1	0.50-0.75/30min	-	0.20	0.44-0.63	-	-	-	-	Hit
08/17/14	Rainbow Valley	1	0.50-0.75/30min	-	0.55	1.23-1.61	0.62	-	X	-	Hit
08/17/14	NW Valley	3	-	-	0.43	2.02-2.20	1.02	-	-	-	Hit
08/17/14	Palo Verde	1	0.75/30min	-	0.55	1.23-1.61	-	X	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/17/14	Upper Centennial	1	0.75/30min	-	0.00	1.03-1.22	-	-	-	-	Hit
08/17/14	Wickenburg	1	0.75/30min	-	0.04	0.84-1.02	-	-	-	-	Hit
08/19/14	Wickenburg	3	-	-	-	-	-	-	X	-	Hit
08/19/14	West Valley	1	0.75-1.00/60min	-	1.06	1.03-1.22	0.70	-	-	-	Hit
08/19/14	NW Valley	1	0.75-1.00/60min	-	1.42	2.81+	1.68	X	-	-	Hit
08/19/14	NR/CC	1	0.75-1.00/60min	-	1.38	2.81+	3.05	X	X	-	Hit
08/19/14	Phoenix North	1	0.75-1.00/60min	-	1.26	2.02-2.20	2.80	X	X	X	Hit
08/19/14	Phoenix South	1	0.75-1.00/60min	-	0.67	1.62-1.81	1.56	-	X	-	Hit
08/19/14	Scottsdale North	1	0.75-1.00/60min	-	1.14	2.81+	4.65	X	-	-	Hit
08/19/14	Scottsdale South	1	0.75-1.00/60min	-	0.39	1.62-1.81	2.40	-	-	-	Miss
08/19/14	SE Valley	1	0.75-1.00/60min	-	0.24	1.03-1.22	0.99	-	-	-	Miss
08/19/14	NR/CC	3	-	-	2.36	2.81+	3.05	X	X	-	Hit
08/19/14	Phoenix North	3	-	-	0.20	2.02-2.20	2.80	X	X	X	Hit
08/19/14	Scottsdale North	3	-	-	1.54	2.81+	4.65	X	-	-	Hit
08/19/14	Scottsdale South	3	-	-	0.24	1.62-1.81	2.40	X	-	-	Hit
08/19/14	Sycamore Creek	1	1.00-2.00/60min	-	1.34	1.82-2.01	-	X	X	-	Hit
08/19/14	Sycamore Creek	3	-	-	0.63	1.82-2.01	-	X	X	-	Hit
08/19/14	NW Valley	3	-	-	1.93	2.81+	-	X	X	X	Hit
08/19/14	Phoenix South	1	-	1.00-1.50	0.79	1.62-1.81	1.56	-	X	-	Hit
08/19/14	Phoenix South	3	-	-	0.79	1.62-1.81	1.56	-	X	-	Hit
08/19/14	Scottsdale South	3	-	1.00-1.50	1.57	1.62-1.81	2.40	X	X	-	Hit
08/19/14	SE Valley	3	-	1.00-1.50	0.83	1.03-1.22	0.99	-	-	-	Hit
08/19/14	Superstition	3	-	1.00-1.50	0.94	1.23-1.61	-	-	-	-	Hit
08/19/14	West Valley	1	0.50-0.75/20-30min	-	0.94	1.03-1.22	0.70	-	X	-	Hit
08/19/14	Phoenix South	1	0.50-0.75/20-30min	-	0.47	1.62-1.81	1.56	-	X	-	Hit
08/20/14	Palo Verde	1	-	0.50-0.75	0.55	1.62-1.81	-	-	-	-	Hit
08/20/14	West Valley	1	-	0.50-0.75	0.20	0.44-0.63	0.70	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/21/14	Wickenburg	2	-	-	-	-	-	-	-	-	Hit
08/21/14	Gila Bend	1	1.00/60min	-	0.94	2.02-2.20	-	X	X	-	Hit
08/21/14	Palo Verde	1	1.00/60min	-	0.47	0.64-0.83	-	-	-	-	Miss
08/21/14	Rainbow Valley	1	-	-	0.67	1.23-1.61	0.60	X	X	-	Hit
08/21/14	West Valley	1	-	-	0.67	1.03-1.22	-	-	-	-	Miss
08/21/14	NW Valley	1	-	-	0.20	0.84-1.02	0.65	-	-	-	Miss
08/21/14	Phoenix North	1	-	-	0.04	0.04-0.24	-	-	-	-	Miss
08/21/14	Phoenix South	1	-	-	0.71	0.64-0.83	-	-	-	-	Miss
08/21/14	Scottsdale North	1	0.50/20min	-	0.04	0.25-0.43	-	-	-	-	Miss
08/21/14	Scottsdale South	1	0.50/20min	-	0.71	0.25-0.43	-	-	X	-	Hit
08/21/14	Wickenburg	1	-	0.50	0.75	0.44-0.63	-	-	-	-	Hit
08/25/14	Upper Centennial	1	0.75-1.00/20-30min	-	0.47	2.02-2.20	-	-	-	-	Hit
08/25/14	Wickenburg	1	0.60-0.90/20-30min	-	1.77	1.62-1.81	-	X	X	X	Hit
08/25/14	Palo Verde	1	0.50-0.75/20-30min	1.25	0.87	1.23-1.61	-	-	-	-	Hit
08/25/14	Rainbow Valley	1	0.75-1.00/20-30min	-	0.75	0.84-1.02	1.03	-	-	-	Hit
08/25/14	West Valley	1	0.75-1.00/20-30min	-	0.87	1.03-1.22	-	-	-	-	Hit
08/26/14	Wickenburg	2	-	-	-	-	-	-	-	-	Miss
08/26/14	Wickenburg	1	0.50-0.75/20-30min	-	0.04	0.25-0.43	-	-	-	-	Miss
09/04/14	Gila Bend	1	-	-	0.16	2.21-2.60	-	-	-	-	Miss
09/04/14	West Valley	1	0.75/30min	-	1.02	1.23-1.61	-	X	-	-	Hit
09/06/14	Phoenix South	1	0.40-0.70/20-30min	1.00-1.50	0.35	0.25-0.43	-	-	-	-	Miss
09/06/14	SE Valley	1	0.40-0.70/20-30min	1.00-1.50	0.35	0.44-0.63	-	-	-	-	Miss
09/06/14	Rainbow Valley	1	-	0.75-1.25	0.51	1.23-1.61	-	-	-	-	Hit
09/06/14	Phoenix North	1	0.40-0.70/20-30min	1.25	0.91	1.23-1.61	1.70	-	-	-	Hit
09/08/14	West Valley	2	-	-	-	-	-	-	-	-	Hit
09/08/14	NW Valley	2	-	-	-	-	-	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
09/08/14	NR/CC	2	-	-	-	-	-	-	-	-	Hit
09/08/14	Sycamore Creek	2	-	-	-	-	-	-	-	-	Miss
09/08/14	Phoenix North	2	-	-	-	-	-	-	-	-	Hit
09/08/14	Phoenix South	2	-	-	-	-	-	-	-	-	Hit
09/08/14	Scottsdale North	2	-	-	-	-	-	-	-	-	Hit
09/08/14	Scottsdale South	2	-	-	-	-	-	-	-	-	Hit
09/08/14	SE Valley	2	-	-	-	-	-	-	-	-	Hit
09/08/14	Superstition	2	-	-	-	-	-	-	-	-	Hit
09/08/14	Upper Centennial	1	-	0.75-1.25	0.75	2.21-2.40	-	-	-	-	Hit
09/08/14	SE Valley	1	-	1.00-1.50	2.24	2.21-2.40	6.00	X	-	-	Hit
09/08/14	Superstition	1	-	1.00-1.50	1.22	2.02-2.20	4.50	X	X	-	Hit
09/08/14	Phoenix South	1	-	1.00-1.50	2.48	2.81+	3.50	X	X	X	Hit
09/08/14	SE Valley	3	-	-	2.48	2.21-2.40	6.00	X	X	X	Hit
09/08/14	Scottsdale North	1	1.00-1.50/60min	1.00-1.50	1.50	2.81+	0.96	X	-	X	Hit
09/08/14	Scottsdale South	1	1.00-1.50/60min	1.00-1.50	2.44	2.81+	4.90	X	X	-	Hit
09/08/14	West Valley	1	-	1.00-1.50	2.01	2.81+	-	X	X	X	Hit
09/08/14	Phoenix South	3	-	-	2.87	2.81+	3.50	X	X	X	Hit
09/08/14	Scottsdale South	3	-	-	2.87	2.81+	4.90	X	X	X	Hit
09/08/14	Scottsdale North	3	-	-	1.57	2.81+	0.96	X	X	X	Hit
09/08/14	Phoenix North	3	-	-	2.72	1.23-1.61	4.00	X	X	X	Hit
09/08/14	NR/CC	1	-	1.50-2.50	2.01	1.62-1.81	2.75	X	X	-	Hit
09/08/14	NW Valley	1	-	1.00-1.50	2.24	2.02-2.20	3.48	X	X	X	Hit
09/08/14	NR/CC	3	-	-	2.36	1.62-1.81	2.75	X	X	-	Hit
09/08/14	Rainbow Valley	1	-	1.25-1.75	2.36	2.81+	2.86	X	-	-	Hit
09/08/14	NW Valley	3	-	-	2.52	2.02-2.20	3.48	X	X	X	Hit
09/08/14	Rainbow Valley	3	-	-	1.73	2.81+	2.86	X	X	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
09/08/14	Wickenburg	1	-	-	0.75	1.23-1.61	-	-	-	-	Miss
09/08/14	Upper Centennial	1	-	0.75-1.00	0.63	2.21-2.40	-	-	-	-	Hit
09/08/14	Wickenburg	1	0.75-1.00/20-30min	-	1.10	1.23-1.61	-	X	X	X	Hit
09/08/14	NW Valley	1	0.60-0.80/20-30min	-	0.43	2.02-2.20	3.48	-	X	-	Hit
09/09/14	Scottsdale South	1	0.50-0.75/20-30min	-	0.71	0.25-0.43	0.57	-	-	-	Hit
09/09/14	Scottsdale North	1	0.70-1.00/20-30min	-	0.31	0.25-0.43	0.54	-	-	-	Miss
09/09/14	Palo Verde	2	-	-	-	-	-	-	-	-	Hit
09/09/14	Rainbow Valley	2	-	-	-	-	-	-	-	-	Miss
09/09/14	West Valley	2	-	-	-	-	-	-	-	-	Hit
09/09/14	NW Valley	2	-	-	-	-	-	-	-	-	Miss
09/09/14	Upper Centennial	2	-	-	-	-	-	-	-	-	Miss
09/09/14	Wickenburg	2	-	-	-	-	-	-	-	-	Miss
09/09/14	Palo Verde	1	0.50-0.75/20-30min	1.00	0.98	1.03-1.22	-	X	-	-	Hit
09/09/14	West Valley	1	0.50-0.75/20-30min	1.00-1.50	1.61	1.23-1.61	-	X	-	-	Hit
09/09/14	West Valley	3	-	-	1.61	1.23-1.61	-	X	-	-	Hit
09/09/14	SE Valley	1	0.50-0.75/20-30min	1.00-1.50	0.16	0.04-0.24	0.52	-	-	-	Miss
09/09/14	Superstition	1	-	0.75-1.00	0.71	0.25-0.43	-	-	-	-	Hit
09/17/14	Gila Bend	2	-	-	-	-	-	-	-	-	Miss
09/17/14	Palo Verde	2	-	-	-	-	-	-	-	-	Miss
09/17/14	Rainbow Valley	2	-	-	-	-	-	-	-	-	Miss
09/17/14	Phoenix South	2	-	-	-	-	-	-	-	-	Hit
09/17/14	SE Valley	2	-	-	-	-	-	-	-	-	Hit
09/17/14	LSRL	2	-	-	-	-	-	-	-	-	Miss
09/17/14	Superstition	2	-	-	-	-	-	-	-	-	Miss
09/17/14	SE Valley	1	-	1.00-1.50	1.26	1.23-1.61	1.50	X	X	-	Hit
09/17/14	SE Valley	3	-	-	1.26	1.23-1.61	1.50	X	X	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2014

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
09/26/14	NR/CC	2	-	-	-	-	-	-	-	-	Hit
09/26/14	Sycamore Creek	2	-	-	-	-	-	-	-	-	Hit
09/26/14	Phoenix North	2	-	-	-	-	-	-	-	-	Hit
09/26/14	Scottsdale North	2	-	-	-	-	-	-	-	-	Hit
09/26/14	Gila Bend	1	-	1.00-1.50	0.79	2.81+	-	X	-	-	Hit
09/26/14	Rainbow Valley	1	-	1.00-1.50	0.67	0.84-1.02	-	-	-	-	Hit
09/27/14	West Valley	1	0.40-0.75/20-30min	1.00-1.50	0.16	0.04-0.24	-	-	-	-	Miss
09/27/14	Palo Verde	1	0.50-0.75/20-30min	1.00-1.50	0.63	1.23-1.61	-	X	-	-	Hit
09/27/14	West Valley	1	0.50-0.75/15-30min	1.00-1.50	1.30	2.21-2.40	2.60	X	X	-	Hit
09/27/14	Rainbow Valley	1	0.50-0.75/15-30min	1.25-1.75	0.87	1.62-1.81	1.10	-	X	-	Hit
09/27/14	Phoenix North	1	0.50-0.75/15-30min	1.00-1.50	0.75	1.23-1.61	1.75	-	X	X	Hit
09/27/14	Phoenix South	1	0.50-0.75/15-30min	1.00-1.50	1.22	1.23-1.61	2.00	-	X	X	Hit
09/27/14	Wickenburg	1	0.50-0.85/20-30min	-	0.59	1.23-1.61	-	X	X	-	Hit
09/27/14	Scottsdale North	1	0.50-0.75/15-30min	1.25-1.50	0.87	1.82-2.01	2.50	X	X	X	Hit
09/27/14	Scottsdale South	1	0.50-0.75/15-30min	1.25-1.50	1.18	1.82-2.01	2.10	X	X	-	Hit
09/27/14	SE Valley	1	0.50-0.75/15-30min	1.25-1.50	1.02	2.02-2.20	2.60	X	-	-	Hit
09/27/14	Gila Bend	1	0.50-0.75/15-30min	1.25-1.50	1.22	2.02-2.20	-	-	X	-	Hit
09/27/14	Wickenburg	3	-	-	1.10	1.23-1.61	-	X	X	-	Hit
09/27/14	NR/CC	1	0.50-0.75/15-30min	1.25-1.50	0.67	1.23-1.61	1.70	-	-	-	Hit
09/27/14	Superstition	1	0.50-0.75/15-30min	1.25-1.50	1.46	2.41-2.60	2.86	-	X	-	Hit
09/27/14	Phoenix South	3	-	-	1.22	1.23-1.61	2.00	X	X	-	Hit
09/27/14	SE Valley	3	-	-	1.85	2.02-2.20	2.60	X	X	X	Hit

APPENDIX C: MSP LAKE ALERTS - VERIFICATION TABLES

TABLE C-1: This table shows each of the individual MSP Lake Alerts issued during the 2014 Monsoon season. The table is broken down by statement Details, observations, and verification. The columns from left to right are defined as follows:

Statement Details – Message information including date, time issued in local standard time, lake, issuing forecaster, and valid time. Data is pulled directly from issued Message.

Observations – Rain information including forecast rainfall intensity and storm total precipitation where applicable. Data is pulled directly from issued Message. It is important to note that not all issued Messages contain forecast rainfall information (noted by an “N/A” in the table).

Lead Time – amount of lead time in minutes from when Lake Alert was issued to when first observation occurred.

Verification – Hits and misses were assigned based on thresholds previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

TABLE C-1: MSP Lake Alerts Issued - Monsoon Season 2014									
Statement Details					Observations			Lead Time	Verification
Date	LST	Lake	Forecaster	Valid Time	Lightning	Wind > 30mph	Hail/Heavy Rain	1st Obs.	Hit/Miss
07/03/14	17:25	Apache Lake	Waters	Now-6pm	x	-	-	0	Hit
07/03/14	20:00	Lake Pleasant	Waters	Now-830pm	-	x	-	14	Hit
07/05/14	19:12	Bartlett Lake	Henz	Now-815pm	-	-	-	-	Miss
07/05/14	19:33	Apache Lake	Henz	Now-830pm	-	-	-	-	Miss
07/06/14	17:20	Bartlett Lake	Henz	Now-630pm	x	x	-	0	Hit
07/07/14	15:42	Bartlett Lake	Henz	Now-440pm	-	x	-	22	Hit
07/07/14	16:37	Canyon Lake	Henz	Now-530pm	x	-	-	7	Hit
07/07/14	16:38	Saguaro Lake	Henz	Now-540pm	x	-	-	8	Hit
07/07/14	17:03	Lake Pleasant	Henz	Now-6pm	-	x	-	4	Hit
07/12/14	16:17	Apache Lake	Henz	Now-520pm	x	-	-	0	Hit
07/13/14	15:09	Saguaro Lake	Henz	Now-410pm	x	-	-	20	Hit
07/13/14	15:19	Canyon Lake	Henz	Now-410pm	x	-	-	10	Hit

TABLE C-1: MSP Lake Alerts Issued - Monsoon Season 2014									
Statement Details					Observations			Lead Time	Verification
Date	LST	Lake	Forecaster	Valid Time	Lightning	Wind > 30mph	Hail/Heavy Rain	1st Obs.	Hit/Miss
07/13/14	15:27	Apache Lake	Henz	Now-410pm	x	-	-	2	Hit
07/13/14	16:38	Lake Pleasant	Henz	Now-530pm	x	-	-	9	Hit
07/14/14	13:42	Apache Lake	Henz	Now-245pm	x	-	-	2	Hit
07/15/14	13:10	Apache Lake	Henz	Now-215pm	x	-	-	17	Hit
07/15/14	13:35	Canyon Lake	Henz	Now-230pm	x	-	-	13	Hit
07/15/14	13:42	Lake Pleasant	Henz	Now-245pm	-	x	-	17	Hit
07/15/14	13:46	Saguaro Lake	Henz	Now-245pm	-	-	x	37	Hit
07/25/14	14:35	Apache Lake	Waters	Now-3pm	-	-	-	-	Miss
07/25/14	14:35	Canyon Lake	Waters	Now-3pm	x	-	-	-	Hit
07/25/14	17:08	Canyon Lake	Waters	Now-530pm	x	-	-	-	Hit
07/25/14	17:08	Saguaro Lake	Waters	Now-545pm	x	-	-	-	Hit
08/01/14	16:05	Apache Lake	Waters	Now-5pm	x	-	-	-	Hit
08/01/14	16:53	Saguaro Lake	Waters	Now-545pm	-	-	-	-	Miss
08/01/14	16:53	Canyon Lake	Waters	Now-530pm	x	-	-	-	Hit
08/02/14	13:04	Bartlett Lake	Henz	Now-130pm	-	-	-	-	Miss
08/02/14	16:14	Saguaro Lake	Henz	Now-530pm	x	-	-	-	Hit
08/02/14	16:14	Canyon Lake	Henz	Now-530pm	-	-	-	-	Miss
08/02/14	16:14	Apache Lake	Henz	Now-530pm	-	-	-	-	Miss
08/02/14	16:16	Lake Pleasant	Henz	Now-530pm	x	-	-	-	Hit
08/10/14	18:00	Apache Lake	Henz	Now-7pm	x	-	-	3	Hit
08/11/14	14:02	Saguaro Lake	Henz	Now-330pm	x	-	-	60	Hit
08/11/14	14:02	Canyon Lake	Henz	Now-330pm	x	-	-	60	Hit
08/11/14	14:02	Apache Lake	Henz	Now-330pm	x	-	-	0	Hit
08/11/14	14:58	Bartlett Lake	Henz	Now-4pm	x	-	-	2	Hit
08/11/14	19:29	Bartlett Lake	Henz	Now-830pm	x	-	-	0	Hit
08/11/14	20:52	Lake Pleasant	Henz	Now-945pm	-	-	-	-	Miss
08/12/14	12:22	Saguaro Lake	Henz	Now-2pm	x	-	-	3	Hit
08/12/14	12:22	Canyon Lake	Henz	Now-2pm	x	-	-	3	Hit

TABLE C-1: MSP Lake Alerts Issued - Monsoon Season 2014									
Statement Details					Observations			Lead Time	Verification
Date	LST	Lake	Forecaster	Valid Time	Lightning	Wind > 30mph	Hail/Heavy Rain	1st Obs.	Hit/Miss
08/12/14	12:22	Apache Lake	Henz	Now-2pm	x	-	-	25	Hit
08/12/14	14:18	Saguaro Lake	Henz	Now-330pm	x	-	-	0	Hit
08/12/14	14:18	Canyon Lake	Henz	Now-330pm	x	-	-	0	Hit
08/12/14	14:18	Apache Lake	Henz	Now-330pm	x	-	-	0	Hit
08/15/14	14:08	Bartlett Lake	Waters	Now-2:15pm	-	-	-	-	Miss
08/17/14	16:55	Bartlett Lake	Waters	Now-6pm	x	-	-	-	Hit
08/17/14	16:55	Saguaro Lake	Waters	Now-630pm	x	-	-	-	Hit
08/17/14	16:55	Canyon Lake	Waters	Now-615pm	x	-	-	-	Hit
08/17/14	16:55	Apache Lake	Waters	Now-6pm	x	-	-	-	Hit
08/17/14	19:22	Lake Pleasant	Waters	Now-8pm	-	x	-	0	Hit
09/06/14	17:57	Bartlett Lake	Henz	Now-7pm	x	-	-	31	Hit
09/06/14	18:34	Saguaro Lake	Henz	Now-8pm	x	-	-	18	Hit
09/06/14	18:34	Canyon Lake	Henz	Now-8pm	x	-	-	10	Hit
09/06/14	18:34	Apache Lake	Henz	Now-730pm	x	-	-	10	Hit
09/27/14	15:12	Saguaro Lake	Henz	Now-5pm	x	-	-	-	Hit
09/27/14	15:12	Canyon Lake	Henz	Now-5pm	x	-	-	-	Hit
09/27/14	15:12	Apache Lake	Henz	Now-5pm	x	-	-	-	Hit

APPENDIX D: QPF PEAK RAINFALL INTENSITY - VERIFICATION TABLES

TABLE D-1: This table shows each of the individual qualifying MSP Messages issued during the 2014 Monsoon season including the detailed forecast rainfall information. The table is broken down by statement details, peak rainfall intensity, and verification. The columns from left to right are defined as follows:

Statement Details – Message information including date and forecast zone. Data is pulled directly from issued Message.

Peak Rainfall Intensity – Rain information including forecast and observed rainfall intensity. Observed rainfall intensities include rain gage type and number (if ALERT data). Data is pulled directly from issued Message. Observations are gathered the ALERT database and NWS local storm reports.

Verification – Percent error, hits and misses were assigned based on thresholds previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

TABLE D-1: MSP QPF Peak Intensity Verification - Monsoon Season 2014						
Statement Details		Peak Rainfall Intensity			Verification	
Date	MSP Forecast Zone	QPF (in/min)	Observed (in/min) *	Gage Type	(%) Error	Hit/Miss
07/03/14	Rainbow Valley	0.50/30min	0.16	ALERT 6840	212.5	Miss
07/03/14	West Valley	0.75/30min	0.71	ALERT 5510	5.6	Hit
07/03/14	NW Valley	0.75/30min	0.94	ALERT 5495	-20.2	Hit
07/03/14	Upper Centennial	0.75/30min	0.71	ALERT 7150	5.6	Hit
07/03/14	Wickenburg	0.75/30min	0.94	ALERT 7080	-20.2	Hit
07/03/14	NR/CC	0.50/30min	0.39	ALERT 4960	28.2	Miss
07/03/14	Phoenix South	0.50/30min	0.43	ALERT 4715	16.3	Hit
07/03/14	Scottsdale North	0.50/30min	0.12	ALERT 4935	316.7	Miss
07/05/14	Sycamore Creek	0.60/20min	1.02	ALERT 5875	-41.2	Miss
07/05/14	Scottsdale North	0.50/30min	0.00	-	n/a	Miss
07/06/14	Wickenburg	1.00/30min	1.46	ALERT 7080	-31.5	Miss
07/06/14	Upper Centennial	0.75/30min	0.51	ALERT 5155	47.1	Miss
07/06/14	Palo Verde	0.75/30min	0.79	ALERT 5120	0.0	Hit
07/08/14	West Valley	0.75/30min	0.00	-	n/a	Miss

TABLE D-1: MSP QPF Peak Intensity Verification - Monsoon Season 2014						
Statement Details		Peak Rainfall Intensity			Verification	
Date	MSP Forecast Zone	QPF (in/min)	Observed (in/min) *	Gage Type	(%) Error	Hit/Miss
07/08/14	NW Valley	0.75/30min	0.04	-	1775.0	Miss
07/08/14	Palo Verde	0.75/30min	0.63	ALERT 5095	19.0	Hit
07/08/14	Gila Bend	0.75/30min	0.08	-	837.5	Miss
07/08/14	Scottsdale North	0.75/30min	0.83	ALERT 5995	-9.6	Hit
07/13/14	Scottsdale North	0.50/30min	0.12	ALERT 5915	316.7	Miss
07/13/14	SE Valley	0.75/30min	0.75	ALERT 6605	0.0	Hit
07/13/14	NR/CC	0.50/30min	0.55	ALERT 5585	-9.1	Hit
07/13/14	Phoenix South	0.50/30min	0.28	ALERT 6550	78.6	Miss
07/13/14	West Valley	0.75/30min	0.67	ALERT 5300	11.9	Hit
07/13/14	Palo Verde	0.75/30min	1.34	ALERT 5075	-44.0	Miss
07/13/14	Rainbow Valley	0.75/30min	0.63	ALERT 6950	19.0	Hit
07/14/14	NW Valley	0.75/30min	0.79	ALERT 5454	-5.1	Hit
07/14/14	Rainbow Valley	0.60/30min	0.67	ALERT 6965	-10.4	Hit
07/14/14	Phoenix South	0.75/30min	0.51	ALERT 4750	47.1	Miss
07/14/14	NR/CC	0.75/30min	0.83	ALERT 4920	-9.6	Hit
07/14/14	Scottsdale North	1.00/30min	1.54	ALERT 5940	-35.1	Miss
07/14/14	Phoenix North	1.00/30min	1.02	ALERT 4825	-2.0	Hit
07/14/14	Scottsdale South	0.75/30min	0.55	ALERT 4805	36.4	Miss
07/15/14	NW Valley	0.75/30min	0.00	-	n/a	Miss
07/15/14	LSRL	0.75/30min	0.79	ALERT 6780	-5.1	Hit
07/15/14	Scottsdale North	0.75/30min	0.87	ALERT 4695	-13.8	Hit
07/15/14	Scottsdale South	0.75/30min	0.87	ALERT 4695	-13.8	Hit
07/23/14	Scottsdale North	0.25/30min	0.20	ALERT 4930	25.0	Hit
07/25/14	Gila Bend	1.25/60min	1.36	ALERT 9407	-8.1	Hit
07/25/14	Superstition	0.75/30min	0.51	ALERT 6750	47.1	Miss
07/25/14	Upper Centennial	0.75/30min	0.94	ALERT 7150	-20.2	Hit
07/25/14	Wickenburg	0.75/30min	0.83	ALERT 7155	-9.6	Hit
07/31/14	West Valley	0.50/20min	0.91	ALERT 5300	-45.1	Miss

TABLE D-1: MSP QPF Peak Intensity Verification - Monsoon Season 2014						
Statement Details		Peak Rainfall Intensity			Verification	
Date	MSP Forecast Zone	QPF (in/min)	Observed (in/min) *	Gage Type	(%) Error	Hit/Miss
08/02/14	NR/CC	0.80/30min	0.75	ALERT 5940	6.7	Hit
08/02/14	Scottsdale North	0.80/20min	1.02	ALERT 4930	-21.6	Hit
08/02/14	Phoenix North	0.80/20min	1.10	ALERT 4800	-27.3	Miss
08/02/14	Wickenburg	0.75/30min	0.59	-	27.1	Miss
08/02/14	Phoenix North	1.00/30min	1.26	ALERT 4800	-20.6	Hit
08/02/14	NW Valley	0.75/30min	0.43	ALERT 5470	74.4	Miss
08/03/14	West Valley	0.40/30min	0.39	ALERT 6820	2.6	Hit
08/03/14	Wickenburg	0.70/30min	1.10	ALERT 5260	-36.4	Miss
08/03/14	Upper Centennial	0.40/30min	0.28	ALERT 7145	42.9	Hit
08/11/14	Scottsdale North	0.75/30min	0.87	ALERT 5975	-13.8	Hit
08/11/14	Palo Verde	0.50/30min	0.59	ALERT 5095	-15.3	Hit
08/11/14	NR/CC	0.60/30min	0.55	ALERT 5625	9.1	Hit
08/12/14	SE Valley	0.75/30min	0.47	ALERT 6575	59.6	Miss
08/12/14	Superstition	1.00/30min	0.98	ALERT 6740	2.0	Hit
08/12/14	Scottsdale South	0.50/30min	0.35	ALERT 4805	42.9	Miss
08/12/14	Phoenix South	1.25/20min	1.33	ALERT 6525	-6.0	Hit
08/12/14	Phoenix North	0.60/30min	0.63	ALERT 5595	-4.8	Hit
08/12/14	West Valley	0.75/30min	0.63	ALERT 5595	19.0	Hit
08/13/14	SE Valley	0.50/30min	0.51	ALERT 6540	-2.0	Hit
08/13/14	Superstition	0.50/min	0.43	ALERT 6635	16.3	Hit
08/17/14	SE Valley	0.50/30min	0.43	ALERT 6585	16.3	Hit
08/17/14	Superstition	0.50/30min	0.35	ALERT 6745	42.9	Miss
08/17/14	NR/CC	0.75/30min	0.67	ALERT 5580	11.9	Hit
08/17/14	Phoenix North	0.75/30min	0.75	ALERT 5565	0.0	Hit
08/17/14	NW Valley	0.75/30min	0.43	ALERT 5470	74.4	Miss
08/17/14	Gila Bend	0.50/30min	0.20	ALERT 6920	150.0	Miss
08/17/14	Rainbow Valley	0.50/30min	0.55	ALERT 6840	-9.1	Hit
08/17/14	Palo Verde	0.75/30min	0.55	ALERT 5040	36.4	Miss

TABLE D-1: MSP QPF Peak Intensity Verification - Monsoon Season 2014						
Statement Details		Peak Rainfall Intensity			Verification	
Date	MSP Forecast Zone	QPF (in/min)	Observed (in/min) *	Gage Type	(%) Error	Hit/Miss
08/17/14	Upper Centennial	0.75/30min	0.00	-	n/a	Miss
08/17/14	Wickenburg	0.75/30min	0.04	ALERT 5270	1775.0	Miss
08/19/14	West Valley	1.00/60min	1.06	ALERT 5520	-5.7	Hit
08/19/14	NW Valley	1.00/60min	1.42	ALERT 5515	-29.6	Miss
08/19/14	NR/CC	1.00/60min	1.54	ALERT 5640	-35.1	Miss
08/19/14	Phoenix North	1.00/60min	1.26	ALERT 4645	-20.6	Hit
08/19/14	Phoenix South	1.00/60min	0.67	ALERT 4770	11.9	Hit
08/19/14	Scottsdale North	1.00/60min	1.14	ALERT 5940	-12.3	Hit
08/19/14	Scottsdale South	0.75/60min	0.43	ALERT 4635	74.4	Miss
08/19/14	SE Valley	0.75/60min	0.24	ALERT 4540	212.5	Miss
08/19/14	Sycamore Creek	1.00/60min	1.06	ALERT 5875	-5.7	Hit
08/19/14	West Valley	0.50/30min	0.47	ALERT 5410	6.4	Hit
08/19/14	Phoenix South	0.50/30min	0.47	ALERT 5505	6.4	Hit
08/21/14	Scottsdale North	0.50/20min	0.04	ALERT 4915	1150.0	Miss
08/21/14	Scottsdale South	0.50/20min	0.24	ALERT 4520	108.3	Miss
08/25/14	Upper Centennial	0.75/30min	0.43	ALERT 7135	74.4	Miss
08/25/14	Wickenburg	0.90/20min	1.10	ALERT 7110	-18.2	Hit
08/25/14	Palo Verde	0.50/30min	0.43	ALERT 5210	16.3	Hit
08/25/14	Rainbow Valley	0.75/30min	0.20	ALERT 6900	275.0	Miss
08/25/14	West Valley	0.75/30min	0.43	ALERT 5210	74.4	Miss
08/26/14	Wickenburg	0.50/30min	0.16	ALERT 7005	212.5	Miss
09/04/14	West Valley	0.75/30min	0.79	ALERT 5210	-5.1	Hit
09/06/14	Phoenix South	0.40/30min	0.35	ALERT 6550	14.3	Hit
09/06/14	SE Valley	0.40/30min	0.35	ALERT 6550	14.3	Hit
09/06/14	Phoenix North	0.70/20min	0.67	ALERT 5535	4.5	Hit
09/08/14	Scottsdale North	1.50/60min	1.50	ALERT 5940	0.0	Hit
09/08/14	Scottsdale South	1.50/60min	2.40	ALERT 4790	-37.5	Miss

TABLE D-1: MSP QPF Peak Intensity Verification - Monsoon Season 2014						
Statement Details		Peak Rainfall Intensity			Verification	
Date	MSP Forecast Zone	QPF (in/min)	Observed (in/min) *	Gage Type	(%) Error	Hit/Miss
09/08/14	Wickenburg	1.00/30min	1.06	ALERT 7050	-5.7	Hit
09/08/14	NW Valley	0.60/30min	0.43	ALERT 5475	39.5	Miss
09/09/14	Scottsdale South	0.75/30min	0.67	ALERT 4685	11.9	Hit
09/09/14	Scottsdale North	0.70/30min	0.31	ALERT 4590	125.8	Miss
09/09/14	Palo Verde	0.50/30min	0.59	ALERT 5040	-15.3	Hit
09/09/14	West Valley	0.75/20min	1.14	ALERT 5280	-34.2	Miss
09/09/14	SE Valley	0.50/30min	0.20	ALERT 6595	150.0	Miss
09/27/14	West Valley	0.40/30min	0.16	ALERT 5405	150.0	Miss
09/27/14	Palo Verde	0.50/30min	0.51	ALERT 5200	-2.0	Hit
09/27/14	West Valley	0.75/15min	0.87	ALERT 6845	-13.8	Hit
09/27/14	Rainbow Valley	0.75/30min	0.87	ALERT 6845	-13.8	Hit
09/27/14	Phoenix North	0.75/30min	0.79	ALERT 4645	-5.1	Hit
09/27/14	Phoenix South	0.75/15min	1.10	ALERT 4715	-31.8	Miss
09/27/14	Wickenburg	0.50/30min	0.35	ALERT 7100	42.9	Miss
09/27/14	Scottsdale North	0.75/30min	0.83	ALERT 5965	-9.6	Hit
09/27/14	Scottsdale South	0.75/15min	0.87	ALERT 4675	-13.8	Hit
09/27/14	SE Valley	0.75/20min	0.75	ALERT 6535	0.0	Hit
09/27/14	Gila Bend	0.50/20min	0.47	ALERT 6960	6.4	Hit
09/27/14	NR/CC	0.50/30min	0.31	ALERT 4920	61.3	Miss
09/27/14	Superstition	0.75/15min	0.91	ALERT 6650	-17.6	Hit
09/27/14	Sycamore Creek	0.50/30min	0.43	ALERT 5925	16.3	Hit
<i>* Data in the Observed column was fit to match QPF Intensity time scale.</i>						

APPENDIX E: QPF STORM TOTAL PRECIPITATION - VERIFICATION TABLES

TABLE E-1: This table shows each of the individual MSP Lake Alerts issued during the 2014 Monsoon season including the detailed forecast rainfall information. The table is broken down by statement Details, observations, and verification. The columns from left to right are defined as follows:

Statement Details – Message information including date and forecast zone. Data is pulled directly from issued Message.

Peak Storm Total Precipitation – Rain information including forecast (QPF), observed (ALERT), radar estimated (GAQPE), and local storm report total (LSR). Data is pulled directly from issued Message. Observations are gathered the ALERT database, WDT Inc radar products, and NWS local storm reports.

Error – Percent error was calculated based on Equation 4 previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

Verification – Hits and misses were assigned based on thresholds previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2014											
Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
07/06/14	Wickenburg	1.50	1.57	-	1.23	1.61	-4.46	n/a	21.95	-6.83	Hit
07/06/14	Upper Centennial	1.25	0.59	-	1.82	2.01	111.86	n/a	-31.32	-37.81	Miss
07/06/14	Palo Verde	1.50	0.12	-	0.84	1.02	1150.00	n/a	78.57	47.06	Miss
07/08/14	West Valley	1.25	0.47	0.82	1.23	1.61	165.96	52.44	1.63	-22.36	Hit
07/08/14	NW Valley	1.25	0.28	-	1.23	1.61	346.43	n/a	1.63	-22.36	Hit
07/08/14	Palo Verde	1.50	0.67	-	1.62	1.81	123.88	n/a	-7.41	-17.13	Hit
07/14/14	Rainbow Valley	1.25	1.38	-	0.64	0.83	-9.42	n/a	95.31	50.60	Hit
07/14/14	NR/CC	1.50	0.87	0.45	1.62	1.81	72.41	233.33	-7.41	-17.13	Hit
07/14/14	Scottsdale North	1.50	1.57	-	0.25	0.43	-4.46	n/a	500.00	248.84	Hit
07/14/14	Phoenix North	1.50	1.18	0.90	1.23	1.61	27.12	66.67	21.95	-6.83	Hit
07/14/14	Scottsdale South	1.50	0.55	1.25	0.84	1.02	172.73	20.00	78.57	47.06	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2014

Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
07/15/14	NW Valley	1.50	0.00	-	0.44	0.63	n/a	n/a	240.91	138.10	Miss
07/15/14	LSRL	1.50	0.94	-	1.03	1.22	59.57	n/a	45.63	22.95	Hit
07/25/14	SE Valley	0.50	0.20	-	0.25	0.43	150.00	n/a	100.00	16.28	Hit
07/31/14	NW Valley	0.50	0.39	-	2.02	2.20	28.21	n/a	-75.25	-77.27	Miss
07/31/14	Gila Bend	1.25	0.24	-	1.03	1.22	420.83	n/a	21.36	2.46	Hit
08/01/14	Palo Verde	0.50	0.63	-	0.44	0.63	-20.63	n/a	13.64	-20.63	Hit
08/01/14	Rainbow Valley	0.50	0.16	0.46	0.04	0.24	212.50	8.70	1150.00	108.33	Hit
08/01/14	West Valley	0.75	1.38	1.13	1.23	1.61	-45.65	-33.63	-39.02	-53.42	Miss
08/01/14	Phoenix South	0.75	1.73	-	1.23	1.61	-56.65	n/a	-39.02	-53.42	Miss
08/01/14	Scottsdale South	0.50	0.12	0.30	0.04	0.24	316.67	66.67	1150.00	108.33	Miss
08/02/14	Wickenburg	1.50	0.83	-	0.84	1.02	80.72	n/a	78.57	47.06	Miss
08/02/14	Phoenix North	1.50	1.38	1.30	1.03	1.22	8.70	15.38	45.63	22.95	Hit
08/02/14	NW Valley	1.50	0.67	0.80	0.25	0.43	123.88	87.50	500.00	248.84	Miss
08/03/14	Scottsdale North	0.50	0.12	0.50	0.04	0.24	316.67	0.00	1150.00	108.33	Hit
08/03/14	Scottsdale South	0.50	0.43	0.40	0.25	0.43	16.28	25.00	100.00	16.28	Hit
08/11/14	NR/CC	1.25	0.55	1.05	1.03	1.22	127.27	19.05	21.36	2.46	Hit
08/12/14	SE Valley	1.50	1.46	1.38	1.62	1.81	2.74	8.70	-7.41	-17.13	Hit
08/12/14	Superstition	2.00	1.34	1.10	1.62	1.81	49.25	81.82	23.46	10.50	Hit
08/12/14	NR/CC	1.50	1.42	1.60	2.81	n/a	5.63	-6.25	-46.62	n/a	Hit
08/17/14	Scottsdale North	0.50	0.47	0.70	0.44	0.63	6.38	-28.57	13.64	-20.63	Hit
08/17/14	Scottsdale South	0.50	0.04	-	0.04	0.24	1150.00	n/a	1150.00	108.33	Miss
08/19/14	Phoenix South	1.50	0.79	1.56	1.62	1.81	89.87	-3.85	-7.41	-17.13	Hit
08/19/14	Scottsdale South	1.50	1.57	2.40	1.62	1.81	-4.46	-37.50	-7.41	-17.13	Hit
08/19/14	SE Valley	1.00	0.83	0.99	1.03	1.22	20.48	1.01	-2.91	-18.03	Hit
08/19/14	Superstition	1.00	0.94	-	1.23	1.61	6.38	n/a	-18.70	-37.89	Hit
08/20/14	Palo Verde	0.50	0.55	-	1.62	1.81	-9.09	n/a	-69.14	-72.38	Hit
08/20/14	West Valley	0.50	0.20	0.70	0.44	0.63	150.00	-28.57	13.64	-20.63	Hit
08/21/14	Wickenburg	0.50	0.75	-	0.44	0.63	-33.33	n/a	13.64	-20.63	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2014

Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
08/25/14	Palo Verde	1.25	0.87	-	1.23	1.61	43.68	n/a	1.63	-22.36	Hit
09/06/14	Phoenix South	1.00	0.35	-	0.25	0.43	185.71	n/a	300.00	132.56	Miss
09/06/14	SE Valley	1.00	0.35	-	0.44	0.63	185.71	n/a	127.27	58.73	Miss
09/06/14	Rainbow Valley	1.25	0.51	-	1.23	1.61	145.10	n/a	1.63	-22.36	Hit
09/06/14	Phoenix North	1.25	0.91	1.70	1.23	1.61	37.36	-26.47	1.63	-22.36	Hit
09/08/14	Upper Centennial	0.75	0.75	-	2.21	2.40	0.00	n/a	-66.06	-68.75	Hit
09/08/14	SE Valley	1.50	2.24	6.00	2.21	2.40	-33.04	-75.00	-32.13	-37.50	Miss
09/08/14	Superstition	1.50	1.22	4.50	2.02	2.20	22.95	-66.67	-25.74	-31.82	Hit
09/08/14	Phoenix South	1.50	2.48	3.50	2.81	n/a	-39.52	-57.14	-46.62	n/a	Miss
09/08/14	Scottsdale North	1.50	1.50	0.96	2.81	n/a	0.00	56.25	-46.62	n/a	Hit
09/08/14	Scottsdale South	1.50	2.44	4.90	2.81	n/a	-38.52	-69.39	-46.62	n/a	Miss
09/08/14	West Valley	1.50	2.00	-	2.81	n/a	-25.00	n/a	-46.62	n/a	Hit
09/08/14	NR/CC	1.50	2.01	2.75	1.62	1.81	-25.37	-45.45	-7.41	-17.13	Hit
09/08/14	NW Valley	1.50	2.24	3.48	2.02	2.20	-33.04	-56.90	-25.74	-31.82	Miss
09/08/14	Rainbow Valley	1.75	2.36	2.86	2.81	n/a	-25.85	-38.81	-37.72	n/a	Miss
09/08/14	Upper Centennial	0.75	0.63	-	2.21	2.40	19.05	n/a	-66.06	-68.75	Hit
09/09/14	Palo Verde	1.00	0.98	-	1.03	1.22	2.04	n/a	-2.91	-18.03	Hit
09/09/14	West Valley	1.50	1.61	-	1.23	1.61	-6.83	n/a	21.95	-6.83	Hit
09/09/14	SE Valley	1.00	0.16	0.52	0.04	0.24	525.00	92.31	2400.00	316.67	Miss
09/09/14	Superstition	0.75	0.71	-	0.25	0.43	5.63	n/a	200.00	74.42	Hit
09/17/14	SE Valley	1.50	1.26	1.50	1.23	1.61	19.05	0.00	21.95	-6.83	Hit
09/17/14	Phoenix South	1.00	0.67	0.50	0.44	0.63	49.25	100.00	127.27	58.73	Miss
09/26/14	Gila Bend	1.00	0.79	-	2.81	n/a	26.58	n/a	-64.41	n/a	Miss
09/26/14	Rainbow Valley	1.00	0.67	-	0.84	1.02	49.25	n/a	19.05	-1.96	Hit
09/27/14	West Valley	1.00	0.16	-	0.04	0.24	525.00	n/a	2400.00	316.67	Miss
09/27/14	Palo Verde	1.50	0.63	-	1.23	1.61	138.10	n/a	21.95	-6.83	Hit
09/27/14	West Valley	1.50	1.30	2.60	2.21	2.40	15.38	-42.31	-32.13	-37.50	Hit
09/27/14	Rainbow Valley	1.75	0.87	1.10	1.62	1.81	101.15	59.09	8.02	-3.31	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2014

Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
09/27/14	Phoenix North	1.50	0.75	1.75	1.23	1.61	100.00	-14.29	21.95	-6.83	Hit
09/27/14	Phoenix South	1.50	1.22	2.00	1.23	1.61	22.95	-25.00	21.95	-6.83	Hit
09/27/14	Scottsdale North	1.50	0.87	2.50	1.82	2.01	72.41	-40.00	-17.58	-25.37	Hit
09/27/14	Scottsdale South	1.25	1.18	2.10	1.82	2.01	5.93	-40.48	-31.32	-37.81	Hit
09/27/14	SE Valley	1.25	1.02	2.60	2.02	2.20	22.55	-51.92	-38.12	-43.18	Hit
09/27/14	Gila Bend	1.50	1.22	-	2.02	2.20	22.95	n/a	-25.74	-31.82	Hit
09/27/14	NR/CC	1.50	0.67	1.70	1.23	1.61	123.88	-11.76	21.95	-6.83	Hit
09/27/14	Superstition	1.50	1.46	2.86	2.41	2.60	2.74	-47.55	-37.76	-42.31	Hit
09/27/14	Sycamore Creek	1.25	1.30	-	2.81	n/a	-3.85	n/a	-55.52	n/a	Hit
* GAQPE (Radar) estimated data given in ranges: (LT) Lower Total and (UT) Upper Total											