

Factual Report – Attachment 1

Longline and 5-minute AGC Automated Surface Observing System data and email correspondence with the National Weather Service.

METEOROLOGY

HWY22MH003

*Submitted by: Mike Richards
NTSB, AS-30*

202201272253 METAR KAGC 272253Z 22009KT 10SM OVC038 00/M13 A3011 RMK AO2
SLP224 T00001133=
202201272353 METAR KAGC 272353Z 22011KT 10SM BKN035 OVC043 M01/M10 A3012
RMK AO2 SLP228 T10061100 10000 21033 55001=
202201280021 SPECI KAGC 280021Z 23011G22KT 4SM -SN OVC007 M01/M08 A3013
RMK AO2 SNB16 P0000 T10111078=
202201280053 METAR KAGC 280053Z 20009KT 2 1/2SM -SN OVC007 M02/M06 A3014
RMK AO2 SNB16 SLP233 P0000 T10171061=
202201280106 SPECI KAGC 280106Z 21007KT 6SM -SN OVC009 M02/M06 A3014 RMK
AO2 P0000 T10171061=
202201280153 METAR KAGC 280153Z 23007KT 6SM -SN OVC009 M02/M06 A3014 RMK
AO2 SLP232 P0000 T10171061=
202201280200 SPECI KAGC 280200Z 24006KT 6SM HZ BKN027 BKN037 OVC044
M02/M06 A3014 RMK AO2 SNE0157 P0000 T10171061=
202201280212 SPECI KAGC 280212Z 24005KT 3SM -SN BKN031 OVC039 M02/M06
A3014 RMK AO2 SNE0157B06 P0000 T10171056=
202201280220 SPECI KAGC 280220Z 25006KT 4SM -SN OVC009 M02/M06 A3014 RMK
AO2 SNE0157B06 P0000 T10171056=
202201280251 SPECI KAGC 280251Z 24008KT 10SM OVC026 M02/M06 A3013 RMK
AO2 SNE0157B06E32 P0000=
202201280253 METAR KAGC 280253Z 23007KT 10SM OVC026 M02/M06 A3013 RMK
AO2 SNE0157B06E32 SLP229 P0000 60000 T10171056 57001=
202201280353 METAR KAGC 280353Z 21006KT 10SM OVC025 M02/M06 A3012 RMK
AO2 SLP224 T10171056=
202201280453 METAR KAGC 280453Z 23007KT 10SM OVC025 M02/M06 A3012 RMK
AO2 SLP219 T10171061 400001178=
202201280553 METAR KAGC 280553Z 24006KT 10SM OVC022 M02/M06 A3010 RMK
AO2 SLP214 60000 T10171061 11006 21017 58010=
202201280653 METAR KAGC 280653Z 26007KT 10SM OVC019 M02/M06 A3009 RMK
AO2 SLP208 T10171061=
202201280753 METAR KAGC 280753Z 28004KT 3SM -SN OVC019 M02/M06 A3009 RMK
AO2 SNB19 SLP208 P0000 T10221056=
202201280800 SPECI KAGC 280800Z 26006KT 1 3/4SM -SN OVC019 M02/M06 A3009
RMK AO2 P0001 T10221056=
202201280853 METAR KAGC 280853Z 22004KT 1SM R28/P6000FT -SN BR VV018
M03/M04 A3008 RMK AO2 SLP205 P0002 60002 T10281044 56007=
202201280920 SPECI KAGC 280920Z 22003KT 1 1/2SM -SN BR FEW007 OVC023
M03/M04 A3007 RMK AO2 P0001 T10281044=
202201280953 METAR KAGC 280953Z AUTO 23003KT 1SM R28/P6000FT -SN BR VV016
M03/M04 A3006 RMK AO2 SLP199 P0002 T10281044=
202201281004 SPECI KAGC 281004Z 23004KT 1SM R28/P6000FT -SN BR FEW005
OVC017 M03/M04 A3007 RMK AO2 P0001 T10281044=

202201281053 METAR KAGC 281053Z 23004KT 1 3/4SM -SN BR OVC033 M03/M04
A3006 RMK AO2 SLP198 P0002 T10281044=

202201281100 SPECI KAGC 281100Z 24004KT 2SM -SN BR OVC033 M03/M04 A3006
RMK AO2 P0000 T10281044=

202201281111 SPECI KAGC 281111Z 23004KT 1 1/2SM -SN BR OVC031 M03/M04
A3006 RMK AO2 P0000 T10281044=

202201281120 SPECI KAGC 281120Z 23004KT 1 1/2SM -SN BR OVC027 M03/M04
A3006 RMK AO2 P0000 T10281044=

202201281144 SPECI KAGC 281144Z 25003KT 1 1/4SM -SN BR FEW005 OVC021
M03/M04 A3006 RMK AO2 P0000 T10281044=

202201281153 METAR KAGC 281153Z 00000KT 1 1/4SM -SN BR FEW004 OVC020
M03/M04 A3006 RMK AO2 SLP197 P0001 60007 70007 T10281039 11017 21028
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14762KAGC AGC20220127234010901/27/22 23:40:31 5-MIN KAGC 280440Z
22007KT 10SM OVC026 M02/M06 A3012 1070 75 -600 230/07 RMK AO2 T10171056

14762KAGC AGC20220127234510901/27/22 23:45:31 5-MIN KAGC 280445Z
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14762KAGC AGC20220127235012601/27/22 23:50:31 5-MIN KAGC 280450Z
22006KT 10SM OVC025 M02/M06 A3012 1070 72 -600 230/06 RMK AO2 SLP220
T10171061 400001178

14762KAGC AGC20220127235510901/27/22 23:55:31 5-MIN KAGC 280455Z
23006KT 10SM OVC025 M02/M06 A3011 1080 72 -600 240/06 RMK AO2 T10171061

14762KAGC AGC20220128000010901/28/22 00:00:31 5-MIN KAGC 280500Z
23007KT 10SM OVC025 M02/M06 A3011 1080 72 -600 240/07 RMK AO2 T10171061

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23006KT 10SM OVC025 M02/M06 A3011 1080 72 -600 240/06 RMK AO2 T10171061

14762KAGC AGC20220128001010901/28/22 00:10:31 5-MIN KAGC 280510Z
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14762KAGC AGC20220128002010901/28/22 00:20:31 5-MIN KAGC 280520Z
24007KT 10SM OVC024 M02/M06 A3011 1080 72 -600 250/07 RMK AO2 T10171061

14762KAGC AGC20220128002510901/28/22 00:25:31 5-MIN KAGC 280525Z
23007KT 10SM OVC024 M02/M06 A3011 1080 72 -600 240/07 RMK AO2 T10171061

14762KAGC AGC20220128003010901/28/22 00:30:31 5-MIN KAGC 280530Z
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14762KAGC AGC20220128003510901/28/22 00:35:31 5-MIN KAGC 280535Z
23006KT 10SM OVC022 M02/M06 A3011 1080 72 -600 240/06 RMK AO2 T10171061

14762KAGC AGC20220128004010901/28/22 00:40:31 5-MIN KAGC 280540Z
23007KT 10SM OVC022 M02/M06 A3010 1080 72 -600 240/07 RMK AO2 T10171061

14762KAGC AGC20220128004510901/28/22 00:45:31 5-MIN KAGC 280545Z
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14762KAGC AGC20220128005014001/28/22 00:50:31 5-MIN KAGC 280550Z
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60000 T10171061 11006 21017 57001

14762KAGC AGC20220128005510901/28/22 00:55:31 5-MIN KAGC 280555Z
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14762KAGC AGC20220128010010901/28/22 01:00:31 5-MIN KAGC 280600Z
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14762KAGC AGC20220128011010901/28/22 01:10:31 5-MIN KAGC 280610Z
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14762KAGC AGC20220128011510901/28/22 01:15:31 5-MIN KAGC 280615Z
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14762KAGC AGC20220128012010901/28/22 01:20:31 5-MIN KAGC 280620Z
23006KT 10SM OVC021 M02/M06 A3009 1090 72 -600 240/06 RMK AO2 T10171061

14762KAGC AGC20220128012510901/28/22 01:25:31 5-MIN KAGC 280625Z
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14762KAGC AGC20220128013010901/28/22 01:30:31 5-MIN KAGC 280630Z
23006KT 10SM OVC019 M02/M07 A3010 1090 69 -600 240/06 RMK AO2 T10171067

14762KAGC AGC20220128013510901/28/22 01:35:31 5-MIN KAGC 280635Z
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14762KAGC AGC20220128014010901/28/22 01:40:31 5-MIN KAGC 280640Z
25005KT 10SM OVC019 M02/M06 A3009 1100 72 -600 260/05 RMK AO2 T10171061

14762KAGC AGC20220128014510901/28/22 01:45:31 5-MIN KAGC 280645Z
25006KT 10SM OVC019 M02/M06 A3009 1100 72 -600 260/06 RMK AO2 T10171061

14762KAGC AGC20220128015011601/28/22 01:50:31 5-MIN KAGC 280650Z
25007KT 10SM OVC019 M02/M06 A3009 1100 72 -600 260/07 RMK AO2 SLP208
T10171061

14762KAGC AGC20220128015510901/28/22 01:55:31 5-MIN KAGC 280655Z
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14762KAGC AGC20220128020010901/28/22 02:00:31 5-MIN KAGC 280700Z
26007KT 10SM OVC019 M02/M06 A3009 1100 72 -600 270/07 RMK AO2 T10171061

14762KAGC AGC20220128020510901/28/22 02:05:31 5-MIN KAGC 280705Z
26006KT 10SM OVC019 M02/M06 A3009 1100 72 -600 270/06 RMK AO2 T10171061

14762KAGC AGC20220128021010801/28/22 02:10:31 5-MIN KAGC 280710Z
27007KT 9SM OVC019 M02/M06 A3009 1100 72 -600 280/07 RMK AO2 T10171061

14762KAGC AGC20220128021510801/28/22 02:15:31 5-MIN KAGC 280715Z
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14762KAGC AGC20220128022012401/28/22 02:20:31 5-MIN KAGC 280720Z
27007KT 6SM -SN OVC019 M02/M06 A3009 1100 72 -600 270/07 RMK AO2 SNB19
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14762KAGC AGC20220128022512401/28/22 02:25:31 5-MIN KAGC 280725Z
28006KT 4SM -SN OVC020 M02/M06 A3009 1100 72 -600 290/06 RMK AO2 SNB19
P0000 T10171061

14762KAGC AGC20220128023012401/28/22 02:30:31 5-MIN KAGC 280730Z
28006KT 4SM -SN OVC020 M02/M06 A3008 1100 72 -600 290/06 RMK AO2 SNB19
P0000 T10171061

14762KAGC AGC20220128023512401/28/22 02:35:31 5-MIN KAGC 280735Z
27007KT 4SM -SN OVC020 M02/M06 A3009 1100 75 -600 280/07 RMK AO2 SNB19
P0000 T10171056

14762KAGC AGC20220128024012401/28/22 02:40:31 5-MIN KAGC 280740Z
27005KT 4SM -SN OVC020 M02/M06 A3009 1100 75 -600 280/05 RMK AO2 SNB19
P0000 T10171056

14762KAGC AGC20220128024512401/28/22 02:45:31 5-MIN KAGC 280745Z
27006KT 5SM -SN OVC019 M02/M06 A3009 1100 78 -700 280/06 RMK AO2 SNB19
P0000 T10221056

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SLP209 P0000 T10221056

14762KAGC AGC20220128025512201/28/22 02:55:31 5-MIN KAGC 280755Z
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P0000 T10221056

14762KAGC AGC20220128030012201/28/22 03:00:31 5-MIN KAGC 280800Z
26006KT 1 3/4SM -SN OVC019 M02/M06 A3009 1100 78 -700 270/06 RMK AO2
P0001 T10221056

14762KAGC AGC20220128030512201/28/22 03:05:31 5-MIN KAGC 280805Z
26006KT 1 1/2SM -SN OVC019 M02/M05 A3009 1100 81 -700 260/06 RMK AO2
P0001 T10221050

14762KAGC AGC20220128031012201/28/22 03:10:31 5-MIN KAGC 280810Z
25005KT 1 1/2SM -SN OVC018 M02/M05 A3009 1100 81 -700 260/05 RMK AO2
P0001 T10221050

14762KAGC AGC20220128031512201/28/22 03:15:31 5-MIN KAGC 280815Z
25006KT 1 1/4SM -SN OVC018 M02/M05 A3009 1100 81 -700 250/06 RMK AO2
P0001 T10221050

14762KAGC AGC20220128032013201/28/22 03:20:31 5-MIN KAGC 280820Z
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RMK AO2 P0001 T10221044

14762KAGC AGC20220128032514001/28/22 03:25:31 5-MIN KAGC 280825Z
23004KT 1SM R28/P6000FT -SN BR BKN016 OVC022 M03/M04 A3008 1100 88 -700
240/04 RMK AO2 P0001 T10281044

14762KAGC AGC20220128033014001/28/22 03:30:31 5-MIN KAGC 280830Z
23005KT 1SM R28/P6000FT -SN BR BKN017 OVC022 M03/M04 A3008 1100 88 -700
230/05 RMK AO2 P0002 T10281044

14762KAGC AGC20220128033514001/28/22 03:35:31 5-MIN KAGC 280835Z
23005KT 1SM R28/P6000FT -SN BR BKN017 OVC022 M03/M04 A3008 1110 88 -700
240/05 RMK AO2 P0002 T10281044

14762KAGC AGC20220128034012501/28/22 03:40:31 5-MIN KAGC 280840Z
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14762KAGC AGC20220128035513201/28/22 03:55:31 5-MIN KAGC 280855Z
22004KT 1SM R28/P6000FT -SN BR VV018 M03/M04 A3008 1110 88 -700 230/04
RMK AO2 P0000 T10281044

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RMK AO2 P0001 T10281044

14762KAGC AGC20220128040512501/28/22 04:05:31 5-MIN KAGC 280905Z
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14762KAGC AGC20220128041012501/28/22 04:10:31 5-MIN KAGC 280910Z
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14762KAGC AGC20220128042013201/28/22 04:20:31 5-MIN KAGC 280920Z
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RMK AO2 P0001 T10281044

14762KAGC AGC20220128042513201/28/22 04:25:31 5-MIN KAGC 280925Z
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14762KAGC AGC20220128043012501/28/22 04:30:31 5-MIN KAGC 280930Z
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P0001 T10281044

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RMK AO2 P0002 T10281044

14762KAGC AGC20220128044513701/28/22 04:45:31 5-MIN KAGC 280945Z AUTO
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RMK AO2 P0002 T10281044

14762KAGC AGC20220128045014401/28/22 04:50:31 5-MIN KAGC 280950Z AUTO
23004KT 1SM R28/P6000FT -SN BR VV016 M03/M04 A3006 1120 88 -700 240/04
RMK AO2 SLP199 P0002 T10281044

14762KAGC AGC20220128045513701/28/22 04:55:31 5-MIN KAGC 280955Z AUTO
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RMK AO2 P0000 T10281044

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240/04 RMK AO2 P0000 T10281044

14762KAGC AGC20220128050514001/28/22 05:05:31 5-MIN KAGC 281005Z
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240/04 RMK AO2 P0001 T10281044

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240/05 RMK AO2 P0001 T10281044

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240/04 RMK AO2 P0001 T10281044

14762KAGC AGC20220128052013201/28/22 05:20:31 5-MIN KAGC 281020Z
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RMK AO2 P0001 T10281044

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P0001 T10281044

14762KAGC AGC20220128053012501/28/22 05:30:31 5-MIN KAGC 281030Z
24004KT 1 3/4SM -SN BR OVC025 M03/M04 A3006 1120 88 -700 250/04 RMK AO2
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14762KAGC AGC20220128053512501/28/22 05:35:31 5-MIN KAGC 281035Z
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P0001 T10281044

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14762KAGC AGC20220128054512501/28/22 05:45:31 5-MIN KAGC 281045Z
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P0001 T10281044

14762KAGC AGC20220128055011501/28/22 05:50:31 5-MIN KAGC 281050Z
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P0002

14762KAGC AGC20220128055512101/28/22 05:55:31 5-MIN KAGC 281055Z
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T10281044

14762KAGC AGC20220128060012101/28/22 06:00:31 5-MIN KAGC 281100Z
24004KT 2SM -SN BR OVC033 M03/M04 A3006 1120 88 -700 250/04 RMK AO2 P0000
T10281044

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P0000 T10281044

14762KAGC AGC20220128061012501/28/22 06:10:31 5-MIN KAGC 281110Z
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14762KAGC AGC20220128062512501/28/22 06:25:31 5-MIN KAGC 281125Z
24004KT 1 1/2SM -SN BR OVC025 M03/M04 A3006 1120 88 -700 250/04 RMK AO2
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14762KAGC AGC20220128064013201/28/22 06:40:31 5-MIN KAGC 281140Z
24004KT 1 1/4SM -SN BR FEW005 OVC021 M03/M04 A3006 1120 88 -700 250/04
RMK AO2 P0000 T10281044

14762KAGC AGC20220128064513201/28/22 06:45:31 5-MIN KAGC 281145Z
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RMK AO2 P0000 T10281044

14762KAGC AGC20220128065016901/28/22 06:50:31 5-MIN KAGC 281150Z
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290/03 RMK AO2 P0000 T10331044

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35003KT 1 1/2SM -SN BKN008 OVC027 M02/M04 A3006 1130 81 -500 360/03 RMK
AO2 P0000 T10171044

Richards Michael

From: Lora J. Wilson - NWS Federal <[REDACTED]@noaa.gov>
Sent: Wednesday, February 16, 2022 2:46 PM
To: Richards Michael <[REDACTED]@ntsb.gov>
Subject: Additional information from WFO PBZ

[CAUTION] This email originated from outside of the organization. Do not click any links or open attachments unless you recognize the sender and know the content is safe.

So, the WCM at WFO PBZ went ahead and answered the original questions you had when we still planned to meet. Thought I would pass them along just so you have the information.

- What were the closest (reliable and static) automated/human snow observations to the accident site? **KPIT is augmented. KAGC is closer but automated.**
- At the time of the accident, what was the estimated snow depth on the bridge asphalt (if different than measured/estimated snow depth over grass/dirt)? Here we are disregarding any removal of snow by plows, etc... and just looking at what would have accumulated over the previous 6, 12 and/or 24 hours. **Our office is the snow measurement as we reported 1.1" that day. With a total snow depth of 7.0" as of 7am on the 28th. The six hour liquid equivalent from KPIT was 0.07" ending at 7am / 12Z on the 28th.**
- Again, disregarding any removal of snow from the bridge, at what point in time prior to accident time would the bridge have been clear of snow (i.e., how long had snow been on the bridge?) **KPIT reported snow through 1720Z on the 28th. Most of the time visibilities were less than two statute miles.**
- How much snow had fallen, and in what intervals, at the accident site over the time period since the bridge was clear of snow? **Again, our office reported 1.1" for the day. We do not have any official snow measurement sites nearby. A CoCoRaHS Observer in Wilkinsburg, PA reported 1.1" as a 24 hour total through 8am / 13Z on the 28th.**
- What observations/datasets specifically were used to estimate these answers? **KPIT and CoCoRaHS.**

Lora

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Lora J. Wilson, MPAL, MPharm (ForSci)

NWS Forensic Services Program Manager & Liaison to NTSB
NWS Volcanic Ash Program Manager

NWS Analyze, Forecast and Support Office/AFS24
Aviation and Space Weather Services Branch

New Office Phone: [REDACTED]

Richards Michael

----- Forwarded message -----

From: **Chet Schmitt - NOAA Federal** <[REDACTED]@noaa.gov>

Date: Wed, Feb 16, 2022 at 4:35 PM

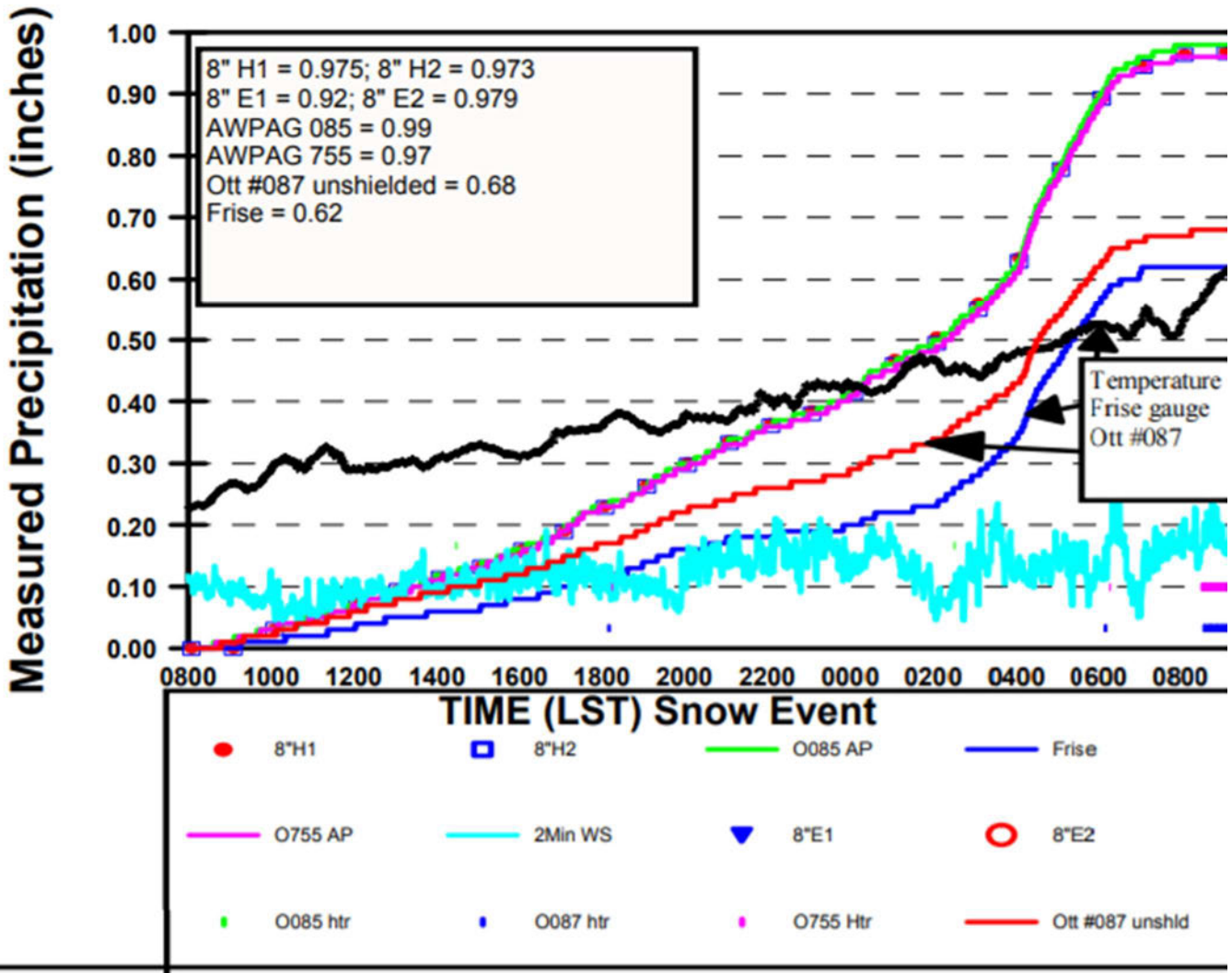
Subject: Re: NTSB REQUEST: ASOS Snow Measurement Clarifications - Pittsburgh Bridge Collapse

To: Lora J. Wilson - NWS Federal <[REDACTED]@noaa.gov>

Hi Lora,

The heated tipping bucket (HTB) can under-catch snow by about a third, and the amount can vary from no under-catch at all to more than half, depending on the conditions. Snow intensity, temperature and wind are the main determining factors. During the development of the all-weather precipitation gauge (or AWPAG), there were extensive evaluations done comparing the AWPAG to the HTB. During a snow event in Johnstown, PA back in 2003, the reference indicated 0.99" of liquid water equivalent snow had fallen, while the HTB (known as Frise after the company that makes the HTB) indicated only 0.62", an undercatch of about 37%:

AWPAG Comparison Data Johnstown, PA 02/16-17/03



Case Study 1

Johnstown Snow Event

Hope this helps,

C

On Wed, Feb 16, 2022 at 4:12 PM Lora J. Wilson - NWS Federal <[redacted]@noaa.gov> wrote:

Thank you so much!

Lora

On Wed, Feb 16, 2022 at 4:10 PM Chet Schmitt - NOAA Federal <[redacted]@noaa.gov> wrote:

Hi Lora,

The ASOS at KAGC is equipped with a 12" diameter heated tipping bucket precipitation gauge, which measures the liquid water equivalent of snow pretty much as you have described. The application of heat to melt the snow induces some evaporation and sublimation, especially during light snow events at temperatures near 32°F. This results in a tendency to under-report precipitation accumulation. This under-reporting is exacerbated during windy conditions.

I will have to do a little digging to find the magnitude of this under-reporting.

C

On Wed, Feb 16, 2022 at 3:57 PM Lora J. Wilson - NWS Federal <[REDACTED]@noaa.gov> wrote:

Hi Chet!

NTSB is doing some work on the [Pittsburgh Bridge collapse](#) and need some information about ASOS so that they ensure they have it correct and it's accounted for in the engineering work on this. For these questions, if any of it is ASOS site specific, they will be using data from KAGC.

- Need to confirm that when ASOS measures snow, it catches the snow in the tipping bucket, melts it, bucket tips, and the liquid is counted as precip. Is this insanely simplified explanation correct?
- If the above is correct, what is the margin of error for this? And if you have any documentation that has this information that can be shared, that would be great. They didn't find it online.

Lora

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Lora J. Wilson, MPAL, MPharm (ForSci)

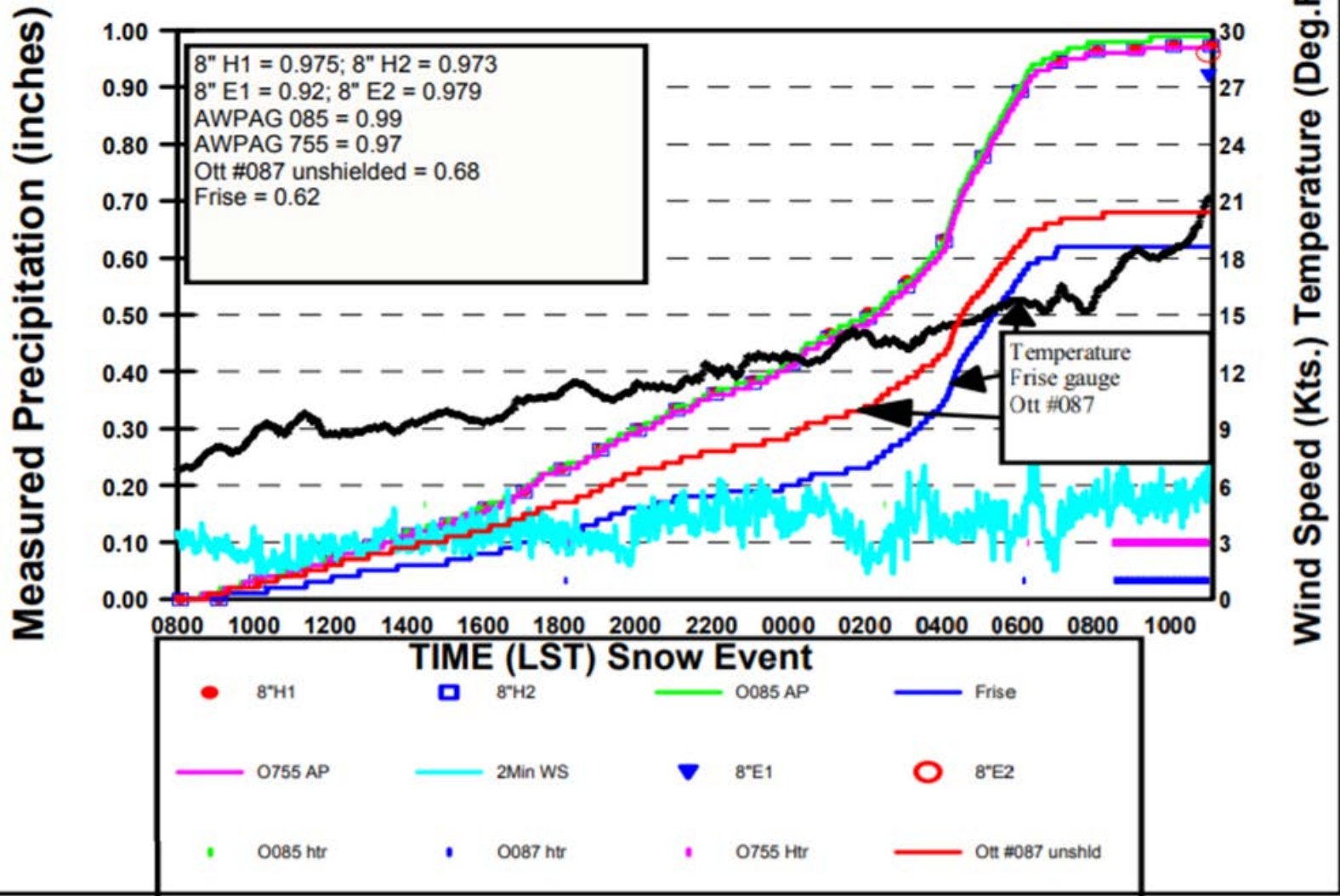
NWS Forensic Services Program Manager & Liaison to NTSB
NWS Volcanic Ash Program Manager

NWS Analyze, Forecast and Support Office/AFS24
Aviation and Space Weather Services Branch

New Office Phone: [REDACTED]

AWPAG Comparison Data

Johnstown, PA 02/16-17/03



Case Study 1

Johnstown Snow Event