Fusion Team/IWRSS Meeting with Stakeholders

Minutes of Meeting held 21 July 2010 at Washington University, Danforth University Center, St. Louis, Missouri

1. The meeting started at 8:10a.m. on Wednesday, 21 July 2010. Mr. Chuck Shadie of MVD opened the meeting and welcomed everyone. Everyone in attendance made self-introductions. Chuck went through a review of the Fusion Team's objectives and what they've been doing for the last couple of years and what they have accomplished. The Corps suggested the Fusion Cell team following the floods of 2008. River-Rainfall Forecast meeting was held in October 2008 and areas of focus were identified. The Fusion Team includes three agencies- the U.S. Corps of Engineers {USACE), the United States Geological Survey {USGS), and the National Weather Service {NWS). The team includes six from USACE including those from Mississippi Valley Division {MVD), Lakes and Rivers Division {LRD), and Northwest Division {NWD); three from USGS; and six from NWS. The Fusion Team Mission is to collaboratively improve the forecasting of the Mississippi River Basin. The Summit was held in St. Louis. It was decided that communication and operations between agencies needed improvement. Some discrepancies exist between the three agencies which causes confusion for the public. In 2008 we were having record levels and problems with rating curves. There were a lot of levee breaks and overtopping which caused problems for forecasting and it was difficult to project the future stages increases. Also, the Flood Impact Statements didn't have enough details. The Fusion Team looked at these issues and took five areas in which to work. They are: 1) enhance communication and coordination; 2) develop cross-agency training; 3) ensure accurate data; 4) identify needed technical forecast improvements; and 5) track river forecasting performance

a) Initiated a web-based pre-flood information sharing site; used NWS- chat prior to 2010 flooding. Utilizing these web sites the Fusion Team can share information instantaneously and they *don't* need to make as many phone calls, which is extremely useful during flood event. An interagency playbook was also developed where we could get our procedures down and in place for all to share. The Fusion Team looked at a segment of the 2008 flood event and went through lessons learned. The team looked where communications were flawed and how to get information out.

b) Positioned USGS and USACE liaisons at NWS which improved communication and helped with coordination. USACE had a liaison at NWS North Central River Forecast Center. The Fusion Team is looking for different ways to cross-train.

c) The agencies collected information in a number of ways but we weren't using uniform standards which was one reason we were different {e.g. flow measuring techniques). The Fusion Team is looking at ways of making data available concurrently to all agencies. The team compared the data from USGS and USACE {e.g. Doppler measurement) and the differences were within acceptable standards. The agencies had consistent readings in most areas. Common terms need to be used between the three agencies. It's possible that gage corrections may be made {for reasons such as drawdown or instruments calibration) so the team made basic procedures so we would all know where corrections are made and everyone would have that information as soon as possible. It would be nice to

have additional gages but it's not possible with funding limitations. USGS has the capability to acquire gages during flood events. The team will be developing and inventory list of all gages and points of contact for those responsible for the gages.

d). The 2008 flood induced record river stages causing the need for rating extrapolations days before the water was in the range where a direct measurement could be made and a correct rating drawn.

e) Rating extrapolations will still be necessary and the team is developing a list of gage sites as noted above. The NWS is converting their modeling platform and will be using HEC-RAS; the Corps is assisting with this conversion.

f) Communication before and after flood events and using collaboration will help with river forecast performance; we are trying to avoid confusion. NWS is developing new platform and working with the USACE. A list of Points of Contact at the USACE that are familiar with systems will help NWS.

Since the 2008 summit, there was a follow-up summit in 2009 in St. Paul. We received additional public feedback there including the statement that the forecasting still needs improvement. The Corps web site has this information and the reports. A Fusion Team Report is going around for signatures and will be posted to web site soon. The web page is http://mvs-wc.mvs.usace.army.mil/fusion/fusion.htm. We are having this workshop here in St. Louis to get more information, concerns, and issues from stakeholders. Noreen Schwein of NWS will talk about the NWS observations. We will always try to provide information and hope to get feedback from the stakeholders. The Fusion Team is working on around fifty action items and most of them have been resolved; most have to do with policy and procedures. We will try to improve the usability of forecasts and will track the accuracy of the forecasts. We are developing metrics of how we can determine if we truly are improving forecasting. The Fusion Team will continue to have tri-agency meetings and will have future workshops.

2. At 8:30a.m. Noreen Schwein of NWS spoke of the impetus of the Fusion Team. A grant was received which allowed us to have this meeting. It was thought that with a smaller group the team could get input about any public confusion and also to find out how you use the information. Noreen wanted to know if the stakeholders have any issues with low water. The background on integrated water resource science and service is to integrate our agencies. The Corps' focus is navigation and flood control. The NWS has a mission of protecting life and property. USGS keeps records and historical information. The idea of Integrated Water Resources Science and Services (IWRSS) is to better integrate and make this all seamless so that the users aren't affected. Noreen showed one slide of the IWRSS objectives which is to improve river forecasting, boost operational collaboration efforts between partners, provide new or enhanced services based on stakeholder input, integrate service, and service delivery. We are moving forward using this initiative. Many people want inundation mapping and that is something that a separate team will undertake; we will need more partners and it will take a while since it is such a large undertaking. Would like to have all water agencies involved. Having transparency is what we are trying to accomplish.

3. At 8:40a.m. Chuck Shadie spoke again and presented a slide showing the team web site and a slide of stakeholder views. He asked the attending stakeholders what information they would want (e.g. information during low water and droughts; how do they use rainfall and river forecasts; how do the forecasts impact their operations; what do they need from us for your decision making; any other suggestions).

4. The first stakeholder to speak was Hon. R.D. James, engineer. He lives in New Madrid, Missouri and has been a civilian member and one of the commissioners of the Mississippi River Commission (MRC) since 1981. MRC has three civilians and two have to be engineers- he is one. Rear Admiral Jonathan Bailey from NOAA is on the Commission. The MRC deals with a broad spectrum of input and they are able to deal with this. The MRC is also responsible for environmental stewardship and sustainability for the Mississippi River, and other contributing rivers like the Ohio, Missouri, Tennessee, and Arkansas. Mr. James stated that the Fusion Team is important during low water and flood events. During floods the MRC acts as an advisory team. Diversion is "buzz" word lately and we are reviewing the possibility of diverting water for irrigation or whatever is needed. It's being pushed by Louisiana and Arkansas. The MRC is concerned as to how much water can be diverted before the navigation industry is adversely impacted. In 2008 the Corps sent forward the Upper Mississippi Comprehensive Plan. There were many subcategories to the plan and one was picked as a recommendation. It was not well received but the Corps thought it was the best for all the people. A recommendation from that plan included placement of additional river gages on the Mississippi River and its tributaries, also, to expand the mainstem water analysis including the tributaries. This was sent directly to Secretary of the Army for Civil Works and then sent to Office of Management and Budget and then sent to the Senate Committee on Environment and Public Works. The MRC is able to touch/make contacts with political individuals. If the Fusion Team would come up with a list of gages, where they are needed, whether they should be manual or electronic, etc., then the MRC could distribute that to Congress and the Secretary for the Army for CW since MRC could have more impact. The MRC would be the doorway to help the agencies. Gage responsibility is important. The 2008 flood showed there were concerns and it wasn't consistent. We have learned this in the lower river before. The Fusion Team is talking and communicating at the Division level but are the districts cooperating as well? In different areas, the districts sometimes have a disconnect. Mr. James suggested making this part of the Fusion Team- to make sure the districts are on the same page. [Fusion Team note: all USACE districts have been made aware of the Fusion Team through various tri-agency meetings since 2008.] In 2008 the gage readings were impacted when there were breaks in levees. On a separate note, Mr. James proposed to put down where we need gages, and also what kind and their approximate cost. The MRC visits twice a year to all members of Congress of states that touch the Mississippi River. In the 1980s this coordination did not exist between MVD and LRD. They each made their own forecasts. At that time, Gen. Kem became commander at LRD. During a trip, they were discussing this and he initiated the idea of coordination. Great strides have already been made. There are exposed weaknesses, particularly with gages. Just keep In mind that help is there.

5. The next stakeholder speaker was A J Mumm. He is the Director of Emergency Management in Polk County, Iowa. Local structures are different in different stages. There is a State statute to

appoint members of a commission. The Board of supervisors includes a sheriff. Representatives of operational agencies carry out the mission. Mr. Mumm's ideas and thoughts included things such as notifications, standards, and communication. The USGS Alerts is a great help and a great tool and didn't exist a few years ago. He is constantly watching and you can set your own thresholds and integrate information to operational planning. The tool is straightforward and allows them to carry out activities of the agency. On standardization and confusion, it exists in Central Iowa when using the 1-day QPF and the 5-day QPF, as to which is best. Decisions are being made by some that don't understand which to use, and the result of these decisions could be bad. It is important to know how that information and the forecasts are used and being shared with locals. His office has a good working relationship with the Rock Island District and they probably talk about five times a day. Sometimes phone calls aren't enough and distribution lists could be good. A political piece is the timing of when people get the information. Some may get it early in morning and others late in afternoon. Having a distribution method to have the same information at the same time would be good. Educational information is important. They don't need to know how the information is developed but it would be helpful to know how the information should be used. A better understanding and education for emergency management would be helpful to learn the models and processes of USGS and USACE. In regard to the Des Moines metropolitan area, discussion is needed on the regulation plan of the reservoirs. How do we make a request and who do we talk to. We need more information on the regulation plans in order to understand them so we can be supportive of them. Also, having impact statements and inundation mapping would be helpful. These will be huge help to all at this particular stage. The mapping and graphical view will be tremendous help. The Iowa Flood Center is at the University of Iowa. We are excited to see their work which includes inundation mapping which is 4-5 years of work. The visual interaction of that information would be helpful. Polk County Emergency Management considers it good practice to use a two-way radio system for communication- they have Micron and are able to talk to NWS. Counties around Des Moines, some Public Works Agencies, Iowa DOT, and others are tied into the system. It's an efficient way to share information. NWS-chat is a new tool and has its place but sometimes if you have small agencies, you can't be sitting in front of the computer. If you see something happening then you use the two-way radio to share that information.

6. The next stakeholder was David Elgin, from Cedar Rapids, Iowa. In regard to the local response group and USACE and NWS, the forecast information from both allowed us to make decisions and we evacuated areas. There were no injuries or deaths which was great! Information is so important for the Emergency Action Plan. Areas were inundated and we had a dark zone/blackout. We were trying to get updated forecasts but there were times we didn't get them. Forecasting information is critical to the response plan and reliance of this information is important to make those decisions. In regard to education, we go through rehearsal each spring and make sure all plans are up to date before the flood season. This was very helpful in 2008. We need information as soon as possible and as early as possible. A three-day notice is necessary in Cedar Rapids. The flood crest was 19 feet above flood stage which was on the Cedar River. The tributaries are also important. In 2002, homes were flooded during the night. We had evacuations then and would like to have the forecast information early on those tributary water sheds. As for inundation mapping, the University of Iowa is trying to promote it. As to the response perspective, we have inundation maps but we consider them Flood Insurance maps.

The GIS system now has the Flood Insurance information so we know what areas to evacuate. From a technical standpoint, all that we do is keyed to the forecast elevation and not the flood maps. We used the National Flood Insurance Program map and once the water level got over the 100-year level we knew it was time to evacuate. We also use contour maps. Our plan is tied to the forecast elevation. Cedar Rapids supplies water for the city from the river and we are also interested in information on low water. The water plant and wastewater treatment plant are on the downstream side and we are concerned with water allocations and this is tied to the cfs of the river. Noreen Schwein asked how many days in advance would they need information on low water levels. He said three to four days is OK but a week is much better. The wastewater treatment plant is affected by the low water levels the most. After 2008 we supported having more gages. We would like to see backup gages at some spots since they are important. Noreen said USGS has rapid-deployment gages and the team is working on this issue. Bob Holmes of USGS talked about some of these gages. The USGS can deploy these gages where and when they are needed.

7. The next stakeholder speaker was David Wilson with Johnson County, Iowa City, Iowa. Locally, their big issue is planning and planning response mitigation is important because recovery takes such a longer time. Mitigation planning is all about the modeling. The flood insurance maps are inadequate and they will be updated and improving. We depend more on the Flood Control Center, USGS, USACE, and NWS. We balance the models off of all of them. The internal models that they have are so different. We use the regulation plan which is strict and we call the USACE a lot. Locally, there is a lot of interest on the cost of the regulation plan and seeing what needs to be changed. Coralville has done mitigation that impacts the downstream. Everyone on the Iowa River shed should work on their plans. We are working with local modeling tools and also use the HAZUS product from FEMA (estimates damages from a disaster). It's more of a recovery tool but it is usually successful. It uses LIDAR information and uses real time data. We look at the 5-day QPF and we look at the worst case scenario. We communicate and coordinate with our partners. Others getting information before some is an issue. The local University is large and the hospital is large. The Hawkeye games have a lot of visitors so closing the roads and flood protection measures is important for planning and how it affects the public and it has a cascading effect. We are looking for official forecasts but we are always comparing it to our own forecasts for our own benefit; it's a safeguard. We are always dealing with the media and the public; the community gets nervous as do the political figures, so we need to get right message out to the public. We are always dealing with radio stations and television stations. As to the print media, we make sure they get the right wording in there. We don't want the public to lose confidence. We try to get the information to all at once. We produce daily sit reps. This works well when there is a high level of anxiety. The Department of Natural Resources has bridge gages in the county. Common tools on web sites and behind the scenes information is important to have for public to obtain. We don't' want them to get wrong information. When technology fails, we have to be able to check real-time information and the modeling. We make phone calls and talk to the right people. We also use airplanes and boats to go out and get the right information. It's better to over-plan than to under-plan. If you under-plan and your prediction is wrong, it would be catastrophic. The Flood Center and the educational partners have a huge stake; the Flood Center came from a grant-funded program through the University of Iowa. They are valuable academics and we need to get them involved. [Fusion Team note: USACE, USGS and NWS are actively involved with the Iowa Flood Center, through the Iowa-Cedar Basin Interagency Team monthly meetings.]

8. After taking a 20 minute break we reconvened at 10:00 a.m.

9. The next stakeholder to speak was Mike Reed with the Sny Island Drainage and Levee District. We have great contact with NWS. We read the forecasts religiously. Forecasting is an impossible feat and I applaud you and curse you (said jokingly}. This sums up what I want to tell you that I want to do whatever I can do to make you look better. It starts with the NWS and the USACE and their coordinated info. Everything incremental starts there for the Sny Island OLD. We are different because we have sand levees and not earthen levees. Sand levees react differently and we have to do fight floods differently. The timing and cost are different from others. For instance, when a forecast comes out that calls for serious flooding and we could see maybe a 4 to 5 foot raise [in a few days]. For us it's too late because of sand levees so we try to anticipate and use the worst case scenario. Mr. Reed watches Iowa weather more than anything else and tracks the Des Moines and Iowa Rivers. The levee system is 54 miles long. In 2008, we had 8 days of work, 24 hours a day and 7 days a week, to do the initial work on flood fight. The 2008 flood was the second highest on the Hannibal gage. He will do what he can to impress on us how important it is to have accurate river and flood forecasts. We use 42 miles of plastic to line the levees on the riverside. We rely so heavily on this forecast information and appreciate what the NWS and USACE are doing. The river gage information for the Sny is active politically in Washington, D.C. and representatives from the Sny are there twice a year. We impress on the DC folks of how important your [USACE, USGS, NWS] work is. The more that they hear it, the better. We echo all that has been said here at this meeting. We are supportive of the USACE and we work with Rock Island District and St. Louis and coordinate with both districts. He checks rivergage.com every day and it's the first thing. We will do whatever we can do to help us do a better job no matter what it is.

10. The next stakeholder speaker was Rod Zerr, with Emergency Management for St. Charles County, Missouri. We deal with flood fighting on a regular basis. We are between the Mississippi and Missouri Rivers and are influenced by the Illinois River and other tributaries. There is a small town called Portage de Sioux that can become totally isolated during flooding; it becomes an island. We need to care for the population and make sure their services are met. They also have pipelines that could have scour around them. There is critical infrastructure and a power plant near Portage de Sioux that becomes isolated. The transportation can shut down in some areas. The railroads need to get coal to the power plant. Seasonal flooding is an annual event. Various services are disrupted. Club house inhabitants need to seek higher ground. We are seeing improved forecasting. It is no longer reactive and becoming proactive. Hydrologic information is important and communicating with USACE and NWS is important. His suggestions: give stage forecasts as early as possible because we can turn from reactive to proactive situations (e.g. sandbagging or evacuations); inundation patterns are important because of the knowledge of routes that are open and the marinas that will be impacted. Our needs are not great but they are critical. We are grateful to all but still ask you to keep up good work and strive to give us information as timely as possible.

11. The next stakeholder to speak was Jessyca Frasher with FEMA from Kansas City, Missouri. She is the Senior Watch Officer and is responsible for a group of nine that maintain a constant situational awareness for Iowa, Kansas, Missouri, and Nebraska. We also go outside our area of responsibility and monitor any event (e.g. weather, all hazards). We look at flooding outside of our

region because locals have explained that they could be impacted. The neighboring FEMA regions could become overwhelmed and we could help them. We are structured similar to local and state governments and we have an Emergency Management Center with work stations available for all stakeholders. This could be local or tribal or whoever. We are the primary reporting agency for everyone. The information that we [USACE, USGS, NWS] provide for stream flows and flooding and inundation, impacts her decision whether to tell key leadership to pull staff from an area and deploy resources in advance. We have them prepositioned and we also preposition commodities like water, food, diapers, cots, generators, etc. This is based on the forecasts. We would rather be too proactive then miss the opportunity to provide assistance. We run into frustration in the regional watch. We want to know information and we need a centralized single source resource center to go and collect information. We use NWS-chat, water.gov.rivergages, the NWS water page, etc. About 40% of the time we come up with conflicting forecasts. We need to protect lives and property and we need to know the sources on information are communicating and coordinating. We don't look at the 5-day QPF and I tell the teams not to use it because it changes all the time. The 5-day QPF needs to be clearer and what it means. We are seeing more of the locals logging on to get information. It's better to use products if we better know how to use them (education). We have a lot of tools in our office like weather awareness reports, situational reports, and they have great information but not many ask for it. Information-sharing is important between the three agencies and FEMA. Bob Holmes with USGS asked whether the FEMA situational reports go out on the web. No, they are just e-mailed for now. HSIN is used and is internal to FEMA. We use chat a lot to hear about information on levees. For reservoir data, we see river gage data and impacts, but would like to see the release information and their impacts to areas downstream.

12. The next speaker was John Butler with KMOX radio. He is the News Director. Our station reaches eastern Missouri and western Illinois which is a pretty good reach. We were invited to this meeting and immediately went to the web site to learn more. Our primary responsibility under the EBS is to be the primary station for St. Louis for any catastrophic event. This has changed over to EAS and it was decided we don't have to do it anymore but we still do. Information from us is critical. For example, last night we got the call about 5 inches of rain. The power of radio and getting information out is important- radio is still the first source. We are concerned with loss of life and property and its aftermath. We work closely with NWS and those in St. Charles with NWS. There is no such thing as too much information especially with catastrophic events. The question is how can you do it better? Your work is outstanding but things could always be better. How is the best way to get the information to the public? NWS here invites KMOX to be on conference calls. We are a news talk station. In terms of available NOAA, Emergency Management, etc., we are always available to go on the air to give information. We try to give information out immediately and want to let people know to react. We are now on FaceBook and Twitter and Blackberries. We like idea of a "clearing center" as one place to go to get information. It comes down to immediacy. We are very satisfied with the support from agencies when there is a weather event. Right now it's pretty darn good.

13. At 10:40 a.m. the meeting was opened for other discussions.

14. Kevin Grode with the Corps, Northwest Division, Omaha, Nebraska spoke about the QPFs. Some look at the 1-day, some look at 1-day and 5-day, some look at the 5-day, and some look at only 1-day and maybe up to the 3-day. Our team wrestled with this topic yesterday and how much level of confidence can you have with this information. AJ Mumm said they are concerned with reliability [of QPF] and that it has value but you must know its limitations and they are concerned with their confidence [in the river forecast]. Dave Wilson said their stakeholders are using this information, too. He plans for more than 1-day and they have to look at the 5-day; 90% of their efforts are on the 3-day and also look at 5-day; he will make calls and ask about the 5-day and how comfortable they are. They have to plan for worst case and can't base decisions on the 1-day forecast. He knows the 5-day will change and they use six things every day. AJ Mumm said they could use guidance about telling the public what information is factored in the forecast. Tom Adams with NWS asked the attending stakeholders, do they want something like a 65% confidence level. David said the public information is different from internal information and that they will not put out information that contradicts what other agencies have sent out. Dave said he liked this idea of a percentage confidence level. Tom Adams and Noreen Schwein asked if there is a problem with over-warning the public. RD James said you need to be careful because with an overactive forecast that doesn't happen, the public may then under-react at the next event. Noreen said we should be able to give a confidence level. AJ Mumm said this is a no- win situation with over-warning or under-warning. There is a big range of people's reactions and risk tolerances. We need to accept that everyone will make a different decision even with evacuations and we should give them a confidence level. Bob Holmes asked RD James about what he thinks people would like to see. RD James said if you give them too much they will not be sure what to think and it causes confusion. People know that it's not a "for sure" number but if you start varying the number and giving them three numbers, it is confusing and shows the uncertainty. Kevin Grode asked does the public know why NWS and USACE give forecasts over and over. Mike Reed from Sny Drainage and Levee District said he only cares about what he needs to know because his neck is on the line since it is his responsibility to protect the people. Scott Dummer with the NWS thinks we can meet the request of both the Levee Districts and the public. Mike Reed with Sny D&LD says he checks the forecasts all the time. When the NWS comes out with a river stage forecast, the USACE offices in St. Louis and Rock Island, they will say it could be worse than we thought. Noreen had a slide about the possible future probabilistic river forecast hydrographs and then one about preliminary river model output. David said they have different trigger points depending on models, reliability of models, and circumstances. Kevin Grode asked about having a clearing center (single source). Also, what information would Jessyca with FEMA want to see? She said it differs per area. Some need historical information, (e.g. a 24-hour possible change). What would be great is that it would be an easy to use web site that combined USGS, USACE, and NWS. Right now you click one spot and it takes you to NWS main web site and is difficult to follow. Kevin Grode asked specifically what information would she look for. Bob Holmes said that the amount of money to spend on such a site might make it unachievable. We could have a webinar once a year for an hour that provides training on where to find needed water information on the web. The University of Iowa has a web site, http://www.iihr.uiowa.edu/about/webcam, that had a lot of this information or at least links to other sites; Jessyca said this is a great site. David Wilson said it would be nice to see older QPF pages. [Fusion Team note: HPC QPF archives are now available at http://www.hpc.ncep.noaa.gov/archives/qpf/get_qpf_images.php]

Jim Stiman from the USACE Rock Island District said Bob Holmes has a great idea with the webinar. AJ Mumm suggested we could have an Emergency Management page (similar to IA EM page from NWS Des Moines) with links on it and we can look at it this afternoon. Noreen Schwein said that having historical data available is dependent on funding but she will try to keep the priority up a little bit. David Wilson said that their political people have asked them what they need. Bob Holmes asked

Noreen if a historical link could be put on the AHPS (Advanced Hydrologic Prediction Service ) page for USGS information. She thought yes and they could do that pretty quickly. [Shortly after this meeting, this request was submitted to the AHPS requirements team.] She would like to do an IWRSS demonstration and make this "dashboard". Scott Dummer asked if, for emergency management, where do elected officials fit in; are they given some of this information that is not for the public? Scott said that we can provide both types of information and can also give the bottom line. The USACE makes forecasts with 24-hour precipitation. The Rock Island District shows the NWS forecasts and their own. AJ Mumm asked if it is clear on the web site that the forecast is the one by NWS using the 24-hour precipitation. Every morning they get info from the River Forecast Center. AJ Mumm said they would like to see a spreadsheet with the information. Joan Stemler with the USACE,St. Louis District added that all the USACE offices do things differently and show things differently. Can this vary by NWS weather offices? Scott said yes, it can. Noreen asked if David shares their model information with the NWS and he said no that it is mostly internal with maybe a couple phone calls. Jim Stiman said he was asked why they didn't empty out the Saylorville Reservoir in preparation of the flooding. AJ Mumm said they would maybe like to review the regulation plan and maybe some would like to see flooding for a shorter period of time if the release had been more and earlier. Jim Stiman said they sometimes do a period of record analysis and they assume the reservoir has been in place all of those years. He wanted to let everyone kind of know how the regulation plans are made.

15. Lunch break and then reconvened at 1:00 p.m.

16. David Elgin said they use NWS sites more in the winter because of snow events. This is an essential set of data to help minimize impacts to the city population. They have issues on low flow, mostly navigation issues, but also infrastructure like water and wastewater treatment plants. David said if there are low flows and contamination, then the plants could be shut down. [With enough lead time, contaminants can be held back if river forecasts indicate lower flows to certain critical levels.] The wastewater plant is under a waste allocation so we may have to shut down some industries like ADM or Quaker Oats and that is significant. They would want to know as soon as possible. Most time the low flows would come gradually Chuck Shadie told him. David said they haven't occurred since 1980s but they monitor the gage data constantly. RD James said the same holds true for Mississippi Valley; if we cant get water from reservoirs, we would have to dredge. There would be adverse impacts to local communities and harbors along the river. Usually the upstream reservoirs can help with that. Earlier we talked about the regulation plans of the reservoirs; the water control plans have low flow conditions. At Rock Island District, the reservoirs have low outflow constraints, which is why we have a conservation pool. Recreation is a side benefit. RD said in lower river stages the greatest impact is from the Kentucky systems. Also, before it was said that there is a lack of gages and their conditions; is this still an issue? Chuck Shadie said that floods damaged some and most have been replaced, repaired, or upgraded and we don't think we have any deficits. Bob Holmes said that it's the financial stability of the gages that are of concern. He said there are 300 gages on the list. The Corps usually has funding to repair the gages and sometimes get funding elsewhere. The major cost of gages is the annual O&M as opposed to the first cost. Jim Stiman said that additional gages could help with accuracy but it's not a bad situation of not having them. RD James said that if there is a need particularly for mainstem or maybe major tributaries, he would like to know and he can help but probably not for funding for O&M. He's bringing it up if it would help with accuracy. David Wilson said that they would be able to help also with support.

17. At 1:30 p.m. Jim Stiman talked about available web sites. The site rivergages.com started in 2003. Prior to that, the site was for only the Corps' Mississippi Valley Division. The presentation and information on the individual web sites were inconsistent so getting data was difficult. The districts worked with each other and the Information Management group and got content together. There were quite a few areas of the country that have information on the web site. Still, each district controls their own content. Jim showed the Rock Island District web site. On the site you can choose a river basin from drop down box. Sheet shows a snap shot of whole basin, each station, stages, and precipitation. You can get stage graphs for certain areas. It is noted that it is the NWS forecast. You can plot historic year and can also see a plot of the last seven days and the maximum and minimum values. It shows pool levels and flows. You can also see a table of rainfall of the last seven days. Those numbers are from rain gages at the sites (typical bucket type gages). We do Quality Control on them and check every once in a while. We went through QC on the Mississippi River but also did one with reservoirs. Jim showed Saylorville Reservoir on the web site as an example. You can also look at graphs of pool levels and flows. You can see other data like forecasts. Historic data can be found here and you can see it in tabular form or graphed, in calendar year, (only 6 am values not hourly). Bob Holmes clarified that if it's a USGS gage, the USACE puts a note that it can be found on USGS site and has a link. The web site also has storage tables, rating tables, reports, inflows, outflows, etc. David Wilson asked if they can show 30-day data. Jim said yes that it goes back quite a ways. Noreen Schwein asked if the historic data can be plotted against the current data but no, only for a certain period of time and not plotted against something else. The site also shows the QPFs and lots of other information. It also has a contact button. Noreen added that the link on that page goes right to NWS site but Jessyca Frasher mentioned that it [MVR website] would be good to go to a hydrologic page that is related [to the specific gage].

18. At 1:45 p.m. Bob Holmes talked about the WaterAiert web site on a USGS site; at this site you can request to receive e-mails for certain gages. WaterAiert is popular and you can get there from WaterWatch. The dots are color-coded that show percentiles. It also has maps of stream flows and maps of anything above flood stage. He showed Hagers Grove on the North Fork of the Salt River; you can find information on the flows, discharge, precipitation, rating tables, historic data, hydrographs, etc. George Arcement of USGS said that you can also use precipitation as a selector for a gage. You can also look at historic data. Shane Barks of USGS asked if Bob Holmes could show something that is below flood stage. Shane noted the red asterisk on the site and that there was a technician at the site recently. This site has direct links to the NWS web site.

19. At 2:00p.m. Tom Adams of NOAA spoke next. Tom had a PowerPoint presentation on Sources of Hydrologic Forecast Uncertainty (his presentation is attached to the end of these meeting minutes). For the Missouri Basin River Forecast Center and the North Central River Forecast Center, he showed the root mean square error for a fast responding and a slow responding river. Root mean square is a statistical measure of the magnitude of a varying quantity. A fast-responding river is up through a 24-hour response time; a medium-responding river is between 24 and 28; a slow-responding river is above 28. He next showed the 5-day QPF from the previous morning and then showed the Ohio River Forecast Center (OHRFC) QPF in comparison and then what really happened. Both the 5-day QPF and the OHRFC were wrong. That is the problem we all are facing using QPFs. He showed a slide of

sources of forecast error which include precipitation forecast, precipitation estimation, precipitation typing, temperature estimation, model error, evapotranspiration estimation, and forecaster error. Predicting in summer is more difficult because of summer storms so there is seasonality shown on the slide of Mean Absolute Errors (MAEs). Mean Absolute Error is a statistical term that is the quantity used to measure how close forecasts or predictions are to the eventual outcomes. Noreen Schwein said that to improve the QPF you need to improve the initial conditions and computer modeling. He showed a slide with box and whisker plots where each dot is a one-month spread. This is probably for all precipitation categories. The next slide was of colored box and whisker plots to show the correlation between QPF and observed precipitation for all the River Forecast Centers. He then showed a slide of the GFS model MAE by NWS RFC for all of the centers and also a slide of GFS model MAE by NWS RFC for QPF. His next slide was about Precipitation Forecasting and QPF for Hurricane Ivan which was in 2004. We received only about one-third of what was predicted. The next six slides were about the Hydrometerological Prediction Center Probabilistic QPF for probabilities of not exceeding 90%, 75%, 50%, 25%, 10%, and 5%. He then presented slides regarding precipitation observation error. We use a radar estimate of precipitation and then show it against rain gage readings. We can then see what bias we get using the radar. The slides show that we at NWS underestimated. The next slide shows that NWS has improved up to year 2008 and the box plots show that we are improving. The slide that shows the seasonal bias also shows spikes surrounding points that are from interferences from items such as cell towers. He also showed a slide that compared June/July/August against December/January/February to show the difference between summer months and winter months. David Elgin said that they have a NWS rain gage at the airport and other rain gages that show something totally different in a different location. He suggested that NWS needs something to show how much rain fell, how much was soaked in, etc. David also asked if NWS will be installing more rain gages. Iowa put in their own rain gages but they are only for their own use. Noreen Schwein asked if they are automated rain gages. Tom Adams said the key point is that the rain gages need to be well maintained. The order of error could be 2-times using QPF. Noreen said they have a few soil moisture gages and their measurements probably don't go into the estimation. AJ Mumm talked about a time that the snowmelt was held up because of the colder temperatures. Scott Dummer said the hydrologists at Weather Forecast Office would be able to help with any of this because it's their job to take technical terms and put it into layman terms.

20. The group took a break and reconvened at 3:00p.m.

21. Noreen Schwein showed a web site of the NWS Weather Forecast Offices. The page www.weather.gov/organization.php shows the organization of NWS Offices and Centers. You can go to http://www.weather.gov/ and look for national items of interest. If you click on the "Water" tab it switches you to water.weather.gov which is similar to the USGS site and you will get a page that has the tabs River Observations, River Forecasts within 48 Hours, and Precipitation. You can also click on the small orange RSS tab and get alerts. You can use this to have alerts sent to your cell phone. A couple people at the meeting noted that they use this feature. Weather Stories can be found at http://www.crh.noaa.gov/crh/graphicasts.php.

22. Chuck Shadie then reiterated the stakeholder key issues:

a) Gage needs- They are adequate and we have enough gages, some have been upgraded; stakeholders asked if any additional gages are needed in certain areas.

b) QPF- topics are reliability, how it's used, what value it has, issues with using it

c) Regulation plans and water control plans- they probably sit on the shelf and the USACE needs to share those with stakeholders. We have authority to deviate from the plans but only to some limits.

d) Single forecast versus a range of forecasts- the public wants a one forecast and they may not be concerned about how accurate it is. For those that use the forecasts for decision-making, the forecasts need to make these people feel confident in their value.

e) An item not mentioned but important, is the history of events afterward and documenting these after-events. We need to take a look back and think about the "what-ifs" when it comes to the reservoirs or anything else. Also, look at what happened and why.

23. Jodi Kormanik-Sonterre with the USACE, Mississippi Valley Division, asked about Micron that some use. There are about 40 to 50 agencies that use this two-way radio system. NWS is a key partner, and mostly local agencies like fire protection agencies. Scott Dummer said the Weather Forecast Office is on it. It's used a lot for wind direction and speed, hazardous waste, etc. There is a steering committee from Emergency Management, NWS, and several others that are the users group that guide the use and policies of this system. It's mostly for the local area and is around Des Moines and Polk County. It's not used in Johnson County, Iowa. They have briefings, follow-ups on teletypes to 911 centers, observations from the field, law enforcement, spotters, and anyone with reliable information. This is a leased system with a minimal cost. It is a local company (an electronic company) that leases it.

24. Action Items:

a) Noreen Schwein said that she will take on the short term action item of historical data on the AHPS web page.

b) Scott Dummer said that we need a flow chart of coordination. It depends on the Corps district and the coordination process. This item matches up with the education action item.

c) The "dashboard" idea on a web site is a good idea. AJ Mumm will send a link to Noreen Schwein about the Des Moines site that has a "dashboard" and we could use this as a pattern. Noreen will send out Des Moines link and each person can say "yes I like this part", etc. Kevin Grode pointed out that NWS works for the Department of Commerce, the Corps of Engineers work for Department of Defense, and the USGS works for the Department of Interior.

d) The next steps will be that the Fusion Team will get back together tomorrow and will talk about a demonstration project that they can do under IWRSS. The Fusion Team will have a short

summary report and a copy will be sent out to stakeholders. It will be sent out as soon as possible. The Fusion Team will meet with stakeholders again to update them.

25. Chuck Shadie asked for any other comments or suggestions. AJ Mumm said just like Mike Reed, he appreciates the opportunity to make people happier and anything he can do, let him know. There is a good relationship between local managers and NWS with daily communications.

a) David Wilson also said that they have more access to political connections if we need help.

b) RD James thanked us for the invitation today. He said don't underestimate the benefit of our jobs because so many people depend on us. He said we do a great job and that we spend a lot of late nights and it's painstaking work. The information we put out is invaluable.

c) Mike Reed seconded RD James' comments.

d) David Elgin said they use the winter forecast a lot for snow, ice, thunderstorms, and slush storms; they use the information and it makes them look good. His agency doesn't do their own forecasting because no one is smarter than the NWS to do that work. They use that information proactively.

26. Chuck thanked everyone and wished everyone a safe trip home.

27. Meeting was adjourned at 3:30p.m.

Meeting minutes respectfully submitted

by: Janet C. Ulivi, P.E.

Civil Engineer

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