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# Colorado – New Mexico Regional Extreme Precipitation Study

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## Summary Report

### Volume I

#### Appendix C-1

#### Workshop Agendas

November 30, 2018



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## 1. CO-NM REPS: Workshop #1 Agenda

Workshop Title & Purpose	<b>Workshop #1:</b> Study overview Team roles and responsibilities Overview and discussion of project task processes and data needs
Workshop Date & Time	August 2-3, 2016
Location	Student Academic Success Building, Room 400 Metropolitan State University of Denver 890 Auraria Parkway, Denver, CO, US
Call-In Information	Join the call: <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a> Optional dial in number: 303-552-3982 PIN: 89370
Organizers	Marine Siohan, Acclivity Associates Bill McCormick, CO DWR

### 1.1. Attendees

#### Project Sponsors

Bill McCormick	Colorado
Mark Perry	Colorado
Jason Ward	Colorado
Jeremy Franz	Colorado
Anna Mauss	Colorado
Charles Thompson	New Mexico
Sushil Chaudhary	New Mexico
James Head	New Mexico

#### Task 1 Consultants

Bill Kappel	AWA, Inc
Geoff Muhlestein	AWA, Inc.
Doug Hultstrand	AWA, Inc.

#### Project Review Board

Nolan Doesken	CCC
Kenneth Fearon	FERC
Kevin Griebenow	FERC

#### Task 2 Consultants

Jason Caldwell	Metstat/EPG
Mel Schaefer	Metstat/EPG
Debbie Martin	Metstat/EPG
George Taylor	Metstat/EPG

#### Task 3 Consultants

Kelly Mahoney	NOAA
Eric James	NOAA
Rob Cifelli	NOAA
Trevor Alcott	NOAA

#### Task 4 Consultants

Marine Siohan	Acclivity
Julie Baxter	Acclivity
Will Meyer	Acclivity

Nezette Rydell	NOAA/NWS
Robert Webb	NOAA/ESRL/PSD
John England	USACE

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John Onderdonk	FERC	Chuck McWilliams	USACE
Ken Kunkel	NCSU	Ken Nowak	USBR
Dave DuBois	NMCC	James Demby	FEMA

*Board Members Joining Remotely*

Sanja Perica	NOAA/NDSC (filling in for Ed Clark)	Chris Cook	Nuclear Regulatory Commission (NRC)
		Kevin Quinlan	NRC

*Board Members Unable to Attend Workshop #1*

*Ed Clark NOAA/NDSC*

**Dam Owners and Other Stakeholders**

John P. Clark (Day 1 morning + Day 2)	Dam Operations Engineer, CPW	Hunter Causey (Day 1 only)	Colorado River District
Casey Dick	Denver Water	Ray Tenney	
Kevin Troutman Brad Bingham	Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)	Bob Bass	Colorado Springs Utilities

1.2. Agenda

1.2.1 Day 1: Tuesday, August 2

Time	Topic	Lead
8:30 - 9:00 am	Registration, Welcome, and Purpose Introductions <ul style="list-style-type: none"> <li>❖ Welcome from James Eklund, CWCB Director and Dick Wolfe, CDWR Director</li> <li>❖ Round-the-room introductions</li> </ul>	Bill McCormick, Chuck Thompson & Julie Baxter
9:00 - 10:00 am	Study Overview <ul style="list-style-type: none"> <li>❖ Workshop purpose</li> <li>❖ Project culture: Team of Teams</li> <li>❖ Study goals and objectives</li> <li>❖ Key challenges and opportunities identified</li> </ul>	Bill McCormick Julie Baxter
10:00 - 10:30 am	Role of Project Review Board <ul style="list-style-type: none"> <li>❖ Expectations</li> <li>❖ Level of engagement</li> </ul>	Bill McCormick

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	<ul style="list-style-type: none"> <li>❖ Communication channels</li> <li>❖ Review process</li> </ul>	
10:30 - 10:45 am	Break	
10:45 am - 11:45pm	Task 1 SOW, Project Process, and Data Needs <ul style="list-style-type: none"> <li>❖ Present and discuss approach and responses to the Project Process and Data Needs Survey.</li> </ul>	Bill Kappel
11:45 - 12:15 pm	Task 1: Questions & Answers	

12:15 - 1:15 pm: Catered lunch, compliments of Project Sponsors

Time	Topic	Lead
1:15 - 2:15 pm	Task 2 SOW, Project Process, and Data Needs <ul style="list-style-type: none"> <li>❖ Present and discuss approach and responses to the Project Process and Data Needs Survey.</li> </ul>	Debbie Martin
2:15 - 2:45 pm	Task 2: Questions & Answers	
2:45 - 3:00 pm	Break	
3:00 - 4:00 pm	Task 3 SOW, Project Process, and Data Needs <ul style="list-style-type: none"> <li>❖ Present and discuss approach and responses to the Project Process and Data Needs Survey.</li> </ul>	Kelly Mahoney
4:00 - 4:30 pm	Task 3: Questions & Answers	
4:30 pm	Adjourn	

5:00 pm: Social Hour

Location: [Tivoli Brewing Tap House](#) (on campus, one-minute walk from Student Success Building)

**1.2.2 Day 2: Wednesday, August 3**

We are providing two hours to the Project Review Board to discuss items of interest identified during Day 1 and prepare talking points to report back to the whole group. We ask that technical task leads and other team members be ready to start at 10:30am.

Time	Topic	Lead
8:30 - 10:15 am	Project Review Board Internal Discussion <ul style="list-style-type: none"> <li>❖ Discuss Day 1 presentations and discussions</li> </ul>	Bill McCormick, Chuck Thompson

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	<ul style="list-style-type: none"> <li>❖ Prepare talking points to report back on the Project Review Board’s perspective on the project.</li> </ul>	
10:15 - 10:30 am	Break	
10:30 am - 12:30 pm	Project Review Board’s Presentation <ul style="list-style-type: none"> <li>❖ PRB’s perspectives on the project</li> <li>❖ Key issues and opportunities</li> </ul> Project Review Board: Questions & Answers	

12:30 - 1:30 pm: Catered lunch, compliments of Project Sponsors

Time	Topic	Lead
1:30 - 2:30 pm	Project schedule and future workshops Content of next workshop	Mark Perry, James Head, Bill Kappel, Tye Parzybok, Kelly Mahoney
2:30 - 3:30 pm	Next Steps: <ul style="list-style-type: none"> <li>❖ Pressing questions</li> <li>❖ Summary of items recorded on the risk register</li> <li>❖ Summary of PRB comments and decisions</li> </ul> Workshop Debrief <ul style="list-style-type: none"> <li>❖ Round-the-room: plus-delta</li> <li>❖ Materials Submittal</li> <li>❖ Logistics</li> </ul>	Julie Baxter
3:30 - 4:00 pm	Additional discussion as needed	Bill McCormick
4:00 pm	Adjourn	

Meeting Materials Distributed Digitally

- ❖ Draft workshop agenda
- ❖ Draft presentations outline
- ❖ Draft presentation slides
- ❖ List of questions for the Project Review Board
- ❖ Team bios repository

## 2. CO-NM REPS: Workshop #2 Agenda

Workshop Title & Purpose	Workshop #2: ❖ Review of Project Review Board Charter ❖ Review of Work Progress
Workshop Date & Time	October 25-27, 2016
Location	DWR Conference Room 814 (8th Floor) 1313 Sherman Street, Denver, CO, US
Call-In Information	Join the call: <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a> Optional dial in number: 303-552-3982 PIN: 89370
Organizers	CO DWR, NM OSE Marine Siohan, Acclivity Associates

### 2.1. Attendees

#### Project Team

#### Project Sponsors

Bill McCormick	Colorado
Mark Perry	Colorado
Jason Ward	Colorado
Jeremy Franz	Colorado
Anna Mauss	CO (Day 1 only)
Charles Thompson	New Mexico
Sushil Chaudhary	New Mexico
Scott Cuthbertson	CO (Day 1 morning)

#### Task 1 Consultants

Bill Kappel	AWA, Inc
Geoff Muhlestein	AWA, Inc.
Doug Hultstrand	AWA, Inc.

#### Task 2 Consultants

Tye Parzybok	MetStat/EPG
Jason Caldwell	Metstat/EPG (Days 2&3)
Mel Schaefer	Metstat/EPG (Days 2&3)
Debbie Martin	Metstat/EPG (Days 2&3)
George Taylor	Metstat/EPG (Days 2&3)

#### Task 3 Consultants

Eric James	NOAA
Rob Cifelli	NOAA

#### Task 4 Consultants

Marine Siohan	Acclivity
Julie Baxter	Acclivity (Days 2&3)
Will Meyer	Acclivity (Day 1 only)
Jessica Williams	Acclivity (Day 1 only)

#### *Team Members Not Able to Attend*

<i>James Head</i>	<i>New Mexico</i>	<i>Kelly Mahoney</i>	<i>NOAA</i>
		<i>Trevor Alcott</i>	<i>NOAA</i>

#### Project Review Board

Kenneth Fearon	FERC	Chuck McWilliams	USACE
Kevin Griebenow	FERC	Karen Weghorst	USB
John Onderdonk	FERC	David Keeney	USB
Nezette Rydell	NOAA/NWS	James Demby	FEMA
Robert Webb (Days 2&3)	NOAA/ESRL/PSD	Kevin Quinlan	NRC (Phone)
John England	USACE	Joseph Kanney	NRC (Phone)
Ken Kunkel (Day 3 only)	NCSU		

#### *PRB Members Not Able to Attend*



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<i>Sanja Perica</i>	<i>NOAA/NDSC</i>	<i>Ken Nowak</i>	<i>USBR</i>
<i>Nolan Doesken</i>	<i>CCC</i>	<i>Dave DuBois</i>	<i>NMCC</i>
<i>Ed Clark</i>	<i>NOAA/NDSC</i>	<i>Chris Cook</i>	<i>NRC</i>
		<i>Siamak Esfandiary</i>	<i>FEMA</i>

Observers

Angela Duren	USACE	Jeff Lukas (Day 2) WWA - CU Boulder
Jessica Voveris	NRC (Phone)	

Dam Owners and Other Stakeholders

John P. Clark	CPW	Brad Bingham	AMAFCA
Casey Dick	Denver Water	Ray Tenney	Colorado River District
Kevin Troutman	AMAFCA		

*Dam Owners and Other Stakeholders Not Able to Attend*

<i>Hunter Causey</i>	<i>Colorado River District</i>	<i>Bob Bass</i>	<i>Colorado Springs Utilities</i>
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2.2. Agenda

2.2.1 Day 1: Tuesday, October 25

Time	Topic	Lead
9:00 - 9:30 am	Welcome and Purpose Introductions	Bill McCormick Chuck Thompson
9:30 - 10:00 am	Follow-up to Workshop #1 <ul style="list-style-type: none"> <li>❖ Project Management Plan</li> <li>❖ Proposed QA/QC plan</li> <li>❖ Scopes of Work Discussion</li> <li>❖ Board Comments &amp; Questions</li> </ul>	Mark Perry
10:00 - 11:00 am	Project Review Board Charter <ul style="list-style-type: none"> <li>❖ Review of Draft Document</li> <li>❖ Discussion</li> </ul>	Bill McCormick Chuck Thompson
11:00 - 11:15 am	Break	
11:15 am - 11:45 am	Overview of Progress <ol style="list-style-type: none"> <li>1) Description of Work Performed</li> <li>2) Activities Proposed for Next Month</li> <li>3) Input Needed from Client or Others</li> <li>4) Problems or Delays and Recommended Solutions</li> <li>5) Deliverables Submitted During This Reporting Period</li> <li>6) Budget and Schedule Status</li> </ol>	Bill Kappel Tye Parzybok

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11:45 am - 12:15 pm 12:15 pm - 12:45 pm	Task 1 Task 2 Task 3	Rob Cifelli
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12:45 - 1:30 pm: Boxed lunch, compliments of Project Sponsors

Time	Topic	Lead
1:30 - 5:00 pm	Task 1: Detailed Technical Discussions	Bill Kappel
1:30-2:15pm	1) Storm List Discussion 45 minutes a) Development of recommended short list to be used for PMP development - PRB Input needed	
2:15-3:15pm	2) SPAS analyses 1 hour a) Example from previous studies b) Potential new storms needed - PRB Input needed	
3:15-3:30pm	c) Discussion of input data sources d) Discussion of SPAS output	
3:30-4:30pm	Break	
	3) Proposed Storm Adjustment Methods: 1 hour a) Orographic Transposition Factor i) Overview of OTF as replacement for HMR SSM - PRB Input Needed ii) PF Climatology to be used for OTF iii) 6-hr for local storm iv) 24hr or 48hr for general/tropical - PRB, Task 2 Input needed v) Total Precip to Rain Relationship for PF Climatology - PRB Input needed	
4:30-5:00pm	b) OTF-MTF double-counting question - PRB Input needed c) Proposed caps on Storm Adjustment Factors d) High elevation adjustments - PRB, Task 3 Input needed	
	4) Example storm adjustment calculations: 45 minutes a) Total adjustment factor spreadsheet b) Grid by grid calculations c) Which durations/area sizes required d) Areas of subjectivity/uncertainty	

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5:00 pm	Adjourn	
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5:30 pm: Social Hour

Location: [Stoney's Bar & Grill](#) (2 blocks south, 5 minute walk)

2.2.2 Day 2: Wednesday, October 26

Time	Topic	Lead
8:30 - 10:15 am	<b>Task 2: Detailed Technical Discussions</b> 1) Precip data sets a) High elevation considerations - PRB Input needed 2) Data processing & QC (QC checklist) 3) Proposed Key Durations for developed spatial maps - PRB Input Needed 4) Storm Typing method details 5) Storm Typing status/results	Debbie Martin  Debbie Martin Debbie Martin  George Taylor Mel Schaeffer
10:15 - 10:30 am	Break	
10:30 am - 12:00 pm	6) SWT Climate Region method details 7) Proposed Super Regions - PRB Input needed	Mel Schaeffer Tye Parzybok

12:00 - 1:00 pm: Catered lunch, compliments of Project Sponsors

Time	Topic	Lead
1:00 - 3:00 pm	<b>Task 3: Detailed Technical Discussions</b> 1) Initial HRRR-derived max/mean-precip grids: data mining method details & results to-date 2) Proposed White Paper on Climate Change operational methods 3) Preliminary discussions regarding future direction for Task 3 collaboration (future PRB input needed): a) Representation of uncertainty b) Elevation effects c) Elevation storm adjustments: e.g., evaluate assumptions behind OTF, other historic factors (7%/1000-ft) d) Test proposed 7500-ft limit for rain-driven flooding e) Rain-snow fraction at high elevation f) Storm maximum efficiency assumptions for PMP	Eric James  Rob Cifelli  Eric James

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	<p>g) Saturated atmosphere assumptions for PMP maximization</p> <p>h) “Virtual Stations” to support PF analysis in mountainous terrain and sparse station data</p> <p>i) HRRR gridded Mean Annual Precip for Task 2 spatial interpolation</p>	
3:00 - 3:15 pm	Break	
3:15 - 3:45 pm	<p>Discussion: Proposed QA/QC Plan</p> <ul style="list-style-type: none"> <li>❖ What is adequate QC?</li> <li>❖ Methods for PRB QA?</li> </ul>	Mark Perry
3:45 - 5:00 pm	<p>Next Steps</p> <p>Task 1: 45 minutes</p> <ol style="list-style-type: none"> <li>1) Transposition process</li> <li>2) Spatial and temporal implementation processes</li> <li>3) Seasonality, rain-on-snow - PRB, CO/NM SEO, user’s Input needed</li> <li>4) Hydrologic implementation of data - PRB, CO/NM SEO, user’s Input needed</li> </ol> <p>Task 2: 30 minutes</p> <ol style="list-style-type: none"> <li>1) Spatial Interpolation/Mapping method details</li> <li>2) Overview of EIRL &amp; criteria for statistical independence</li> </ol>	<p>Bill Kappel</p> <p>Tye Parzybok</p>
5:00 pm	Adjourn	

5:00 pm: Social Hour

Location: [City O’ City](#) (across the street)

2.2.3 Day 3: Thursday, October 27

Time	Topic	Lead
8:30 am - 12:00 pm*	<p>PRB Internal Working Session</p> <p>Goals:</p> <ul style="list-style-type: none"> <li>❖ Write / Approve Final Version of the Board Charter</li> <li>❖ Write / Approve Final Version of QA/QC Plan</li> <li>❖ Draft Technical Comments: PRB input on Detailed Technical Discussion Items</li> </ul>	<p>PRB Co-Chairs</p> <p>Project Sponsors</p> <p>Project Management Team</p>

\*End time may vary. Will reconvene and proceed with agenda whenever PRB finishes the working session. Consultants: please be available to join earlier than noon if necessary.

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12:00 - 12:30 pm: Boxed lunch, compliments of Project Sponsors  
 Consultants are welcome to join at noon for lunch.

Time	Topic	Lead
12:30 - 1:30 pm	PRB Report Out <ul style="list-style-type: none"> <li>❖ Present Final Versions of the Board Charter and QA/QC Plan</li> <li>❖ Discuss Draft Technical Comments</li> </ul>	PRB Co-Chairs
1:30 - 2:00 pm	Concluding Remarks <ul style="list-style-type: none"> <li>❖ Finalize dates for remaining Workshops</li> <li>❖ Next Steps</li> <li>❖ PRB's Input on Workshop</li> </ul>	Bill McCormick Chuck Thompson
2:00 pm	Adjourn for PRB Members	
2:00 - 3:00 pm	Internal Workshop Debrief (Project Sponsors, Task Leads)	Project Management Team
3:00 pm	Adjourn for Project Sponsors & Consultants	

Meeting Materials Distributed Digitally

- ❖ Draft Workshop Agenda
- ❖ Draft Project Review Board Charter

Recommended Reading Prior to Workshop #2

All documents can be found in the [CO-NM REPS Materials for PRB](#) Google Drive folder. Individual links to each document or folder are specified below.

Task 1: AWA

SPAS Program

This folder provides a write up of the SPAS program and analysis process. Also included are four example SPAS analysis results that provide the standard output of a SPAS analysis. AWA will discuss the SPAS program in detail at the workshop.

[https://drive.google.com/open?id=0B\\_lAnpncLRQjNGt5eUs4czRRU2c](https://drive.google.com/open?id=0B_lAnpncLRQjNGt5eUs4czRRU2c)

Storm Adjustment Process

This folder contains examples of storm representative dew point analysis for several storms relevant to this study (In-Place Maximization Factor - IPMF). There is a write up describing the background and implementation of the Moisture Transposition Factor (MTF) process and a write up of the Orographic Transposition Factor (OTF) process. An Excel spreadsheet provides an example of the Total Adjustment Factor spreadsheet, which is used to house and calculate all adjustment factors at all grid points for each storm. Finally there is a discussion and example of the sensitivity that was done to show the difference in using the 24 hour precip-frequency data versus the 48 hour precip-frequency data in the OTF calculation process .

AWA will discuss each of the three adjustment calculation processes (IPMF, MTF, OTF) in detail and go through explicit examples of each at the workshop.

[https://drive.google.com/open?id=0B\\_lAnpncLRQjYkswT2lRZ2NNWG8](https://drive.google.com/open?id=0B_lAnpncLRQjYkswT2lRZ2NNWG8)

### Storm Lists

This folder provides the initial long list of storms to be considered for PMP development. A subset of these storms will eventually be used for this study to determine PMP values. This list contains storms that have been important for PMP development during previous and ongoing studies after review by various review boards and analysis of each storm in relation to a much larger set of data. Therefore, the list can be considered an intermediate storm list, as many hundreds of storms have been removed as they would not affect PMP after all adjustments are applied. PRB members who are familiar with extreme storms in the region affecting Colorado and New Mexico should go through this list and note any storms that should be considered for inclusion before Workshop #2. At the workshop, AWA will walk through the development of the storm list, discuss how the short list (a subset of this overall list) will be determined, and identify any storm that may require full SPAS analysis and has not been analyzed previously. This will be an interactive discussion with all in attendance.

[https://drive.google.com/open?id=0B\\_lAnpncLRQjYWxuejhRQThxbHc](https://drive.google.com/open?id=0B_lAnpncLRQjYWxuejhRQThxbHc)

### Texas Statewide PMP Report

This is a copy of the Texas Statewide PMP Report which was completed last month. Please note that this report has not been released by TCEQ to the public yet and should be treated as proprietary, similar to a CEII designation. Please **DO NOT SHARE THIS REPORT** beyond those in attendance. This is for review purposes only as it can be applied in this study.

[https://drive.google.com/open?id=0B\\_lAnpncLRQjNHAwTzlRay1aTTA](https://drive.google.com/open?id=0B_lAnpncLRQjNHAwTzlRay1aTTA)

### Task 2: MetStat | EPG

- ❖ *Regional precipitation-frequency analysis and spatial mapping of 24-hour precipitation for Oregon*, MGS Engineering Consultants, Oregon Climate Service & JR Wallis, August 2007

[https://drive.google.com/open?id=0B\\_ji1\\_xkOujXbWhldFkxSUVoVEE](https://drive.google.com/open?id=0B_ji1_xkOujXbWhldFkxSUVoVEE)

- ❖ *Regional Precipitation-Frequency Analyses for Mid-Latitude Cyclones, Mesoscale Storms with Embedded Convection, Local Storms and Tropical Storm Remnant Storm Types in the Tennessee Valley Watershed*, Schaefer, Barker, Carney, Day, Gibson, Martin, Parzybok & Taylor

<https://drive.google.com/open?id=0B3XdGSFxCvdpdWlGSVNnak9HYjA>

- ❖ *TECHNICAL MEMORANDUM: Regional Precipitation-Frequency Analysis Using the Climate Region Method for Application in Analyses of Extreme Precipitation and Floods*, Extreme Precipitation Group, August 19, 2016

<https://drive.google.com/open?id=0B3XdGSFxCvdpR1JsQnVfRnQ5ZTg>

### Task 3: NOAA

- ❖ *Multi-Year High-Resolution Rapid Refresh Forecast Climatology*, James, Alexander, Jamison & Benjamin, NOAA Global Systems Division | Earth Modeling Branch, 2014  
This conference paper describes the general background and motivation for using the HRRR dataset. Note that it is written largely with model performance/forecast assessment applications in mind. Recall that in this project our aim is *not* to use the dataset to evaluate model forecast accuracy but rather to increase the sample size of

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physically-plausible, high-resolution data. Thus, the usage of this dataset will be adapted and its applications expanded to suit this specific project. This conference paper represents the first use of the long-term HRRR forecast dataset used within this project.

<https://drive.google.com/open?id=0B3XdGSFxCvpYmxwaFNrcHZPcWc>

### 3. CO-NM REPS: Workshop #3 Agenda

<b>Workshop Purpose</b>	Review of Progress, Working Sessions, Decision-Making, Path Forward
<b>Workshop</b>	Tuesday, February 28 - Thursday, March 2, 2017
<b>Date &amp; Time</b>	<ul style="list-style-type: none"> <li>• <u>Day 1</u>: 8:00 am breakfast; 8:30 am meeting commences; 5:00 pm meeting adjourns followed by social</li> <li>• <u>Day 2</u>: 8:00 am commence; 5:00 pm adjourn followed by social</li> <li>• <u>Day 3</u>: 8:00 am commence; 11:45 am adjourn for PRB and Tech Consultants, 1:00 pm adjourn for Sponsors and PM Consults</li> </ul> <p><i>Informal and optional gathering on Monday evening, February 27: Applebee's (2600 Menaul Blvd NE, across the street from Holiday Inn)</i></p>
<b>Location</b>	Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) Board Room 2600 Prospect Ave NE, Albuquerque, NM 87107
<b>Call-In Information</b>	<p>Main web conference:  <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a>                      Dial in number (main): 303-552-3982   PIN: 89370</p> <p>Secondary web conference (for 2nd breakout sessions):  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>                      Secondary dial in number: 888-601-7442   PIN: 31318</p>
<b>Organizers</b>	Colorado Division of Water Resources New Mexico Office of the State Engineer (OSE) Acclivity Associates

#### 3.1. Attendees

##### Project Core Team

##### Project Sponsors

Bill McCormick	Colorado
Mark Perry	Colorado
Jason Ward	Colorado
Jeremy Franz	Colorado
Anna Mauss	Colorado (phone)
Charles Thompson	New Mexico
Sushil Chaudhary	New Mexico
James Head	New Mexico

##### Task 1 Consultants

Bill Kappel	AWA
Doug Hultstrand	AWA
Geoff Muhlestein	AWA (phone)

##### Task 2 Consultants

Tye Parzybok	MetStat/EPG
Jason Caldwell	Metstat/EPG
Mel Schaefer	Metstat/EPG
Debbie Martin	Metstat/EPG
George Taylor	Metstat/EPG (phone)

##### Task 3 Consultants

Eric James	NOAA
Rob Cifelli	NOAA (phone)
Trevor Alcott	NOAA (phone)
Kelly Mahoney	NOAA (phone)

##### Task 4 Consultants

Jessica Williams	Acclivity
Julie Baxter	Acclivity

Project Core Team Members Not Able to Attend



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Scott Cuthbertson	Colorado (Sponsor)	Will Meyer	Acclivity (Task 4)
<u>Project Review Board</u>			
Chuck McWilliams	USACE	Chris Cook	NRC (tentative)
Ken Fearon	FERC	John England	USACE
Siamak Esfandiary	FEMA (tentative)	Karen Weghorst	USBR (phone)
Kevin Griebenow	FERC	David Keeney	USBR
John Onderdonk	FERC	Ken Nowak	USBR (phone)
Ken Kunkel	NCSU (phone)	Kevin Quinlan	NRC (phone)
Dave DuBois	NMCC	Joseph Kanney	NRC (phone)
Robin Webb	NOAA/ESRL/PSD (phone)	Williams Asquith	USGS
Nolan Doesken	CCC (phone)		

PRB Members Not Able to Attend			
Ed Clark	NOAA/NDSC	Nezette Rydell	NOAA/NWS
Sanja Perica	NOAA/NDSC	James Demby	FEMA

<u>Dam Owners</u>			
Brad Bingham	AMAFCA	Casey Dick	Denver Water
Kevin Troutman	AMAFCA	Joe Donnelly	Northern Water
John Clark	CPW	Nichole Young	
Ray Tenney	Colorado River District	Sigmund Silber	SF-Pojoaque Soil & Water District

Dam Owners Not Able to Attend			
Bob Bass	Colorado Springs Utilities	Hunter Casey	Colorado River District

<u>Other Stakeholders and Observers</u>			
David Heber	NM State Office	Pat Conley	Conley Engineering
Bud Brock	NM State Office	David Gochis	UCAR
Zack Libbin	EBID	Angela Duren	USACE
Shawn Bennett	NOAA	Lisa Shoaff	USACE
Jessica Voveris	NRC	Stephen Brown	USACE
Jeff Lukas	WWA - CU Boulder	Stephen Scissons	USACE
Chuck Easterling	OCCAM		
Dan Aguirre	Wilson & Company		

### 3.2. Agenda

#### 3.2.1 Day 1: Tuesday, February 28

Large group sessions: [Web: www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Leads	Participants
8:00 - 8:30 am	Commence (coffee & hellos)		

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8:30 - 9:30 am	<p>Welcome &amp; Introductions</p> <p>Project Overview and Status</p> <p>Agenda Review</p>	<p>Chuck Thompson / Bill McCormick</p> <p>Jessica Williams</p>	<p>All, with potential visit from Tom Blaine and John Longworth, NM Office of the State Engineer</p>
9:30 - 10:00 am	<p>Project Review Board Follow-up</p> <ul style="list-style-type: none"> <li>● Review PRB discussion to Workshop #2 comments</li> </ul>	<p>Mark Perry / Chuck McWilliams / Ken Fearon</p>	<p>All</p>
10:00 - 10:15 am	<i>Break</i>		
10:15 - 10:45 am	<p>Task 2 (MetStat): Review of Progress &amp; High Level Technical Elements</p> <ol style="list-style-type: none"> <li>1) Description of Work Performed</li> <li>2) Activities Proposed through to next workshop</li> <li>3) Input Needed from Client or Others</li> <li>4) Problems or Delays and Recommended Solutions</li> <li>5) Deliverables Submitted During This Reporting Period</li> <li>6) Budget and Schedule Status</li> <li>7) Present flow charts</li> </ol>	<p>Tye Parzybok &amp; Debbie Martin</p>	<p>All</p>
10:45 - 11:15 am	<p>Task 3 (NOAA): High Level Review of Progress &amp; Technical Elements</p> <ol style="list-style-type: none"> <li>1) Description of Work Performed</li> <li>2) Activities Proposed through to next workshop</li> <li>3) Input Needed from Client or Others</li> <li>4) Problems or Delays and Recommended Solutions</li> <li>5) Deliverables Submitted During This Reporting Period</li> <li>6) Budget and Schedule Status</li> <li>7) Present flow charts</li> </ol>	<p>Eric James Kelly Mahoney</p>	<p>All</p>
11:15 - 11:45 am	<p>Task 1 (AWA): High Level Review of Progress &amp; Technical Elements</p> <ol style="list-style-type: none"> <li>1) Description of Work Performed</li> <li>2) Activities Proposed through to next workshop</li> </ol>	<p>Bill Kappel</p>	<p>All</p>

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	<p>3) Input Needed from Client or Others                  4) Problems or Delays and Recommended Solutions                  5) Deliverables Submitted During This Reporting Period                  6) Budget and Schedule Status                  7) Present flow charts</p>		
11:45 - 12:45 pm	<i>Lunch (boxed lunches / TBD)</i>		
<p>12:45 - 4:45 pm                  (with 15 minute break)</p> <p><i>Working session agenda and discussion items are listed below in this document</i></p>	<p><b>Working Session #1-A: Technical Discussions</b>  <i>Breakout into working groups to work through Identified topics requiring PRB's Recommendation of Best Available Science and to identify PRB QA Items and necessary deliverables</i></p> <p><b>Task 1: PRB subgroup with AWA (1 of 2)</b>  <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a>                  Dial in: 303-552-3982   PIN: 89370#</p> <p><b>Task 2: PRB subgroup with MetStat (1 of 1)</b>  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>                  Dial in: 888-601-7442   PIN: 31318#</p>	<p><b>Task 1 breakout</b>                  PRB Task 1 experts (TBD)                  /                  Bill Kappel</p> <p><b>Task 2 breakout</b>                  PRB Task 2 experts (TBD)                  /                  Tye Parzybok, Debbie Martin, Mel Schaefer &amp; Jason Caldwell</p>	<p>Project Sponsors</p> <p>Task 1 &amp; 2 Consultants</p> <p>Other interested parties                  (optional)</p>
4:45 - 5:00 pm	<i>Closeout &amp; Adjourn</i>		

5:30 pm: Social Hour (Location: Pueblo Harvest Cafe at the Indian Pueblo Cultural Center, 2401 12th St NW, Albuquerque 87104)

3.2.2 Day 2: Wednesday, March 1

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Lead	Participants
8:00 - 10:00 am	<p><b>Group Working Session #1-B: Technical Discussions</b>  <i>Breakout into working groups to Discuss work through Identified topics requiring PRB's Recommendation of Best Available</i></p>	<p>PRB Sub-group lead (TBD) and sub-group members / Bill Kappel</p>	<p>Project Sponsors</p> <p>Task 1 consultants</p>

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	<p><i>Science and to identify PRB QA/QC Items and necessary deliverables/ Other TBD</i></p> <ul style="list-style-type: none"> <li>• Task 1 Breakout: PRB subgroup with AWA (2 of 2)</li> </ul> <p><i>Working session agenda and discussion items are listed below in this document</i></p>		Other interested parties <i>(optional)</i>
10:00 - 10:15 am	<b>Break</b>		
10:15 - 10:45 am	<p><b>Task 2: Working Session Briefing for Large Group</b> <i>Report out on discussion, decisions, and open items</i></p>	PRB sub-lead (TBD) / Tye Parzybok, Debbie Martin, Mel Schaefer & Jason Caldwell	All
10:45 - 11:15 am	<p><b>Task 1: Working Session Briefing for Large Group</b> <i>Report out on discussion, decisions, and open items</i></p>	PRB sub-lead (TBD) / Bill Kappel	All
11:15 - 11:45 am	<b>Question &amp; Answer Period</b>	Bill Kappel, Tye Parzybok	All
11:45 am - 12:45 pm	<b>Lunch</b>		
12:45 - 2:45 pm	<p><b>Group Working Session #1-C: Task 3 Technical Discussions with NOAA ESRL</b></p> <p><i>Working session agenda and discussion items are listed below in this document</i></p>	PRB sub-lead (TBD) / Eric James, Kelly Mahoney	All
2:45 - 3:00 pm	<b>Break</b>		
3:00 - 3:30 pm	<p><b>Group Discussion: Criteria for Project Success</b> <i>Identify criteria for a successful project. How will we know that this project was a success? What are the criteria and characteristics of the final</i></p>	Julie Baxter	All

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	<i>project tool(s), deliverables, and accomplishments?</i>		
3:30 - 5:00 pm	<p><i>(3:30 - 5 pm) Working Session #2-A: PRB Internal Working Session</i>  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>                      Dial in: 888-601-7442   PIN: 31318#</p> <ul style="list-style-type: none"> <li>• Discussion on sub-groups</li> <li>• Development of inter-workshop calls (i.e., monthly?)</li> <li>• Open discussion of any questions concerning Tasks #1-3 (from the earlier presentations)</li> <li>• QA/QC goals prior to workshop #4</li> </ul>	Chuck McWilliams	PRB Members
	<p><i>(3:30 - 4:15 pm) Working Session #2-B: Defining Project Deliverables and Roles &amp; Responsibilities</i>  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>                      Dial in: 303-552-3982   PIN: 89370#</p> <ul style="list-style-type: none"> <li>• Summary Report</li> <li>• Standard of Practice Document</li> <li>• Summary of Topics for Further Research</li> <li>• GIS Tool</li> </ul>	Jessica Williams	Project Sponsors  All Consultants
	<p><i>(4:15 - 5 pm) Working Session #2-C: Collaboration to incorporate Task 3 research into Tasks 1 &amp; 2</i>  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>                      Dial in: 303-552-3982   PIN: 89370#</p> <ul style="list-style-type: none"> <li>• TBD (<i>discuss needs, approaches, actions, etc. primarily a discussion between tech consultants with project sponsor participating as observers and advisors</i>)</li> </ul>	Consultant Leads	Project Sponsors ( as observers and advisors)  All Consultants
5:00 pm	<i>Adjourn</i>		

5:30 pm: Social Hour (Location: El Pinto at 10500 4th Street Albuquerque 87114 )

3.2.3 Day 3: Thursday, March 2

Time	Topic	Lead	Participants
8:00 - 8:15 am	<i>Commence &amp; Group Comments</i>	Jessica Williams	All
8:15 am - 10:00 am	<b>PRB Report Out</b> <ul style="list-style-type: none"> <li>Discuss collaborative plan for Task Consultants to address PRB Recommendations (Agreed upon revisions, additional investigations, etc. should be summarized in a draft PRB Workshop Report)</li> <li>Get PRB direction on questions posed by Task Consultants</li> <li>Discuss agreed-upon items for PRB QA review and needed deliverables from Task Consultants</li> </ul>	PRB Co-Chairs	All
10:00 - 10:15 am	<i>Break</i>		
10:15 - 11:15 am	<b>Concluding Remarks &amp; Debrief</b> <ul style="list-style-type: none"> <li>Finalize dates for remaining Workshops</li> <li>Next Steps</li> <li>PRB's Input on Workshop</li> </ul>	Bill McCormick / Chuck Thompson	All
11:15 - 11:45 am	<i>Adjourn for PRB Members &amp; Technical Consultants Break and Fare-thee-wells</i>		
11:45 - 12:45 pm	Internal Workshop Debrief (working lunch) (Project Sponsors, PM Consultants)	Bill McCormick	Project Sponsors  Task 4 Consultants
12:45 pm	<i>Adjourn for Project Sponsors &amp; PM Consultants</i>		

### 3.2.4 Working Session #1: Agenda & Discussion Items

Working Session	Leads
<p><b>Task 1: Deterministic PMP Estimation</b></p> <p><u>Detailed Technical Discussion Items</u></p> <ul style="list-style-type: none"> <li>● Present flow charts - discuss QA/QC plan with PRB</li> <li>● Discuss Storm List (first 2.5hrs at beginning of working session 1, day 1)                             <ul style="list-style-type: none"> <li>○ Discuss storm list (45 minutes)</li> <li>○ Identify any storms to be added (1 hour)</li> <li>○ Identify any storms to be analyzed (30 minutes)</li> <li>○ Finalize shortlist (45 minutes)</li> </ul> </li> <li>● Discuss OTF (3rd hour of working session 1, day 1)                             <ul style="list-style-type: none"> <li>○ Present findings of various sensitivities/examples</li> </ul> </li> <li>● Present recommendations for rain only precip frequency (first 1hr at beginning of working session 1, day 2)</li> <li>● Respond to remaining PRB comments (2nd hour at beginning of working session 1, day 2)</li> <li>● State questions to PRB for input (2nd hour at beginning of working session 1, day 2)</li> </ul>	<p>PRB sub-lead: TBD AWA: Bill Kappel</p>
<p><b>Task 2: Regional Extreme Precipitation Frequency Estimates</b></p> <p><u>Detailed Technical Discussion Items</u></p> <ul style="list-style-type: none"> <li>● Present flow charts - discuss QA/QC plan with PRB</li> <li>● Data collection update</li> <li>● Storm typing update and automated algorithm</li> <li>● Climate Heterogeneous Super-Regions</li> <li>● Spatial mapping process</li> <li>● Spatial mapping of 24-hr &amp; 72-hr from 48-hr</li> <li>● Development of watershed PF relationships</li> <li>● HRRR data applications/uses</li> <li>● GIS Tool development</li> </ul>	<p>PRB sub-lead: TBD MetStat: Tye Parzybok, Debbie Martin, Mel Schaefer &amp; Jason Caldwell</p>

<p><b>Task 3: Dynamic Modeling</b></p> <p><u>Detailed Technical Discussion Items</u></p> <ul style="list-style-type: none"> <li>● Present flow charts - discuss QA/QC plan with PRB</li> <li>● Technical discussion topics:             <ul style="list-style-type: none"> <li>○ HRRR max-precip grids:                 <ul style="list-style-type: none"> <li>■ Review 1, 3, 6, 12 hour products</li> <li>■ Rain-snow analysis</li> <li>■ Monthly/annual mean overview(?)</li> <li>■ Update on ongoing work/thinking regarding identification of intelligent “search radius” using precipitation frequency/PDF space</li> </ul> </li> <li>○ Comparison of HRRR to observed precipitation                 <ul style="list-style-type: none"> <li>■ Intercomparison of 5-year periods (using longer-duration CPC analysis)</li> <li>■ Comparison of HRRR max-precip grids to Stage IV max-precip grids</li> </ul> </li> <li>○ High-elevation precipitation analysis</li> <li>○ Comparison of HMR PMP to HRRR-derived max-precip products</li> <li>○ Sept 2013 flood work(?)</li> <li>○ Non-stationarity/climate change and PMP white paper progress                 <ul style="list-style-type: none"> <li>■ Discussion of possible survey for PRB or organizational appointees</li> </ul> </li> </ul> </li> <li>● Respond to remaining PRB comments</li> <li>● State questions to PRB for input             <ul style="list-style-type: none"> <li>○ Known PMP exceedance events</li> </ul> </li> <li>● <i>Other TBD</i></li> </ul>	<p>PRB sub-lead: TBD NOAA: Eric James, Kelly Mahoney</p>
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**Meeting Materials Distributed Digitally<sup>1</sup>**

- Workshop Agenda
- Workshop Presentations
- Task 1 Data Package

**Recommended Reading Prior to Workshop #3**

All documents can be found in the [CO-NM REPS Materials for PRB](#) Google Drive folder. Individual links to each document or folder are specified below.

**Task 1: AWA**

- Process Flow Chart
- Data

**Task 2: MetStat | EPG**

- Process Flow Chart

<sup>1</sup> <https://drive.google.com/drive/folders/0B3XdGSFxCvZnpZ1A5MmJma0E>



## CO-NM Regional Extreme Precipitation Study

- Review slide deck
- Read/Review: Regional Precipitation-Frequency Analysis Using the Climate Region Method for Application in Analyses of Extreme Precipitation and Floods<sup>2</sup>

### Task 3: NOAA

- Process Flow Chart

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<sup>2</sup> <https://co-nm-reps.slack.com/messages/workshops/files/F23P4SJSZ/>  
Volume I - Appendix C-1

## 4. CO-NM REPS: Workshop #4 Agenda

Workshop Purpose	Review of Progress, Working Sessions, Decision-Making, Path Forward
Workshop	Tuesday, June 20 - Thursday, June 22, 2017
Date & Time	<ul style="list-style-type: none"> <li>• <u>Day 1</u>: 8:00 am breakfast; 8:30 am meeting commences; 5:00 pm meeting adjourns followed by social</li> <li>• <u>Day 2</u>: 8:00 am commence; 5:00 pm adjourn followed by social</li> <li>• <u>Day 3</u>: 8:00 am commence; 12 pm adjourn for PRB and Tech Consultants, 1:30 pm adjourn for Sponsors and PM Consults</li> </ul> <p><i>Informal gathering Monday 5:00 pm June 19: City O' City (206 E 13th Ave, Denver)</i></p>
Location	Colorado Division of Water Resources Conference Room 814 (8th Floor) and 318 (3rd Floor) 1313 Sherman Street, Denver, CO, US
Call-In Information	<p><b>Main web:</b> <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a>   PIN: 89370</p> <p><b>Dial in number (main):</b> 303-552-3982   PIN: 89370#</p> <p><b>Secondary web (for 2nd breakout sessions):</b> <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>   PIN: 31318</p> <p><b>Secondary dial in number:</b> 888-601-7442   PIN: 31318#</p>
Organizers	Colorado Division of Water Resources (DWR) New Mexico Office of the State Engineer (OSE) Acclivity Associates

### 4.1. Attendees

#### Project Core Team

##### Project Sponsors

Bill McCormick (CO)  
 Chuck Thompson (NM)  
 Mark Perry (CO)  
 Sushil Chaudhary (NM)  
 Scott Cuthbertson (CO)  
 Jeremy Franz (CO)  
 James Head (NM)  
 David Heber (CO)  
 Judy Leyba (CO)  
 Anna Mauss (CO)  
 Jason Ward (CO)

##### Task 1 - AWA

Bill Kappel  
 Doug Hultstrand  
 Geoff Muhlestein (phone)

##### Task 2 - MetStat / EPG

Tye Parzybok  
 Debbie Martin  
 Jason Caldwell  
 Mel Schaefer

##### Task 3 - NOAA

Kelly Mahoney  
 Eric James  
 Rob Cifelli  
 Trevor Alcott (phone)

##### Task 4 - Acclivity

Will Meyer  
 Jessica Williams  
 Julie Baxter  
 Jess Drawhorn

*Project Core Team members not able to attend: George Taylor (MetStat), Rob Cifelli (NOAA)*

#### Project Review Board

CO-NM Regional Extreme Precipitation Study

Chuck McWilliams  
 Ken Fearon  
 Chris Cook  
 David Keeney  
 James Demby  
 John England  
 John Onderdonk  
 Joseph Kanney (phone)

Karen Weghorst  
 Ken Kunkel  
 Kevin Griebenow  
 Kevin Quinlan  
 Nezette Rydell  
 Robert Webb  
 William Asquith

*PRB members not able to attend: Nolan Doesken, Dave Dubois, Siamak Esfandiary, Ken Nowak*

Dam Owners, Observers & Other Stakeholders

Bob Bass  
 Brad Bingham  
 Brian McCormick  
 Casey Dick  
 David Gochis  
 George Hayes  
 John Clark  
 Kevin Troutman

Kirsty Bramlett  
 Matthew Masek  
 Matthew Young  
 Nicole Young  
 Pat Conley  
 Ray Tenney  
 Royce Fontenot (phone)  
 Sigmund Silber (phone)

*Dam Owners not able to attend: Joe Donnelly, Lisa Shoaff*

4.2. Agenda

4.2.1 Day 1: Tuesday, June 20

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Leads	Participants
8:00 - 8:30 am	<i>Commence (coffee &amp; hellos)</i>		
8:30 - 9:00 am	Welcome & Introductions  For the Good of the Order <ul style="list-style-type: none"> <li>● Agenda review</li> <li>● List of items for PRB acceptance</li> <li>● Review QA process</li> </ul>	Bill McCormick / Chuck Thompson  Jessica Williams	All
9:00 - 9:45 am	Project Review Board Follow-up <ul style="list-style-type: none"> <li>● Review PRB Task Tracker (status of and response to Workshop #3 comments)</li> <li>● Review list of Workshop #4 decision items</li> </ul>	Mark Perry / Chuck McWilliams / Ken Fearon	All
9:45 - 10:00	<i>Break</i>		

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<i>am</i>			
10:00 - 10:30 am	<b>Task 3 (NOAA): High Level Review of Progress &amp; Technical Elements</b> 1) Description of work performed 2) Activities proposed through next workshop 3) Input needed from others 4) Problems or delays and recommended solutions 5) Deliverables submitted during this reporting period 6) Budget and schedule status	Kelly Mahoney	All
10:30 - 11:00 am	<b>Task 1 (AWA): High Level Review of Progress &amp; Technical Elements</b> 1) Description of work performed 2) Activities proposed through next workshop 3) Input needed from others 4) Problems or delays and recommended solutions 5) Deliverables submitted during this reporting period 6) Budget and schedule status	Bill Kappel	All
11:00 - 11:30 am	<b>Task 2 (MetStat): Review of Progress &amp; High Level Technical Elements</b> 1) Description of work performed 2) Activities proposed through next workshop 3) Input needed from others 4) Problems or delays and recommended solutions 5) Deliverables submitted during this reporting period 6) Budget and schedule status	Tye Parzybok & Debbie Martin	All
11:30 am - 12:30 pm	<i>Working Lunch (boxed lunches)            Facilitated discussion of project business            (role and responsibilities,            communication, tools, decision-making            protocols, etc.)</i>	Jessica Williams	All
12:30 - 4:45 pm (includes 15 minute break)	<b>Working Session #1-A&amp;B: Technical Discussions</b> <i>Breakout into working groups to work            through Identified topics requiring PRB's</i>	<u>Task 1            breakout</u> Kevin Griebenow &	Project Sponsors  Task 1 & 2

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<p><i>Working session agenda and discussion items are listed below in this document</i></p>	<p><i>recommendation of Best Available Science and to identify PRB QA Items and necessary deliverables</i></p> <p><u>#1-A - Task 1: PRB subgroup with AWA (1 of 2)</u>  <a href="#">Room: TBD</a>  <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a>   PIN: 89370  <a href="tel:3035523982">Dial in: 303-552-3982</a>   PIN: 89370#</p> <p><u>#1-B - Task 2: PRB subgroup with MetStat (1 of 2)</u>  <a href="#">Room: TBD</a>  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>   PIN: 31318  <a href="tel:8886017442">Dial in: 888-601-7442</a>   PIN: 31318#</p>	<p>Bill Kappel,          Doug Hultstrand,          Geoff Muhlestein</p> <p><u>Task 2 breakout</u>          John England /          Tye Parzybok,          Debbie Martin, Mel Schaefer &amp; Jason Caldwell</p>	<p>Consultants           Other interested parties <i>(optional)</i></p>
<p>4:45 - 5:00 pm</p>	<p><i>Closeout &amp; Adjourn</i></p>		

5:30 pm: Social Hour and Ballgame! Colorado Rockies vs. Arizona Diamondbacks (Location: Coors Field at 2001 Blake St, Denver, CO 80205). Social hour from 5:30-6:30 p.m., first pitch at 6:40 p.m. Link to flyer: <https://drive.google.com/drive/u/1/folders/0B5iuHrG4N7tQWEhHVy13S0U4eW8>. For ticket information and reservations prior to 6/1, contact Jess Drawhorn at [JDrawhorn@AcclivityAssociates.com](mailto:JDrawhorn@AcclivityAssociates.com) or get your ticket for the Rooftop directly or at the box office on game day.

4.2.2 Day 2: Wednesday, June 21

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Lead	Participants
<p>8:00 - 10:00 am</p>	<p><b>Group Working Session #2-A&amp;B: Technical Discussions</b>  <i>Breakout into working groups to Discuss work through Identified topics requiring PRB's Recommendation of Best Available Science and to identify PRB QA/QC Items and necessary deliverables/ Other TBD</i></p> <p><u>#2-A - Task 1: PRB subgroup with AWA (2 of 2)</u>  <a href="#">Room: TBD</a>  <a href="http://www.uberconference.com/acclivity_asso">www.uberconference.com/acclivity_asso</a></p>	<p><u>Task 1 breakout</u>          Kevin Griebenow &amp; Bill Kappel,          Doug Hultstrand,          Geoff Muhlestein</p> <p><u>Task 2</u></p>	<p>Project Sponsors           Task 1 &amp; 2 consultants           Other interested parties <i>(optional)</i></p>

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	<p><a href="#">ciates</a>   PIN: 89370  Dial in: 303-552-3982   PIN: 89370#</p> <p><u>#2-B - Task 2: PRB subgroup with MetStat (2 of 2)</u>  Room: TBD  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>   PIN: 31318  Dial in: 888-601-7442   PIN: 31318#</p> <p><i>Working session agenda and discussion items are listed below in this document</i></p>	<p><u>breakout</u>  John England /  Tye Parzybok,  Debbie Martin, Mel Schaefer &amp;  Jason Caldwell</p>	
10:00 - 10:15 am	<b>Break</b>		
10:15 - 11:45 am	<p>Group Working Session #3: Task 3  Technical Discussions with NOAA ESRL</p> <p><i>Working session agenda and discussion items are listed below in this document</i></p>	<p>David Keeney &amp; Kelly Mahoney</p>	<p>Project Sponsors</p> <p>Task 3 consultants</p> <p>Other interested parties (optional)</p>
11:45 am - 12:45 pm	<b>Lunch (hot bar)</b>		
12:45 - 1:45 pm	<p>Project Deliverables</p> <ul style="list-style-type: none"> <li>• Summary Report</li> <li>• Standard of Practice Document</li> <li>• Summary of Topics for Further Research</li> <li>• GIS Tool</li> </ul>	<p>Bill McCormick /  Jessica Williams</p>	<p>Project Sponsors  PRB Members  Consultants</p> <p>Other interested parties (optional)</p>
1:45 - 4:45 pm (with 15 minute break)	<p>Working Session #4-A: Collaboration Across Technical Tasks  Room: 814  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>  Dial in: 303-552-3982   PIN: 89370#</p> <ul style="list-style-type: none"> <li>• Coalescing to deliver</li> <li>• Criteria for success</li> </ul>	<p>Consultant Leads</p>	<p>Project Sponsors (as observers and advisors)</p> <p>All Consultants</p>

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	<ul style="list-style-type: none"> <li>• Collaboration to incorporate Task 3 research into Tasks 1 &amp; 2</li> <li>• Total Precip vs. Rain only / seasonality</li> <li>• Temporal distributions</li> <li>• GIS tool integration</li> </ul>		
1:45 - 4:45 pm <i>(with 15 minute break)</i>	<p>Working Session #4-B: PRB Internal Working Session  <b>Room: TBD</b>  <a href="http://www.uberconference.com/acclivityassociates">www.uberconference.com/acclivityassociates</a>  <b>Dial in: 888-601-7442   PIN: 31318#</b></p> <ul style="list-style-type: none"> <li>• OTF</li> <li>• Task 2 storm typing data</li> <li>• Recommendations for Task 3 supporting Tasks 1 and 2</li> <li>• ID new Task 3 sub-group lead</li> <li>• Project technology and communications</li> </ul>	Chuck McWilliams & Ken Fearon	PRB Members
4:45 - 5:00 pm	<i>Closeout &amp; Adjourn</i>		

5:30 pm: Social Hour (Location: Pints Pub at 221 W 13th Ave, Denver, CO 80204)

4.2.3 Day 3: Thursday, June 22

Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates) | PIN: 89370; Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Lead	Participants
8:00 - 8:15 am	<i>Commence &amp; Group Comments</i>	Jessica Williams	All
8:15 - 8:45 am	<p>Task 3: Working Session Briefing for Large Group  <i>Report out on discussion, decisions, and open items</i></p> <ul style="list-style-type: none"> <li>• Use of Task 3 modeling tools Task 1 and Task 2</li> </ul>	David Keeney & Kelly Mahoney	All
8:45 - 9:15 am	<p>Task 1: Working Session Briefing for Large Group  <i>Report out on discussion, decisions, and open items</i></p>	PRB sub-lead Kevin Griebenow / Bill Kappel, Doug Hultstrand,	All

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		Geoff Muhlestein	
9:15 - 9:45 am	<b>Task 2: Working Session Briefing for Large Group</b> <i>Report out on discussion, decisions, and open items</i>	PRB sub-lead John England / Tye Parzybok, Debbie Martin, Mel Schaefer & Jason Caldwell	All
9:45 - 10:00 am	<i>Break</i>		
10:00 - 11:30 am	<b>PRB Report Out</b> <ul style="list-style-type: none"> <li>• Discuss collaborative plan for Task Consultants to address PRB recommendations (Agreed upon revisions, additional investigations, etc. should be summarized in a draft PRB Workshop Report)</li> <li>• Get PRB recommendations on questions posed by Task Consultants</li> <li>• Discuss agreed-upon items for PRB QA review and needed deliverables from Task Consultants</li> </ul>	Chuck McWilliams & Ken Fearon	All
11:30 - 11:45 am	<b>Concluding Remarks &amp; Next Steps</b>	Bill McCormick / Chuck Thompson	All
11:45 am - 12:00 pm	<i>Adjourn for PRB Members &amp; Observers - Break and Fare-thee-wells</i>		
12:00 - 1:00 pm	<b>Working Lunch: Discuss ASDSO Conference Presentation (boxed lunch)</b>	Bill McCormick	Project Sponsors  All Consultants
1:00 pm	<i>Adjourn for Technical Consultants</i>		



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1:00 - 1:45 pm	Internal Workshop Debrief (working lunch) (Project Sponsors, PM Consultants)	Bill McCormick / Jessica Williams	Project Sponsors  Task 4 Consultants
1:45 pm	<i>Adjourn for Project Sponsors &amp; PM Consultants</i>		

Technical Items for PRB Recommendations on Best Available Science

Task 1 - AWA

- OTF
- MTF

Working Session	Leads
<p><b>Task 1: Deterministic PMP Estimation</b></p> <p><u>Detailed Technical Discussion Items</u></p> <ul style="list-style-type: none"> <li>• Day 1:                             <ul style="list-style-type: none"> <li>○ Initial OTF results/maps</li> <li>○ Initial MTF results/maps</li> <li>○ Initial Total Adjustment results/maps</li> </ul> </li> <li>• Day 2:                             <ul style="list-style-type: none"> <li>○ Storm analysis updates</li> <li>○ Transposition zones</li> <li>○ Initial transposition limits</li> <li>○ Rainfall Only                                     <ul style="list-style-type: none"> <li>■ HRRR Data</li> </ul> </li> </ul> </li> </ul>	<p>PRB sub-lead: Kevin Griebenow AWA: Bill Kappel, Doug Hultstrand, Geoff Muhlestein</p>
<p><b>Task 2: Regional Extreme Precipitation Frequency Estimates</b></p> <p><u>Detailed Technical Discussion Items</u></p> <ul style="list-style-type: none"> <li>• Day 1:                             <ul style="list-style-type: none"> <li>○ Storm Typing final review</li> <li>○ Preliminary results for 2-day MLC/TSR</li> <li>○ L-RAP demonstration</li> <li>○ Long-term behavior in L-moments</li> <li>○ Uncertainty and EIRL</li> <li>○ Recap and decision on Development of Watershed PF Relationships</li> </ul> </li> <li>• Day 2:                             <ul style="list-style-type: none"> <li>○ Using PF findings and storm temporal patterns for hydrologic analyses</li> <li>○ HRRR data applications/uses</li> <li>○ GIS Tool Development</li> </ul> </li> </ul>	<p>PRB sub-lead: John England MetStat: Tye Parzybok, Debbie Martin, Mel Schaefer &amp; Jason Caldwell</p>

<p><b>Task 3: Dynamic Modeling</b></p> <ul style="list-style-type: none"> <li>● Review of annual mean and mean-annual-max datasets for different durations (based on 5 year HRRR record) provided to Tasks 1&amp;2</li> <li>● Review of the rain vs. snow assessment for CO/NM based on HRRR forecasts</li> <li>● HRRR performance for the 11-12 Sep 2013 event</li> <li>● Examining PDFs of precipitation occurrence at each 3km HRRR gridpoint: 95th or even 99th percentile much less “noisy” than the 5-year max</li> <li>● FUTURE/ONGOING WORK:             <ul style="list-style-type: none"> <li>○ Can we estimate an “effective period of record” for the HRRR dataset in order to assess return intervals?</li> <li>○ Can we find a way to take advantage of both the high spatial resolution of the HRRR as well as the long periods of record for the station observations used by Tasks 1, 2?</li> </ul> </li> <li>● Update on Non-stationarity/Climate Change white paper, request for info</li> </ul>	<p>PRB sub-lead: David Keeney NOAA: Kelly Mahoney</p>
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- Storm list-SPAS storm to be analyzed
- Initial transposition zones
- Rain only precip frequency list

**Task 2 - MetStat**

- Storm Typing procedure
- Method for Watershed PF Relationships

**Task 3 - NOAA**

- None

**Working Session: Agenda & Discussion Items**

**Meeting Materials Distributed Digitally**

- Workshop Agenda
- Workshop Presentations
- Rockies Game Flyer
- Project Final Deliverable Draft

Link: <https://drive.google.com/drive/u/1/folders/0B5iuHrG4N7tQWEhHVy13S0U4eW8>

**Recommended Reading Prior to Workshop #4**

All documents can be found in the [CO-NM REPS Materials for PRB](#) Google Drive folder. Individual links to each document or folder are specified below.

### Project Deliverables

- Summary Report Outline
- Standard of Practice Document Outline

### Task 1: AWA

- OTF/MTF maps and excel files
- OTF 100-yr vs 1000yr vs linear regression memo
- SPAS lite results

### Task 2: MetStat | EPG

- Technical Memorandum for Stochastic Storm Generation “Move-the-Earth” Procedure - for use in developing watershed PF relationships
- Seasonality and L-moment Images for the Heterogeneous Super-Regions

### Task 3: NOAA

- None

## 5. CO-NM REPS: Workshop #5 Agenda

Workshop Purpose	Review of Progress, Working Sessions, Decision-Making, Path Forward
Workshop	All: Tuesday, October 24 - Wednesday, October 25, 2017
Date & Time	Sponsors & Task 4 Consultants: Thursday, October 26, 2017 <ul style="list-style-type: none"> <li>• <u>Day 1</u>: 7:30 am - 4:45 pm meeting</li> <li>• <u>Day 2</u>: 8:00 am - 5:00 pm meeting</li> <li>• <u>Day 3</u>: (Sponsors &amp; Task 4 consultants only) 8:00 am - 12:00 pm</li> </ul> Social hour each evening at 5:30 pm (main gathering on Tuesday)
Location	New Mexico Office of the State Engineer District 1 5550 San Antonio Dr. NE, Albuquerque, NM 87109
Call-In Information	<b>Main Meeting Room: Room: Rio Grande Conference Room (1st Floor)</b> Web: <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a>   PIN: 89370 Dial in number (main): 303-552-3982   PIN: 89370# <b>Secondary Meeting Room: OSE District 1 Conference Room (1st Floor)</b> Web: <a href="http://www.uberconference.com/acclivity">www.uberconference.com/acclivity</a>   PIN: 71068 Dial in number (secondary): 888-915-8032   PIN: 71068#
Organizers	Colorado Division of Water Resources (DWR) New Mexico Office of the State Engineer (OSE) Acclivity Associates

### 5.1. Attendees

#### Project Core Team

Project Sponsors	Task 2 - MetStat / EPG
Bill McCormick	Tye Parzybok (remote)
Chuck Thompson	Debbie Martin
Mark Perry	Jason Caldwell
Bud Brock	Mel Schaefer
Sushil Chaudhary	Task 3 - NOAA
Jeremy Franz	Kelly Mahoney
James Head	Eric James
David Heber	Trevor Alcott (remote)
Jason Ward	Task 4 - Acclivity
Task 1 - AWA	Will Meyer
Bill Kappel	Jessica Williams
Doug Hultstrand	
Geoff Muhlestein (remote)	

*Project Core Team members no able to attend: Scott Cuthbertson (Sponsor), David Heber (Sponsor), Judy Leyba (Sponsor), Anna Mauss (Sponsor), George Taylor (Task 2), Victoria Bahls (Task 2), Rob Cifelli (Task 3), Julie Baxter (Task 4), Jess Drawhorn (Task 4)*

#### Project Review Board

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Chuck McWilliams (remote)	Joe Kanney (remote)
Ken Fearon	Ken Kunkel
Nolan Doesken (tentative, remote)	John Onderdonk
Dave Dubois	Kevin Quinlan
John England (remote)	Atiq Syed
Kevin Griebenow	

*PRB members not attending:* Siamak Esfandiary, David Keeney, Ken Nowak, Nezette Rydell, Robin Webb, Karen Weghorst

Dam Owners, Observers & Other Stakeholders

Steven Anslemo*	Gerhard Schoener
Brad Bingham*	Stephen Scissons (tentative)
Kristy Bramlett	Sigmund Silber* (tentative)
Pat Conley	Ray Tenney*
Casey Dick*	Anne Tillery
Chuck Easterling (tentative)	Kevin Troutman*
Royce Fontenot	Joseph Wright
Don Lopez	Matthew Young* (remote)
Matthew Masek (remote)	Nicole Young* (remote)
Michele Minihane (remote)s	

\* Dam Owner

*Dam Owners not attending:* Bob Bass, Hunter Causey, John Clark, Joe Donnelly, Brian McCormick, Lisa Shoaff

5.2. Agenda

Informal Social Hour on Monday, October 23 at 5:30 pm at the Cracker Barrel (5200 San Antonio Dr NE, Albuquerque, NM 87109)

5.2.1 Day 1: Tuesday, October 24

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Leads	Participants
7:30 - 8:00 am	<i>Commence (coffee &amp; hellos)</i>		
8:00 - 8:20 am	Welcome  For the Good of the Order <ul style="list-style-type: none"> <li>● Workshop Goals</li> <li>● Logistics</li> </ul>	Bill McCormick / Chuck Thompson / Jessica	All

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	<ul style="list-style-type: none"> <li>● Agenda Review</li> <li>● Workshop #5 Decision Item List Review</li> </ul>	Williams	
8:20 - 9:00 am	ASDSO Conference Debrief & Hurricane Harvey Storm	Bill McCormick / Bill Kappel / Tye Parzybok/Eric James/Kelly M.	
9:00 - 9:15 am	Task 2 (MetStat): High Level Review of Progress & Technical Elements	Debbie Martin	All
9:15 - 9:30 am	Task 1 (AWA): Review of Progress & High Level Technical Elements	Bill Kappel	All
9:30 - 9:45 am	<i>Break</i>		
9:45 - 11:15 am	Task 3 (NOAA): Group Working Session #1	Kelly Mahoney	All
11:15 am - 12:15 pm	Working Lunch: NRC Review Status of the TVA Overall Basin PMP and Local Intense Precipitation Topical Report	Kevin Quinlan	All
12:15 - 4:30 pm <i>(including setup and 15 minute break at discretion of group)</i>	<p>Working Sessions #2 &amp; #3: Technical Task Discussions*</p> <p>→ <u>Working Session #2: Task 2</u></p> <p>▷ Conference Room: Rio Grande</p> <p>▷ Web: <a href="http://www.uberconference.com/acclivity">www.uberconference.com/acclivity</a>   PIN: 71068</p> <p>▷ Dial-in: 888-915-8032   PIN: 71068#</p> <p>→ <u>Working Session #3: Task 1</u></p> <p>▷ Conference Room: OSE District 1</p> <p>▷ Web: <a href="http://www.uberconference.com/acclivity_asociates">www.uberconference.com/acclivity_asociates</a>   PIN: 89370</p> <p>▷ Dial-in: 303-552-3982   PIN: 89370#</p>	<p>Debbie Martin / Will Asquith</p> <p>Bill Kappel / Kevin Griebenow</p>	<p>Project Sponsors</p> <p>Task Consultants</p> <p>Other interested parties <i>(optional)</i></p>
4:30 - 4:45 pm	<i>Closeout &amp; Adjourn</i>		

\* Breakout into working groups to discuss work-through issues that require recommendations from the PRB based on Best Available Science and to identify PRB QA/QC Items and

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necessary deliverables. Session sub-agenda and discussion items are detailed below in this document.

Social Hour: 5:30 pm at Sadie's (5400 Academy Rd NE, Albuquerque, NM 87109)

5.2.2 Day 2: Wednesday, October 25

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Lead	Participants
8:00 - 8:15 am	<i>Commence &amp; Group Comments</i>	Jessica Williams	All
8:15 - 9:00 am	Climate Change White Paper Presentation & Group Discussion	Jeff Lukas & Kelly Mahoney	All
9:00 am - 11:15 pm (including optional break at discretion of group)	<p>Working Sessions #4 &amp; #5: Technical Task Discussions*</p> <p>→ <u>Working Session #4: Task 2</u></p> <p>▷ Conference Room: Rio Grande</p> <p>▷ Web: <a href="http://www.uberconference.com/acclivity">www.uberconference.com/acclivity</a>   PIN: 71068</p> <p>▷ Dial-in: 888-915-8032   PIN: 71068#</p> <p>→ <u>Working Session #5: Task 1</u></p> <p>▷ Conference Room: OSE District 1</p> <p>▷ Web: <a href="http://www.uberconference.com/acclivity_associates">www.uberconference.com/acclivity_associates</a>   PIN: 89370</p> <p>▷ Dial-in: 303-552-3982   PIN: 89370#</p>	<p>Debbie Martin / Will Asquith</p> <p>Bill Kappel / Kevin Griebenow</p>	<p>Project Sponsors</p> <p>Task Consultants</p> <p>Other interested parties (optional)</p>
11:15 am	<p><u>Lunch</u></p> <p>PRB: Working lunch combined with Working Session #6</p> <p>All Others: Lunch break 11:15 am - 12:15 pm followed by Working Session #7</p>		
PRB ONLY 11:15 am - 2:00 pm (including optional break)	<p>Working Session #6: PRB Internal Meeting*</p> <p>Discuss technical task items as needed for decisions and recommendations</p> <p>▷ Conference Room: OSE District 1</p>	Ken Fearon (All Tasks) & Task Sub-Leads Kevin Griebenow	PRB Members

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<i>at group's discretion)</i>	<p>▷ Web: www.uberconference.com/acclivity   PIN: 71068</p> <p>▷ Dial-in: 888-915-8032   PIN: 71068#</p>	(T1), Will Asquith (T2), Ken Fearon (T3)	
<p><i>All Others</i> 12:15 - 2:00 pm</p>	<p><b>Working Session #7: Technical Task Collaboration &amp; Information Exchange*</b></p> <ul style="list-style-type: none"> <li>● Project schedule(s) (dependencies, etc.)</li> <li>● Task Coordination</li> <li>● Temporal Distributions for design storms</li> <li>● Project Tools: QA/QC discussion, testing, beta testing, etc.</li> </ul> <p>▷ Conference Room: Rio Grande</p> <p>▷ Web: www.uberconference.com/acclivity_associates   PIN: 89370</p> <p>▷ Dial-in: 303-552-3982   PIN: 89370#</p>	Sponsors; Consultant Task Leads	<p>All Consultants; Other interested parties (<i>optional</i>)</p>
<p>2:00 - 2:15 pm</p>	<i>Break</i>		
<p>2:15 - 3:15 pm</p>	<p><b>PRB Report Out</b></p> <ul style="list-style-type: none"> <li>● Tasks report out on results of technical breakout sessions: decisions, recommendations, and requests for information</li> <li>● Discuss plan for Task Consultants to address PRB recommendations</li> <li>● Get PRB recommendations on questions posed by Task Consultants</li> <li>● Discuss items for PRB QA review and needed deliverables from Task Consultants</li> </ul>	Project Sponsors; Consultant Task Leads	All
<p>3:15 - 4:00 pm</p>	<p><b>Task Consultant Present Project Schedules</b> <i>October 2017 to February 2018 (Workshop #6) to have working products and preliminary results</i></p> <ul style="list-style-type: none"> <li>● Task 1 (3:45 - 4:00 pm)</li> <li>● Task 2 (4:00 - 4:15 pm)</li> <li>● Task 3 (4:15 - 4:30 pm)</li> </ul>	Bill Kappel / Debbie Martin / Kelly Mahoney	All



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4:00 - 4:30 pm	Discussion of test basins & beta testing/QA process (March-June) <ul style="list-style-type: none"> <li>● Project needs and path forward</li> <li>● End user uses and needs</li> </ul>	Mark Perry	All
4:30 - 5:00 pm	Workshop Conclusion <ul style="list-style-type: none"> <li>● Discuss project schedule to completion (March - June 2018)</li> <li>● Next steps</li> <li>● Concluding remarks</li> </ul>	Jessica Williams, Bill McCormick, Chuck Thompson	All
5:00 pm	<i>Adjourn and fare thee wells for PRB Members, Consultants Tasks 1-3 &amp; Observers</i>		

\* Breakout into working groups to discuss work through Identified topics requiring PRB's recommendation of Best Available Science and to identify PRB QA/QC Items and necessary deliverables. Discussion items are detailed below in this document.

Informal Social Hour at 5:30 pm at Starr Brother's (Suite B1, 5700 San Antonio Dr NE, Albuquerque, NM 87109)

### 5.2.3 Day 3: Thursday, October 26

(Participation in-person only)

Time	Topic	Lead	Participants
8:00 - 11:30 am (with break)	Project Management Working Session Briefing for Project Management Team <ul style="list-style-type: none"> <li>● Workshop Debrief</li> <li>● Project Deliverables</li> <li>● Project Plan</li> </ul>	Jessica Williams, Bill McCormick, Chuck Thompson	Sponsors, Task 4 Consultants
11:30 am - 12:00 pm	<i>Working Lunch, Cleanup &amp; Adjourn, and Fare-thee-wells for Project Sponsors &amp; Task 4 Consultants</i>		

## Technical Items for Decisions and PRB Recommendations on Best Available Science

### Task 1 - AWA

- In-place maximization of new SPAS analyses
- Transposition limits of individual storms
- HRRR ratio application for rain only correction factor
- Temporal applications-by storm type and by region
- Discussion regarding envelopment process and whether it is needed

### Task 2 - MetStat

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- Spatial Mapping Method and Review
- Watershed Precipitation-Frequency Development
- End User Product

Task 3 - NOAA

- Any additional necessary/desired analysis on:
  - HRRR gridded max, mean, percentile products/diagnostics
  - Precipitation distribution analysis
  - WRF model experiments
- Any changes to Task 3 data use in Task 1’s rain-snow distinction
- Task 3’s role in Task 2’s “move the earth” method

Guidance on most beneficial “working products” to deliver by Feb 2018; whether/how Task 3 can be used in final deliverables (e.g., GUI, etc.)

Working Session	Leads
<p><b>Task 1: Deterministic PMP Estimation</b></p> <ul style="list-style-type: none"> <li>● New SPAS Storm Analyses</li> <li>● New Storm Maximizations</li> <li>● Initial Storm Transposition Limits</li> <li>● HRRR results implementation for high elevation rainfall</li> <li>● GTF-MTF-TAF and initial PMP values</li> <li>● GIS database setup</li> <li>● Spatial and temporal envelopment</li> <li>● Temporal patterns for design storms</li> </ul>	<p>PRB sub-lead: Kevin Griebenow AWA: Bill Kappel, Doug Hultstrand, Geoff Muhlestein</p>
<p><b>Task 2: Regional Extreme Precipitation Frequency Estimates</b></p> <ul style="list-style-type: none"> <li>● AMS data QC update</li> <li>● Seasonality of Storm Types</li> <li>● Tropical versus Non-Tropical Magnitudes</li> <li>● Spatial mapping approach with results for 48-hour MLC/TSR</li> <li>● Precipitation Frequency Tool with TVA GUI demo</li> <li>● Watershed Selection</li> <li>● Point PF to Hydrologic Response</li> <li>● Tech Task Tracker items</li> </ul>	<p>PRB sub-lead: William Asquith MetStat: Tye Parzybok, Debbie Martin, Mel Schaefer &amp; Jason Caldwell</p>
<p><b>Task 3: Dynamic Modeling</b></p> <ul style="list-style-type: none"> <li>● HRRR dataset distribution-fitting development work</li> <li>● WRF model case studies</li> <li>● Non-stationarity/climate change white paper</li> </ul>	<p>PRB sub-lead: Ken Kunkel NOAA: Kelly Mahoney</p>

Meeting Materials Distributed Digitally

- Workshop Agenda
- Workshop Presentations
- Pre-meeting materials

Link: <https://drive.google.com/drive/u/2/folders/0B5iuHrG4N7tQbzZMZEExFNGRHZlk>

### Recommended Reading Prior to Workshop #5

All documents can be found in the [CO-NM REPS Materials for PRB](#) Google Drive folder. Individual files are specified below.

#### Task 1: AWA

- Storm list and adjustments
- SPAS storm information
- Envelope process
- Temporal process
- GIS PMP tool
- GTF summary statistics
- Checklist
- Gibson Dam comparisons

#### Task 2: MetStat | EPG

- None

#### Task 3: NOAA

- None

#### Additional Supporting Materials

- Peer Review of the TVA study by John England and Jerry Stedinger (relates to Task 2 work) CO-NM REPS: Workshop #6

### 5.3. Agenda

Workshop Purpose	Review of Progress, Working Sessions, Decision-Making, Path Forward
Workshop	Monday, April 9 - Wednesday, April 11, 2018
Date & Time	<ul style="list-style-type: none"> <li>• <u>Day 1</u>: 11:30 am - 5:00 pm meeting (evening social: Rockies Game!)</li> <li>• <u>Day 2</u>: 8:00 am - 5:00 pm meeting (evening social: main gathering)</li> <li>• <u>Day 3</u>: 8:00 am - 5:00 pm meeting (evening social)</li> </ul>
Location	Colorado Division of Water Resources 1313 Sherman Street, Denver, Colorado
Call-In Information	<p><b>Main Meeting Room: 814 (8th Floor)</b>  <a href="http://www.uberconference.com/acclivity_associates">Line 1 Web: www.uberconference.com/acclivity_associates</a>   PIN: 89370            Line 1 Dial in number (main): 303-552-3982   PIN: 89370#  <b>Secondary Meeting Room: 220 (2nd Floor)</b>  <a href="http://www.uberconference.com/acclivityassociates">Line 2 Web: www.uberconference.com/acclivityassociates</a>   PIN: 31318            Line 2 Dial in: 888-601-7442; 31318</p>
Organizers	Colorado Division of Water Resources (DWR) New Mexico Office of the State Engineer (OSE) Acclivity Associates

### 5.4. Attendees

#### Project Core Team

#### SPONSORS

Bill McCormick  
 Chuck Thompson  
 Mark Perry  
 Sushil Chaudhary  
 Jeremy Franz  
 James Head  
 David Heber  
 Anna Mauss  
 Jason Ward

#### TASK 1 - AWA

Bill Kappel  
 Doug Hultstrand  
 Geoff Muhlestein  
 Kristi Steinhilber

#### TASK 2 - MetStat

Tye Parzybok  
 Debbie Martin  
 Mel Schaefer  
 Victoria Bahls  
 Blake Allen  
 George Taylor (remote)  
 Katie Ward

#### TASK 3 - NOAA

Kelly Mahoney  
 Trevor Alcott  
 Eric James  
 Rob Cifelli

#### TASK 4 - Acclivity

Will Meyer  
 Jessica Williams  
 Julie Baxter  
 Jess Drawhorn

*Project Core Team members not able to be present: Bud Brock*

## CO-NM Regional Extreme Precipitation Study

### Project Review Board

Chuck McWilliams	David Keeney
Ken Fearon	Ken Kunkel
William Asquith (remote)	John Onderdonk
John England (remote)	Kevin Quinlan
Kevin Griebenow	Nezette Rydell
Gokhan Inci	Russ Schumacher
Joe Kanney	Robin Webb

*PRB members not able to be present: Chris Cook, James Demby, Nolan Doesken, Dave Dubois, Siamak Esfandiary, Ken Nowak, Atiq Syed, Karen Weghorst*

### Dam Owners, Observers & Other Stakeholders

Steven Anslemo	Jeff Lukas
Bob Bass	Brian McCormick
Brad Bingham	Michele Minihane
Kirsty Bramlett	Ray Tenney
John Clark	Charles Thomas
Pat Conley	Kevin Troutman
Casey Dick	Doug Woolridge
Ken Easterling	Joseph Wright
Royce Fontenot	

*Dam owners members not able to be present: Hunter Causey, Joe Donnelly, Zack Libbin, Lisa Shoaff, Sigmund Silber, Matthew Young, Nicole Young*

### Meeting Materials

- Workshop agenda
- Workshop presentations
- Other supporting materials

Link: [https://drive.google.com/drive/u/1/folders/1klkjhWBlul8bUTQwxwz3Yd7xkE8i\\_36x](https://drive.google.com/drive/u/1/folders/1klkjhWBlul8bUTQwxwz3Yd7xkE8i_36x)

### Recommended Reading Prior to Workshop #6

*All documents can be found in the Google Drive folder (link above)*

- Draft Summary Report Volumes I-V, VII
- Task 1 materials
- Gibson Dam Storm Analysis

### Items for Decisions and PRB Recommendations on Best Available Science

#### Task 1 - AWA

- Are the current PMP estimates acceptable and reasonable?
- Are the recommended temporal accumulations patterns acceptable?

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- Are there any sections/technical discussions which need to be included in the Task 1 documentation?

### Task 2 - MetStat

- AEP map review
- Final deliverables and end-user product

### Task 3 - NOAA

- Any concerns about historical model case studies that have been used by Task 1 for storms of interest?
- Any desire for HRRR/model grids in end-user product(s)?
- Survey PRB on potential use/interest (following HRRR-based gridded moisture maximization example)
- Final input/discussion on climate change/non-stationarity report (after presenting overview/draft executive summary)
- Discussion of next steps for dynamical model approach development (perhaps specifically to hydrologic/probable maximum flood applications)

## 6. CO-NM REPS: Workshop #6

### 6.1. Agenda

#### 6.1.1 Day 1: Monday, April 9

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Leads	Participants
11:30 - 12:30 pm	<i>Commence &amp; Lunch</i>		
12:30 - 1:00 pm	Welcome <ul style="list-style-type: none"> <li>• Introductions</li> <li>• Workshop Overview</li> </ul>	Bill McCormick / Chuck Thompson / Jessica Williams	All
1:00 - 1:30 pm	High Level Review of Progress & Technical Elements for Tasks 1, 2	Bill Kappel / Debbie Martin	All
1:30 - 2:00 pm	Task 3 Technical Presentation <ul style="list-style-type: none"> <li>• High level review of progress</li> <li>• HRRR model moisture maximization, historic storm WRF analyses, and more</li> </ul>	Kelly Mahoney	All
2:00 - 3:00 pm	Resolution of Open Items from prior workshops  Gibson Dam	Mark Perry & PRB Leads  Ken Kunkel	All
3:00 - 3:15 pm	Beta Testing Results	Mark Perry / Chuck Thompson	All
3:15 - 3:30 pm	<i>Break</i>		
3:30 - 5:00 pm	*Technical Discussion 1: Task 1 - AWA <i>Line 1 (refer to page 1)</i>	Bill Kappel	All Task 1 stakeholder representatives
	*Technical Discussion 2: Task 2 - MetStat	Debbie Martin & Mel	All Task 2 stakeholder

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	<a href="#">Line 2 (refer to page 1)</a>	Shaeffer	representatives
5:00 pm	<b>Closeout &amp; Adjourn</b>		

\* This session runs concurrent with another session

Social: Rockies vs. San Diego at Coors Field (2001 Blake St, Denver, CO 80205)

6.1.2 Day 2: Tuesday, April 10

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Lead	Participants
8:00 - 11:45 am (with 15 minute break)	*Technical Discussion 1: Task 1 - AWA continued <a href="#">Line 1 (refer to page 1)</a>	Bill Kappel	All Task 1 stakeholder representatives
	*Technical Discussion 2: Task 2 - MetStat continued <a href="#">Line 2 (refer to page 1)</a>	Debbie Martin & Mel Shaeffer	All Task 2 stakeholder representatives
11:45 am - 12:45 pm	<b>Lunch</b>		
12:45 - 2:00 pm	Consultant Demo of Tools Tasks 1 & 2	Bill Kappel, Debbie Martin	All
2:00 - 2:15 pm	<b>Break</b>		
2:15 - 5:00 pm	*PRB Internal Meeting <a href="#">Line 2 (refer to page 1)</a>	Chuck McWilliams	PRB Members
	<u>2:15 - 3:15</u> *Conversation with the Dam Owner & Observers (questions & comments) <a href="#">Line 1 (refer to page 1)</a>  <u>3:15 - 5:00 pm</u> *Project Coordination Meeting <ul style="list-style-type: none"> <li>Task integration</li> <li>Draft Standard of Practice document</li> </ul> Outline/Development/Review	Jessica Williams / Bill McCormick	Sponsors, Consultants, Dam Owners & Observers (others welcome to observe)



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	<i>Line 1 (refer to page 1)</i>		
5:00 pm	<i>Closeout &amp; Adjourn</i>		

\* This session runs concurrent with another session

Social Hour at 5:30 pm at Stoney’s Bar and Grill (1111 Lincoln St, Denver, CO 80203)

6.1.3 Day 3: Wednesday, April 11, 2018

Large group sessions: Web: [www.uberconference.com/acclivity\\_associates](http://www.uberconference.com/acclivity_associates); Phone: 303-552-3982 | PIN: 89370#

Time	Topic	Lead	Participants
8:00 - 8:15 am	<i>Commence &amp; Group Comments</i>	<i>Jessica Williams</i>	<i>All</i>
8:15 - 11:45 am (with break)	<p>Summary Report: “Big Picture” Content Review &amp; PRB Comments (“Is there anything missing?”)</p> <p>Volume 1: Background and Need Volume 2: Deterministic Regional Probable Maximum Precipitation Estimation Volume 3: Regional Precipitation-Frequency Estimation Volume 4: High Resolution Rapid Refresh Numerical Weather Forecasting Model Volume 5: Draft Standard of Practice Volume 6: Climate Change White Paper Volume 7: Topics for Further Research</p>	Jessica Williams	All
11:45 - 1:00 pm	<p><i>Working Lunch: NOAA Presentation</i></p> <ul style="list-style-type: none"> <li>• Climate change white paper</li> <li>• Future direction for role of dynamical modeling in extreme precip/PMP</li> </ul>	Kelly Mahoney	<i>All</i>
1:00 - 3:00 pm	PRB Report Out	Chuck McWilliams & Task Sub-Leads	All
3:00 - 3:15 pm	<i>Break</i>		

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3:15 - 3:45 pm	Criteria for Success - How are we doing?	Julie Baxter	All
3:45 - 4:15 pm	Project Action Planning / Next Steps	Jessica Williams	All
4:15 - 4:30 pm	Project Appreciation & Closing Remarks	Bill McCormick & Chuck Thompson	All
4:30 pm	<i>Adjourn</i>		

Social Hour at 5:00 pm at Pints Pub (221 W 13th Ave, Denver, CO 80204)

## 7. CO-NM REPS: Workshop #7

Workshop Purpose	Project Closeout Meeting
Workshop	Wednesday, August 22, 2018
Date & Time	10:00 a.m. - 1:00 p.m. Mountain Time <i>Lunch will be provided</i>
Location	Hunter Education Building Colorado Parks & Wildlife Campus 6060 Broadway, Denver, Colorado
Call-In & Video Link	Webinar <a href="https://www.uberconference.com/acclivity_associates">https://www.uberconference.com/acclivity_associates</a> ; PIN: 89370 Dial in number: 303-552-3982; PIN: 89370#
Organizers	Colorado Division of Water Resources New Mexico Office of the State Engineer Acclivity Associates

### 7.1. Agenda

- Welcome
- High Level Project Summaries - Results and Tools
  - Task 1 - PMP Maps of the Region and AEP of PMP, Tool Demo (AWA)
  - Task 2 - AEP Maps of the Region, Tool Demo (MetStat)
  - Task 3 - Lessons Learned about Uses of Dynamical Modeling for Extreme Precipitation (NOAA)
- PRB Project Overview & Thoughts on their Final Project Documentation (PRB)
- Talking Points for all Project Participants (Acclivity)
- Next Steps
  - The Extreme Storm Event Work Group Proposal (Sponsors/FERC)
  - Consultant Next Steps (AWA, MetStat, NOAA)
  - Conferences - AMS, AGU, ASDSO 2019 Western Regional Conference, ASDSO 2019
  - Finalizing and Publishing reports (Acclivity)
  - CO/NM Rules, Guidance Docs, Schedule for Outside Use (Sponsors)
- Acknowledgements (Sponsors)