Mount Hood Coordination Plan Table Top Exercise

November 20, 2013

Objectives

- **Familiarize participants with implementation processes of the Mount Hood Coordination Plan**
  - Test plan structure – does it work?
- Identify likely players for plan activation
- Identify critical pathways and processes for information-sharing before, during, and after a volcanic event
- Identify gaps, weaknesses
- Discuss next steps in coordination. More training? Exercises with more partners, etc.?

How things will work today

- Tabletop: scenario-based, facilitated discussion. Scenario is based on activity at the volcano, but is **not real-time**
- Everyone "plays themselves;" and each agency shares its own perspective with others
- Coordination vs. operations; don't want to get in the weeds, but general actions important (e.g., closures, evacuation, etc.)
- Within exercise there will be questions to consider, but not dictate discussion
  - Focus on decision points
- We're counting on you to ask questions if you don't understand the implication of the information you are getting or wonder if another agency is engaged in something that may affect you

Constant context

- Primary concerns
  - Collective
  - Individual agency/jurisdiction
- Information
  - What's needed?
  - How does it circulate?
- Key decision thresholds
  - Activation/escalation
- Uncertainty, multiple possible event paths
  - Managing extended incident without a defined duration or end-point

Monday, July 15

Information Statement

- An earthquake (seismic) swarm that began July 12 continues (3 days)
  - Most earthquakes (EQs) shallow and <M1.5; rare M2-2.5
  - EQs at similar locations to past swarms
  - Swarm duration and EQ magnitudes not out of the ordinary
  - USGS conducted gas flight; no change - nothing above background levels

USGS, 2010

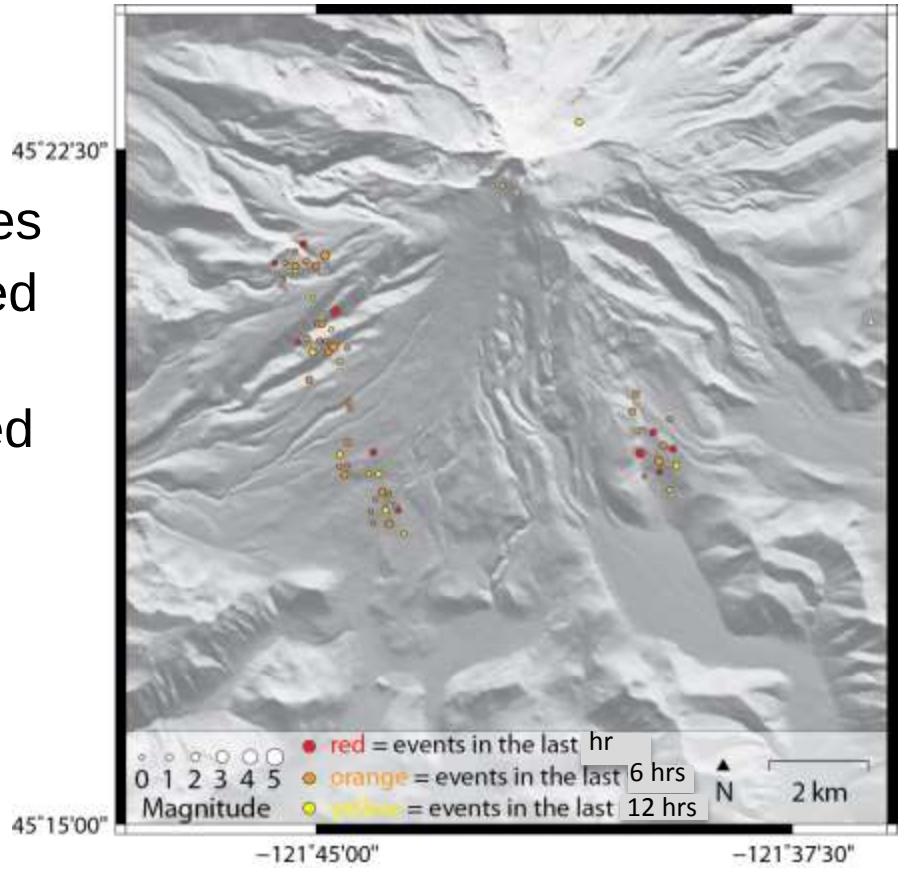
Reaction?

Thursday, July 18 (day 6)

Information Statement

- USGS issues 2nd Information Statement
  - Earthquake (EQ) swarm continues
  - EQ locations off summit, scattered in familiar locations
  - Numbers reaching unprecedented levels
  - Keeping an eye on the activity

Reaction?

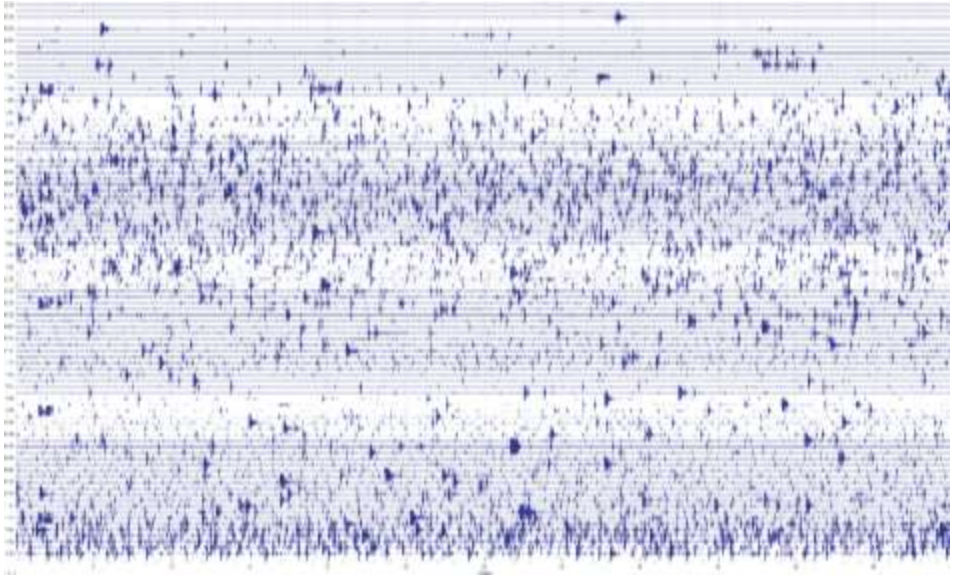


Saturday, July 20 (day 8)

VAN/VONA: Alert Level change from **Normal/GREEN to Advisory/YELLOW**

- Swarm increases in intensity; outside of background norm
  - four shallow M3-3.5 EQs in less than 2 hrs—widely felt
  - EQs occurring every couple of minutes
- Gas flight shows background level; no deformation detected
- No sense of imminent eruption

USGS, 2010



Media picks up story; calls increase sharply at local and State EMs, at USGS

Mount Hood Coordination Plan Tabletop Exercise – 11/20/13

Your Reaction?

- Does your organization respond to this change in alert level? If so, how?
- How are you interacting with other agencies?
- How are you getting information?
- What questions are you getting from the media/public/businesses?
- How are you distributing information?

Alert-level System VOLCANIC-ALERT LEVELS	
NORMAL	Volcano is in typical background, noneruptive state or, after a change from a higher level, volcanic activity has ceased and volcano has returned to noneruptive background state.
ADVISORY	Volcano is exhibiting signs of elevated unrest above known background level or, after a change from a higher level, volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
WATCH	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, OR eruption is underway but poses limited hazards.
WARNING	Hazardous eruption is imminent, underway, or suspected.
AVIATION COLOR CODES	
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Red	Eruption is imminent with significant emission of volcanic ash into the atmosphere likely OR eruption is underway or suspected with significant emission of volcanic ash into the atmosphere [ash-plume height specified, if possible].

Monday, July 22 (day 10)

Daily Update

- Yesterday's gas measurements showed and increase in CO_2 and H_2S
- Seismicity increasing with occasional M3's
- Field crews installed 2 webcans on the south side and lahar detection equipment in Sandy, Zigzag and White River drainages
- If activity continues, could see low-level explosions or activity could die down.

USGS, 2010

Information Demand: Options?

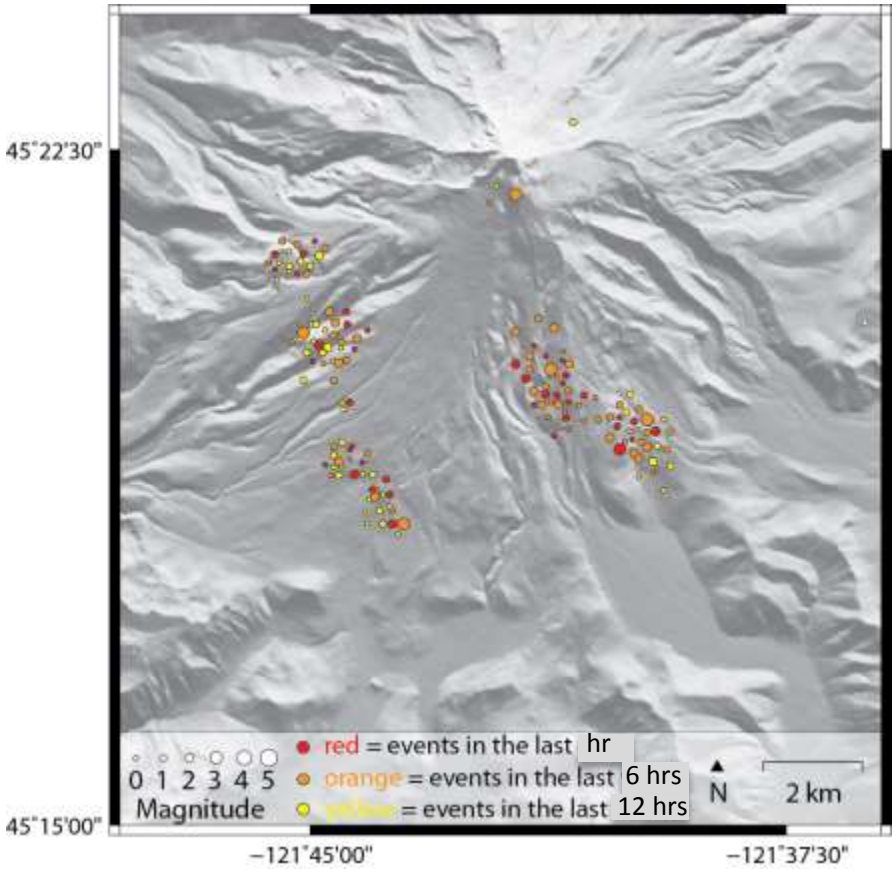
- What options/strategies available for meeting information demand, while maintaining coordination
  - How is your organization responding?
  - What messages are important for your agency to get out?
  - What are your internal/external information demands?

USGS, 2004

Friday, July 26 (day 14)

Daily Update

- Seismicity remains elevated with EQs also in near-summit fumarole area (Devils Kitchen)
- Gas flux increased slightly over previous week
- FLIR and satellite data show no elevated temperatures in fumarole area
- No sense of imminent eruption; activity could also die down



Saturday, July 27 (day 15)

VAN/VONA: Alert Level change from **Advisory/YELLOW** to **Watch/ORANGE**

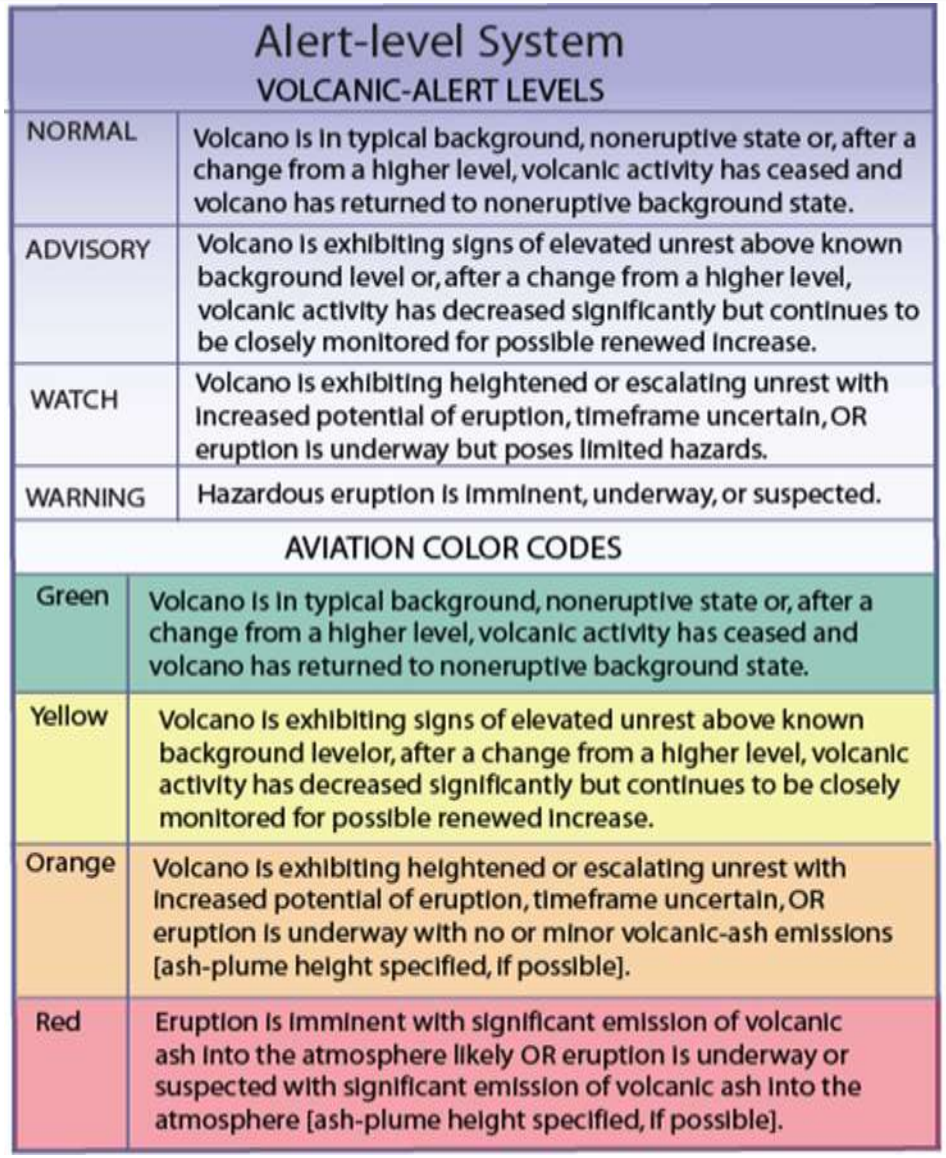
- 5:40 a.m. – small explosion opens vent in Devils Kitchen area
- Minor ash to 15,000 feet, moves eastward, lasts 12 minutes
- EQ activity remains high
- Increase in volcanic gas noted in afternoon flight; SO_2 detected
- Other explosions could occur without warning; likelihood of eruption increased, not promised

USGS, 2011

Mount Hood Coordination Plan Tabletop Exercise – 11/20/13

Your Reaction?

- What has changed relative to your primary concerns?
- How are you interacting with other agencies?
- How are you getting/sending out information?
- What questions are you getting from the media/public/businesses?
- What actions are you taking?
- Looking forward, what are your primary concerns?



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Wednesday, July 31 (day 19)

Daily Update

- EQs continue at high levels
- Gas flux up moderately from flight on Saturday
- No increase in temperature in fumarole area
- Additional explosions likely, can't forecast when

Realities:

- Tourists/media flock to area - Where are they staged? Together?
- Hikers trying to reach vent/summit area to watch activity
- How would you deal with injuries/calls for help from these individuals?

Tourists flock to area to see volcanic activity

Thursday, August 1 (day 20)

Daily Update - small lahar in White River valley

- Hot weather induces an outburst of water from the White River Glacier
- Resultant lahar reduces capacity in areas under OR Hwy 35 bridge
- All monitoring parameters remain elevated

Your response to the lahar?

Debris under the Highway 35 bridge across White River, USGS, 1998

Sunday, August 4 (day 23)

Daily Update

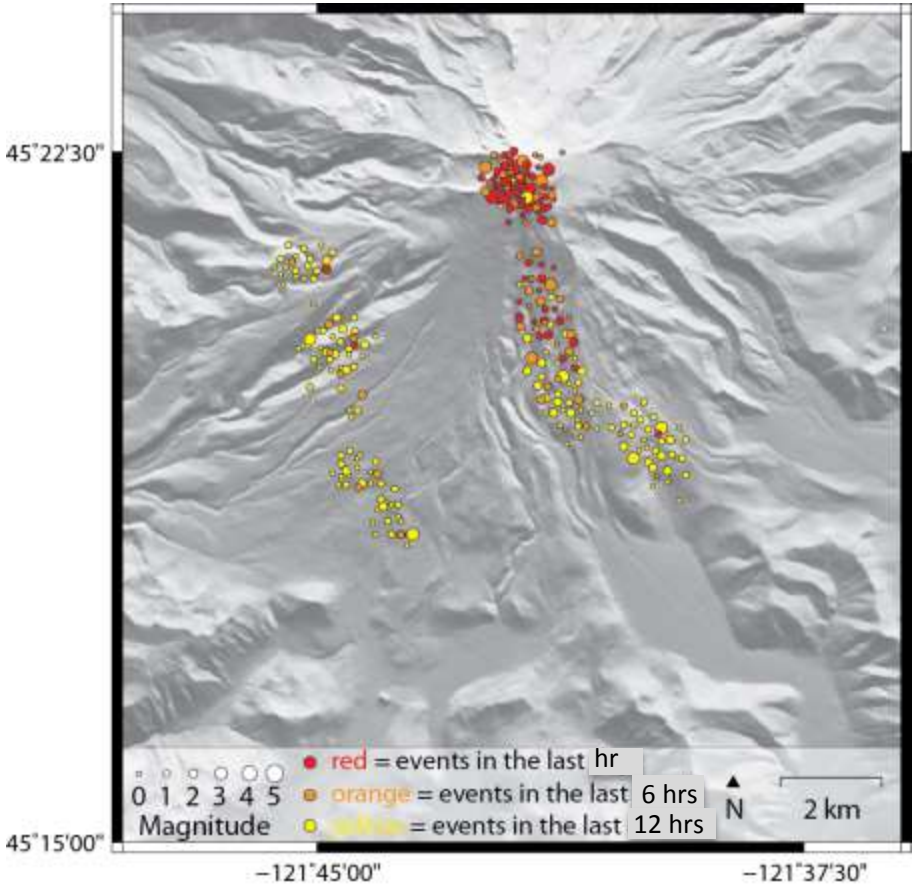
- 5 explosions over past 2 days; ash to 15,000 feet, lasting 10-20 mins; plumes drift eastward
- Seismicity remains elevated
- Gas emissions show moderate increase
- Minor inflation detected in Crater Rock/Devils Kitchen area
- Concerns about increase of rockfall in summit/crater area
- Explosions could happen at anytime without warning


USGS, 2010

Wednesday, August 7 (day 26)

Daily Update

- Explosion, ash to 20,000 feet, 18 mins, plume to west
- Inflation continues in Devils Kitchen area
- Gas emissions remain elevated
- Seismicity continues at elevated rate, most EQs now located below summit area near vent area
- Eruption appears more likely



Sunday, August 18 (day 37)

Daily Update

- No explosions since August 7, eleven days ago
- Seismicity, gas, and deformation remain at elevated levels
- Alert level remains at Watch/ORANGE
- Explosions could still happen at anytime, still no promise of an eruption

USGS, 1998

How are is your agency responding?

- Activity has gone on now for over a month—are you able to maintain response levels?
- What does the collective organizational structure look like?
- Status of closures?
- What pressures are pushing back at you?
  - Economic – internal and external (e.g., Hood to Coast)
  - Workforce
  - Others?
- Has there been a declaration request?

Monday, August 19 (day 38)

Daily Update

- Explosion occurs at 11:25 a.m.
- Plume reaches 20,000 ft; for 20 min, moves eastward
- SO2 values up sharply
- Local inflation increasing
- No change in temperatures in fumarole area
- More (perhaps larger) explosions possible at any time, no imminent threat of eruption, but conditions could change quickly

USGS, 2009

Tuesday, August 20 (day 39)

VAN/VONA: Alert Level change from Watch/ORANGE to Warning/RED

- At 5 p.m., vigorous explosion sends ash to 30,000 ft for 25 minutes, sends ash west
- EQs change character
- Inflation increasing in vent area
- Notable increase in temperatures in vent and fumarole areas
- These suggest that magma may be close to surface; eruption may be imminent

USGS, 2010

Mount Hood Coordination Plan Tabletop Exercise – 11/20/13

Questions and Issues

- What has changed relative to your primary concerns?
- How are you interacting with other agencies?
- What advice are you giving/getting?
- What questions are you getting from the media/public?
- How are you distributing information?
- Looking forward, what are your primary concerns?

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Wednesday, August 21(day 40)

Daily Update

- On morning of August 21 scientists observe a new lava dome in Devils Kitchen area
- Possible dome collapse increases risk of pyroclastic flows (pfs)
- August 22-25: dome growth continues, rate slowly increasing
- Alert level Warning/RED

INGEOMINAS, 2011

Thursday, August 29 (day 48)

Daily Update: Dome Collapse

- Accelerated dome growth of past few days leads to a dome collapse at 6:30 p.m.
- PFs 8 km down White River valley
- Lahar makes OR 35 bridge/rd impassible
- Ash emission to 30,000 ft lasts for 35 minutes, drifts east; ash also coming off PFs
- Seismicity and gas remain elevated
- Dome growth continues at a high rate (15 m^3/s); potential for future dome collapses or explosions

NERC, 2011

Questions and Issues

- How do you respond to this first dome collapse?
- Who/what is at risk from future larger dome collapses?

Sunday, Sept 8 (day 58)

VAN/VONA: Alert level change from **Warning/RED** to **Watch/ORANGE**

- Small dome collapse at 9:45 a.m.
- Minor ash to 15,000 ft drifts east
- Dome growth has slowed over past few days
- Gas and seismic activity have decreased somewhat
- USGS lowers alert level
- Remain vigilant, dome growth inherently unstable situation

USGS, 2004

Sunday, September 15 (day 65)

Daily Update

- Over past week, dome has been at a slower growth rate (2-5 m^3/s)
- Weather clouds currently obscuring dome growth area
- Gas sensors indicate lower values, but overall seismicity is up
- Warn that an explosion could occur in the next couple of days, but no change in alert level

INGEOMINAS, 2011

Tuesday, September 17 (day 67)

Alert level changed from **Watch/ORANGE** to **Warning/RED**

- Large explosion signal at 5:45 p.m.; vent area obscured by activity
- Webcams pick up PFs in Sandy and Zigzag drainages
- AFMs indicate a lahar likely down these valleys
- Ash to 50,000 ft, moving westward at 60 mph

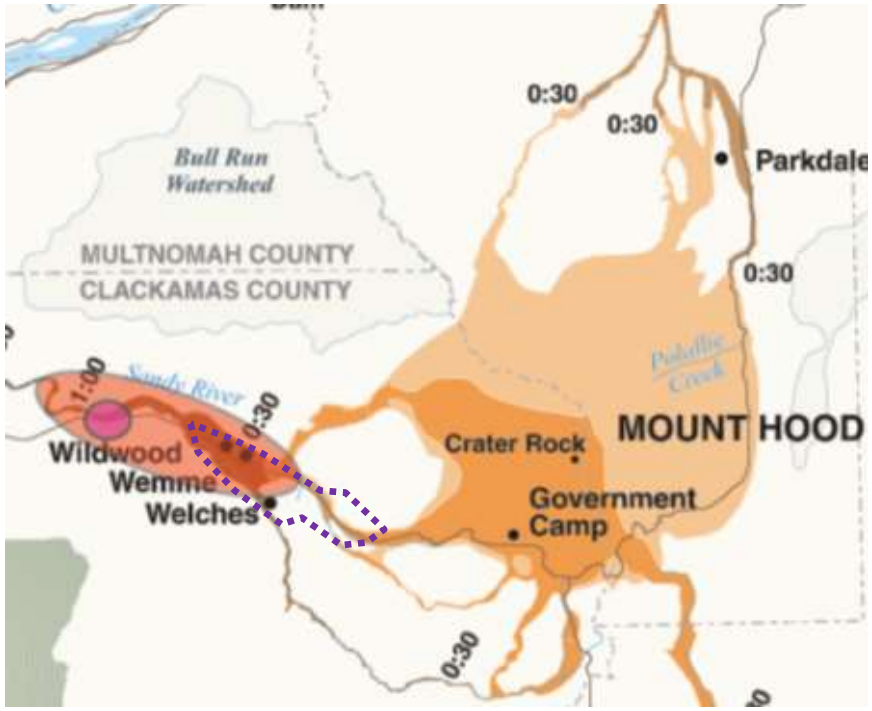
Questions and Issues

- How do you respond to this activity?
- How are citizens informed of the dome collapse and lahar?
- Was anyone evacuated? If so, when? Status of US 26?
- How does this differ from wildfire evacuations?
- Are citizens in the Metro area aware of possible ashfall and what to do?

Wednesday, September 18 (day 68)

Daily Update: Yesterday's lahar

- PFs yesterday significantly damaged Timberline Lodge
- Lahar reached Welches, Zigzag, Wemme, Wildwood, and Brightwood in under an hour
  - extensive damage to homes and US 26; flooding downstream
- Seismicity suggests that dome growth continues; weather prevents gas measurements and visual observations



Sept 19-Oct 27 (days 69-107)
Continued Dome Growth

- Alert level change from **Warning/RED** to **Watch/ORANGE** on September 21 due to low dome growth rate and decreased gas and seismicity
- Activity over next month is variable dome growth, small to moderate explosions, small to moderate dome collapses with or without explosions
- Alert level fluctuates between Watch and Warning due to activity at volcano and size of dome collapses
- How does your organization operate in the extended and uncertain circumstances?
- How long do you maintain JIC/JOC or other organizational structures?

Friday, August 29 (3 years later)

- A small dome collapse yesterday was the 200th collapse since start of eruption
- Gas and seismicity are near background; dome growth difficult to detect
- In the past 3 years:
  - Timberline Lodge, Govt Camp and much of summit Hwy 26 destroyed; upper Sandy, Zigzag and White River valleys buried in PF and lahar deposits (as much as 300 ft)
  - Hwy 35 bridge area impassible
  - Sandy River has aggraded over 45 ft near Welches; extensive flooding downstream and sediment in Columbia River
  - Air traffic has been disrupted 115 days out of past 1095 days since eruption began

USGS, 2010

Summary

- Precursory phase: 40 days
- First steam explosion: day 15
- First lahar: day 20 (not associated with volcanic activity however)
- Dome growth begins: day 40
- First dome collapse: day 48
- First large, damaging explosion: day 67
- Eruption ends: 3.5 years after start
- Long-term sediment issue
- This CAN happen
  - Dome growth and collapse w/ small explosions typical of the activity to be expected from Mount Hood

National Geographic Society, 2002

Scenario Considerations

- How does event duration affect your response?
- Recall when you ordered evacuations
  - Would you change their timing?
  - How did you deal with the uncertainty?
- How/when would the JIC/JOC be demobilized?
- What would be the wider consequences of such an event to Portland and other parts of Oregon?
- What would the recovery phase look like?
- What if the preceding scenario occurs in the winter? If dome growth was was episodic (i.e., happen for months, nothing for months/yrs, etc.)
  - How might that change your response?

This scenario is just one of many ways in which a crisis might unfold; important to be prepared and flexible

Hot Wash

- Are your individual and agency/jurisdictional responsibilities clear?
- Do you feel that you have the resources/knowledge/ training you would need to do your job in a real event?
- Are the communication lines and protocols spelled out in the plan adequate for you to respond successfully?
- Is it clear how/when the role of the FAC changes?
- Was the exercise useful? How can it be improved?
- What can you/your agency do or change to be better prepared for an actual crisis at Hood?

What's next?

- Should we plan an exercise with a broader participation?
  - If yes, With whom? Policy makers? Businesses? Other agencies?
  - If yes, When? Summer?
- What would need to happen to make this possible?
  - AWR-233 class?
  - Other training/presentations/field trip?
  - Desirable location (e.g., Timberline?)
- Should we aim for a FEMA-Integrated Emergency Management Course (IEMC)? This would be several years out. Steps?

Mount Hood Coordination Plan Table Top Exercise

Thank you for your participation!

November 20, 2013