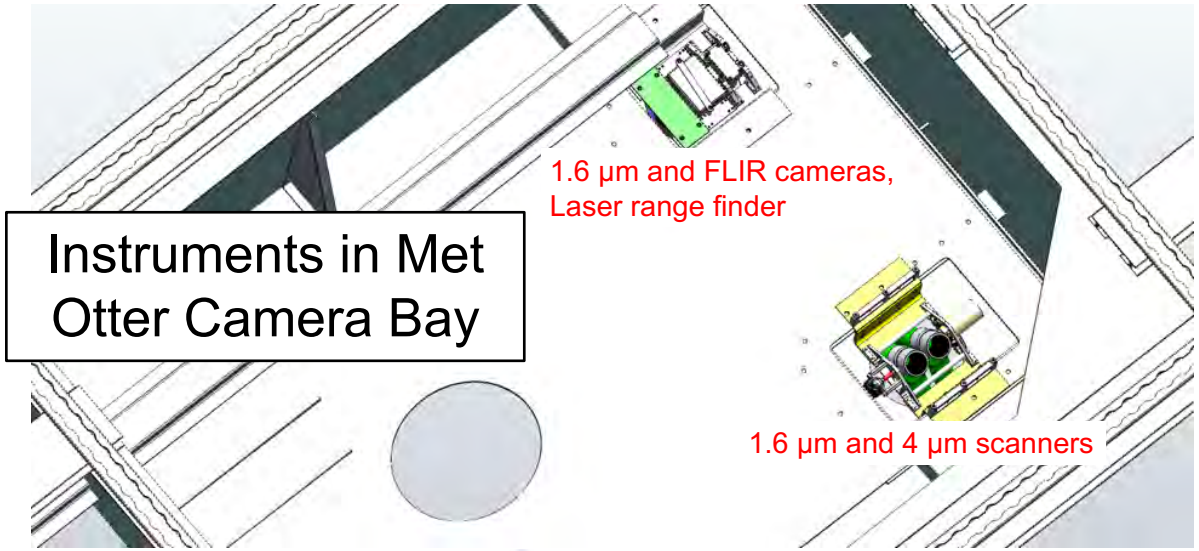
2019 FIREX-AQ Twin Otter Teleconference
June 20, 2019

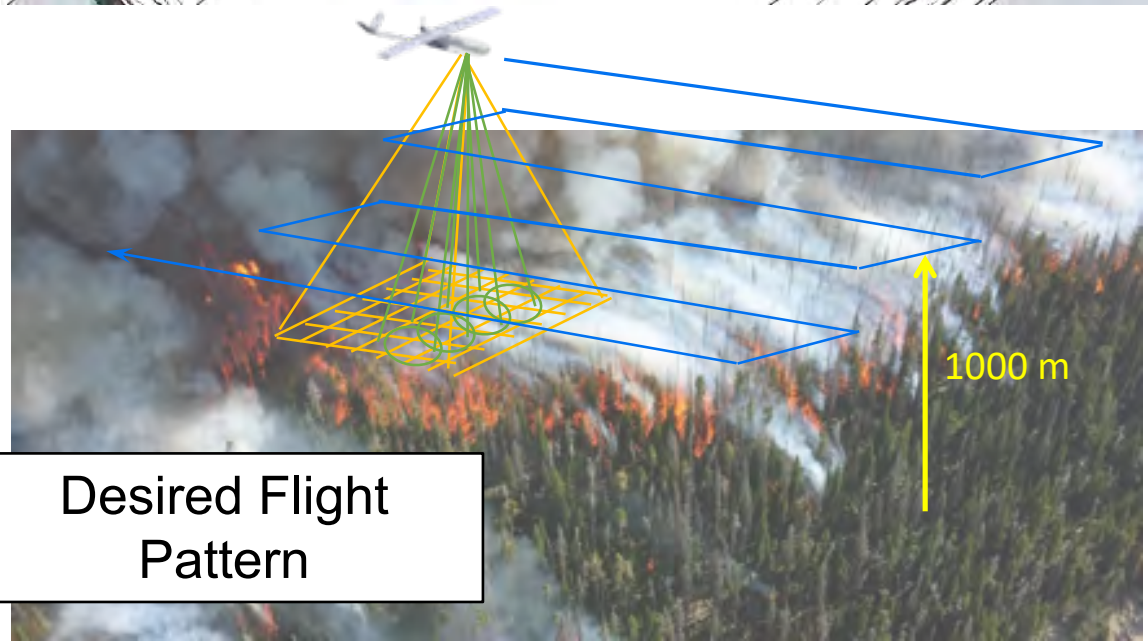
1. Met Otter & Night Fox
2. Chem Otter instrument updates
3. Chem Otter payload weight and options to extend flight endurance
4. Strategies for excursions from Boise

Night Fox: the Nighttime Fire Observations eXperiment

Ru-Shan Gao, Troy Thornberry NOAA /CSD



Instruments in Met Otter Camera Bay



Desired Flight Pattern

Photo: NPS

Single-element FRP sensor footprint
Imager pixel, not to scale

- Key instruments: 1.6 and 4 µm cross-track scanners
  - → Instead of true FRP, we report fire temperatures
  - → Calibrated
  - → 500 – 1500°C temperature range
  - → 1° FoV and sweep ±30°
  - → ~50 m footprint at 3 km altitude
- 1.6 µm camera (broad band) for sanity check
- For FIREX-AQ two fire maps will be produced (1.6 and 4 µm)
- Visible and thermal cameras (FLIR DUO) may provide directional information of fire propagation (which side of a fire line is hot)
  - → Probably no visible and thermal maps due to the lack of precise timing information

Key Data Product for Otters:

- Spatial maps of fire temperature, from which fire radiative power can be derived
- May be useful in relating emissions & chemistry in downwind plumes to fire temp
- Similar strategy will be employed at larger scale from ER2 – DC-8 combination

Instrument	Position	Species Measured	Investigators	Institution	Status
Picarro CRDS	1	CO, CO_2, CH_4, H_2O	Colm Sweeney	NOAA GMD	
Met Probe & Diff GPS	1	RH, Temp, Pres, Winds, GPS, flight data	Mike Robinson, Steve Brown	NOAA CSD	
Tenax cartridge autosampler	1	Speciated VOC	Kelley Barsanti, Lindsey Hatch, Avi Lavi, Paul Van Rooy	UC Riverside	
I^- ToF CIMS	2	Acids (HNO_3, HONO, Organics), acid gases (N_2O_5, $ClNO_2$), Oxygenated organics, Organic nitrates, Halogens	Joel Thornton, Brett Palm, Carley Fredrickson, Zach Decker	University of Washington / NOAA	
Aerosol mass spectrometer, UHSAS	3	Aerosol composition + size distributions	Ann Middlebrook, Ale Franchin, Kathy Hayden, Shao-Meng Li	NOAA CSD Environment Canada	
Brown carbon PiLS	4a	Spectrally resolved aerosol absorption	Rebecca Washenfelder, Lisa Azzarallo	NOAA CSD York University	
Chemi-luminescence	4b Floor	NO, NO_2, O_3	Andy Weinheimer, Denise Montzka, Geoff Tyndall, Frank Flocke	NCAR	
TRAC Sampler	4a	Particle composition, mixing state, morphology	Alex Laskin, Jay Tomlin, Kevin Jankowski	Purdue University	
Offline WSOC analysis	4a	Particle composition	Cora Young, Lisa Azzarallo	York University	
jNO_2 heads	Camera port	NO_2 photolysis rates	Mike Robinson	NOAA CSD	

Chem Otter Integration Schedule – No Changes

2019 JULY						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
14	15 Transit Florida to RAF Box Truck NOAA to RAF	16 Box Truck NCAR to RAF	17 Aircraft Prep	18 Sta. 1 & 2 NO_x Pump	19 Sta. 1 & 2 NO_x Pump	20 Sta. 3 AMS
21	22 Sta. 3 AMS	23 Sta. 4 BrC, NOx O_3 Shelf	24 Sta. 4 BrC, NOx O_3 Shelf	25 Instrument Tests & Cross Training	26 Test Flights & Packing	27 ??
28	29 Test Flights & Packing	30 Test Flights & Packing	31 Transit RAF to Boise		First Research Flight	

Picarro, Met Probe, J-heads, Aerosol Inlet	July 17 – 19
VOC Autosampler	July 17 – 19
I- CIMS	July 17 – 19
AMS	July 17, July 20 – 22
BrC PiLS	July 17, July 23 – 24
TRAC Sampler (?)	July 23 – 24
NO_x, O3	July 17 – 19, July 23 – 24
All Instrument Teams	July 25 - 31

Two Notes:

1. No access on Saturday, July 27. The 27-28th will be a non-working (at least at RAF) weekend.
2. Alan and Steve have requested that he EMMA (100 hour maintenance) take place for both Otters at RAF during the integration period
   - The met otter (N46) will be done first so it can leave first, but EMMA might delay its departure
   - Both otters should depart RAF with 100 flight hours prior to next EMMA, but anticipate at least one maintenance period during the campaign

Chem Twin Otter Payload (N48)

Station	Power (kVA)	Weight Estimate (lbs)	Deployed ? (1 = yes)	Deployed Weight (lbs	Deployed Power (kVA)	Position
Station 1 - Met/DAQ/VOC	0.6	182.5	1	182.5	0.6	1
Station 2 - ICIMS	1.1	368.1	1	368.1	1.1	2
Station 3 - AMS	1.1	436.4	1	436.4	1.1	3
Station 4 - BrC/NOx	1.55	447.3	1	447.3	1.55	4
O3 Plate	0	76	1	76	0	4a
Station 4 Pump Plate	0	98.8	1	98.8	0	4b
Bottle Rack	0	76.3	1	76.3	0	5
Equipment Subtotal	**4.35**	**1685**	**7**	**1685**	**4.35**	
Pilots		180	2	360		
Scientists		180	2	360		
Life raft		70	0	0		
Crew Subtotal		**430**		**720**		
Total	**4.35**	**2115**		**2405**	**4.35**	
Available	4 kVA 115 VAC	**2200**		**2200**		
	~3 kVA 28 VDC					
	up to 7 kVA					

Currently ~200 lbs over target

Expect limit to be close to 2.5 hours at current instrument weights

<u>Options:</u>

1. 2.5 hour research flights
2. Identify non-essential instruments
3. Consider flying with only one scientist (sometimes)

Single Scientist Flights

- Flight scientist in front seat, but no instrument scientist in the back to keep an eye on instrument operation and functions – may risk not identifying instrument failures during flight

- Possible to compensate by sending more scientists with the support truck to service and support instruments during re-fuel operations.

    - Feasible for short (<3 hour one-way ?) support truck drives
    - Trivial if operations are out of a single airfield (no ferry / support)

- Possible to use two scientists for some flights, one for others depending on logistics and needs of a given flight (e.g., ferry distance or type of flight – plume chasing vs. valley profiling)

- Comments? Worth considering? Too risky ?

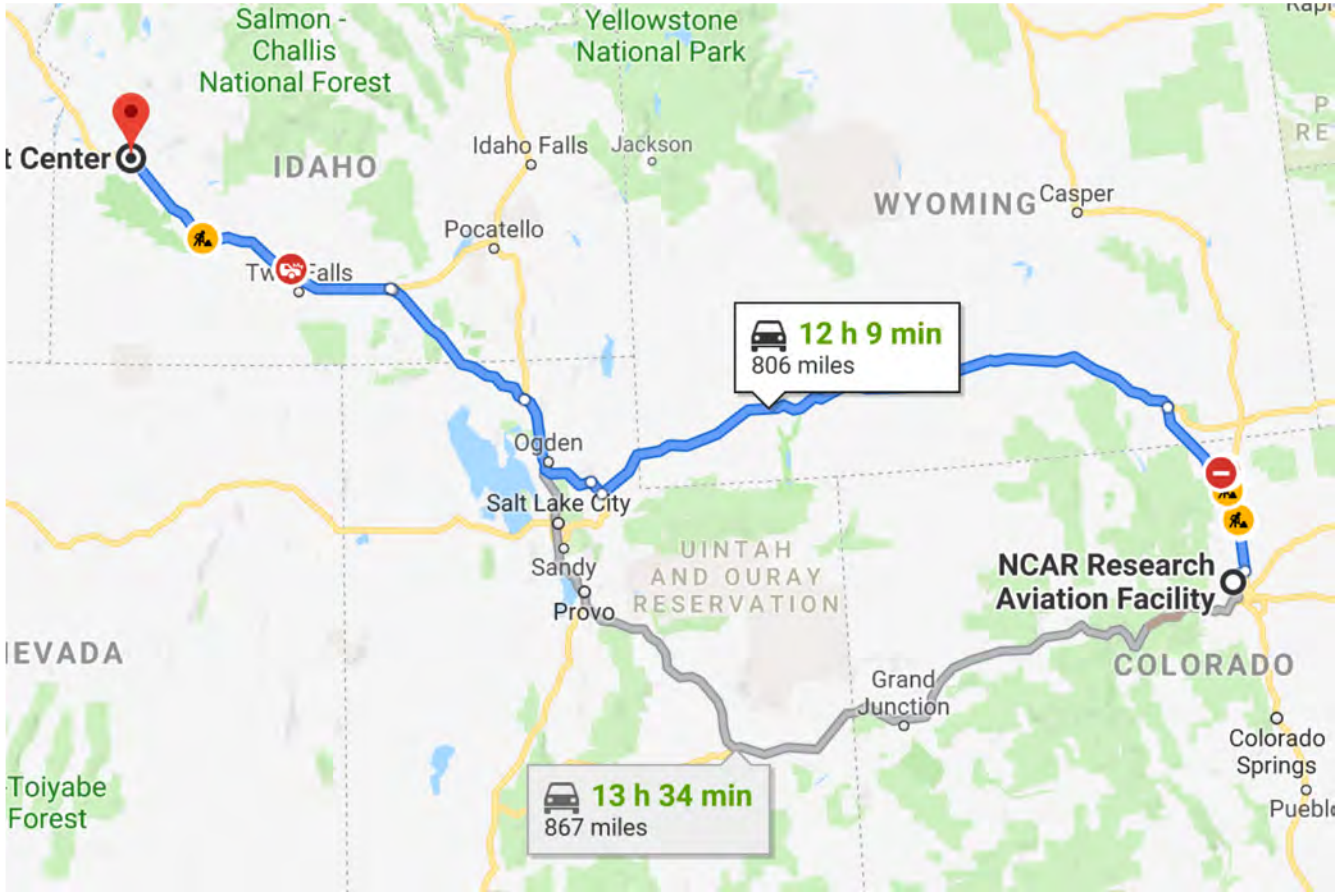
Chem Otter Transit to Boise – July 31, 2019

• Transport equipment from RAF to Boise on July 31 in a 24’ rental truck with a lift gate. Support truck (NOAA CSD F350) will transit at same time.

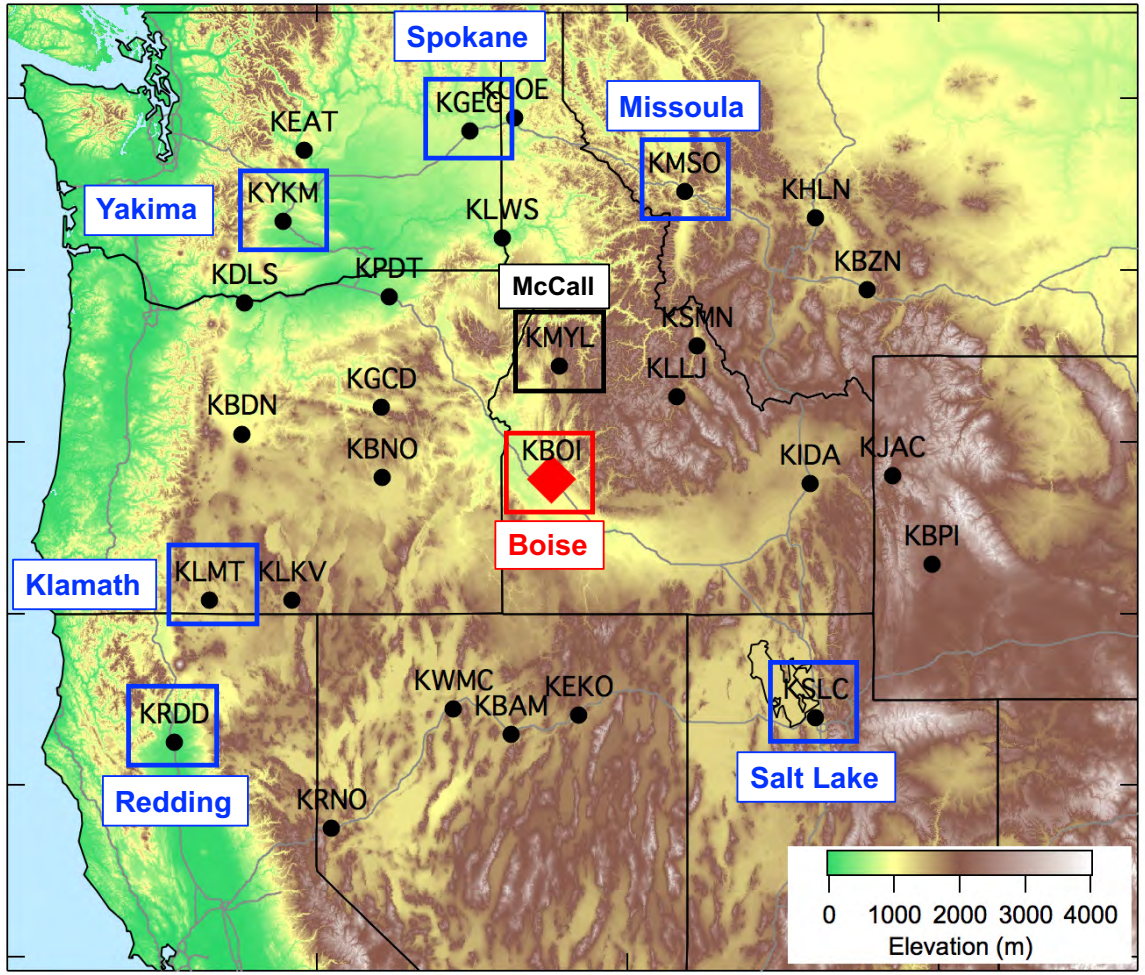
• Four truck drivers for this transit
  - Matt Roberts
  - Zach Decker
  - Ale Franchin
  - Macy Morgan (CSD CNRG)

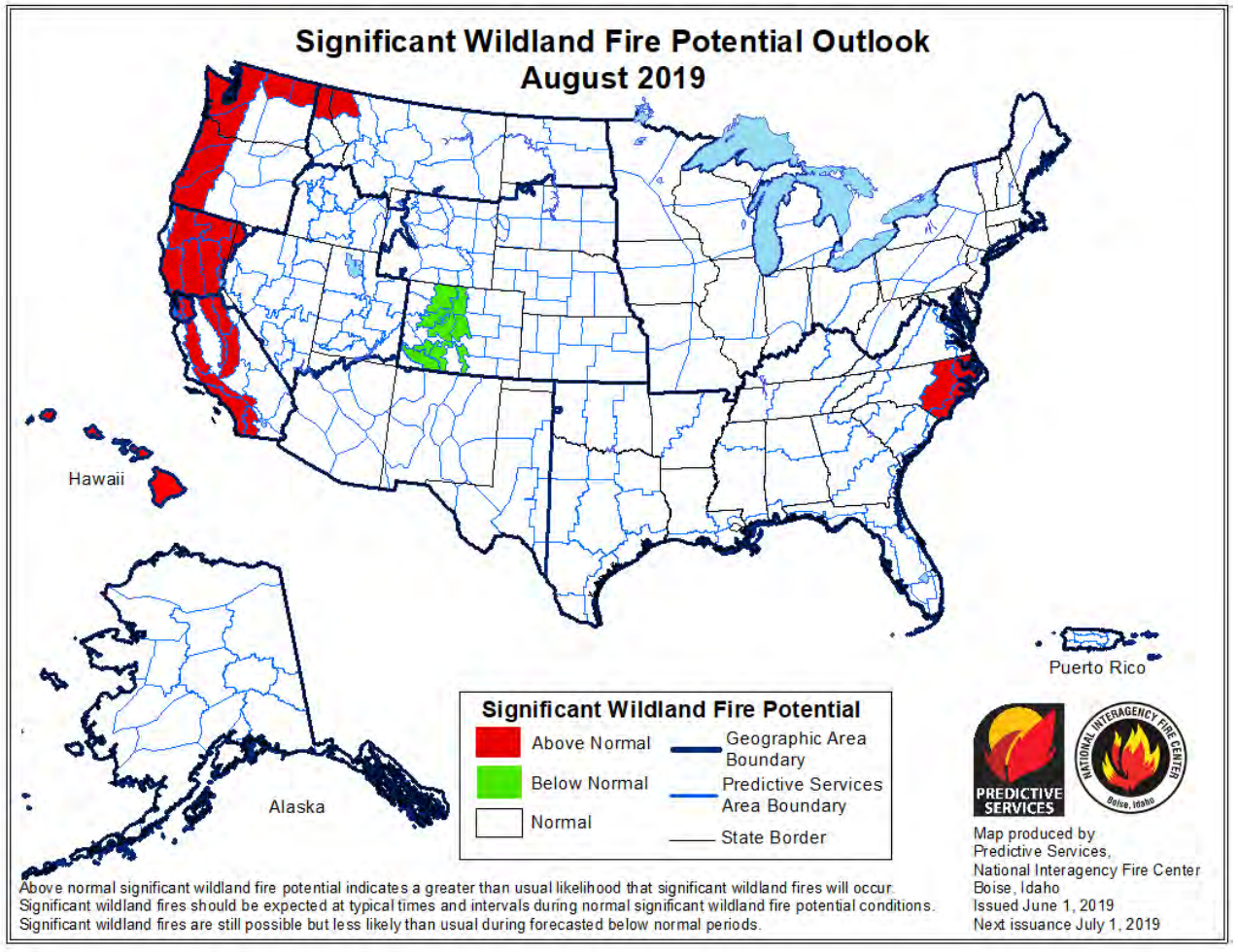
• All others should make flight reservations if you have not already.
  - Schedule may slip ! Be prepared for this.

• Plan for rental cars in Boise. Best is 2 people per car (3 OK), so find a rental car buddy now ! We will need these cars for transits from Boise.



Excursions from Boise





West coast remains most likely destination outside of Boise

Yakima WA (5.5 hours), Klamath Falls OR (7 hours), Redding CA (9 hours)

Drive equipment and people to these locations for maximum flexibility

Need to plan / discuss the timing and logistics of these excursions

Airfield Information

City	Airfield	Alt (ft)	FBO	Phone	GPU	Hangar	Avg Hi / Lo	Notes
Yakima, WA	KYKM	1,099	McCormick Air	509 248 1680	Yes	Yes	88 / 58 °F	
Klamath Falls, OR	KLMT	4,095	Century Aviation	541 882 4681	Yes	Yes	85 / 50	
Redding, CA	KRDD	505	Redding Jet Center	530 224 2300	Yes	Maybe	99 / 63	Heavy aerial firefighting traffic
Boise, ID	KBOI	2,871	Jackson Jet Center		Yes	Yes	92 / 57	

Of the 3 west coast airfields, Yakima and Klamath falls look easiest

Excursion Dates and Hotel Information

***Ideal*:** Schedule dates and location when we know the fire activity
***Reality*:** Need to set dates now to reserve hotel room blocks during tourist season (thanks Frank F.)

Excursion 1: August 4 – 13 (10 days, shorten as needed)

Met and Chem Otter can work together. DC-8 operating in northwest.
Langley mobile lab operating during this time, Aerodyne starts Aug 7 (nominal, but likely later).

Excursion 2: August 21 – 30 (10 days, shorten as needed)

Chem Otter only. Met otter and DC-8 departed by this time
Langley and Aerodyne mobile labs available during this time. Aerodyne finishes Aug 29

Logistics:

- Currently setting up hotel room blocks for these dates in each potential locations
- Information on hotels will be provided through campaign web site as soon as blocks are finalized
- Investigators will have to make their own reservations in each place
- Steve to provide reminders by e-mail to make all needed reservations and then cancel the unneeded ones
- Hold all Boise reservations for now, adjust those reservations as needed

Excursion Dates and Hotel Information

Tentative hotel room block reservations are listed below. 15 rooms requested for the first block and 12 for the second to accommodate met + chem on block 1 and chem only on block 2. Block request can be increased to accommodate the mobile lab investigators if needed.

Hotel	Block Name & Release	Block Name & Release	Cancellation Policy	Rate	Instructions	Point of Contact
Best Western PLUS Yakima Hotel 1614 N 1st Street Yakima, WA 98901 509-453-8898	4-13 Aug 1 FIREX-AQ Release 27 July	21-30 Aug 2 FIREX-AQ Release 14 Aug	24 hours prior to check-in	$94.00	Phone hotel directly and provide personal credit card # to hold the reservation. Phone hotel directly to cancel/change reservations.	General Manager, Sarah Purdy
MICROTEL Inn & Suites by Wyndham 2716 Dakota Ct. Klamath Falls, OR 97603 541-273-0206	4-13 Aug Name TBD Release 22 July	21-30 Aug Name TBD Release 8 Aug	24 hours prior to check-in	$94.00	Phone hotel directly and provide personal credit card to hold the reservation	Regional Sales director Mark Lucarelli
Baymont by Wyndham Anderson 2040 Factory Outlets Drive Anderson, CA 530-365-6100	4-13 Aug FIREX-AQ Itinerary # 5136B11715 4850 Release 27 July	21-30 Aug FIREX-AQ Itinerary # 5136B11715 8222 Release 14 Aug	24 hours prior to check-in	$89.99	Phone hotel @ 877-361-2496 and provide personal credit card # to hold the reservation. Reference the Itinerary # provided for each range of dates. Guests must also phone hotel directly to cancel/change reservations.	Hotel POC: Amanda and Group Sales POC: Melissa Cook

Calendar View

Boise

Excursion

Transit

Note: These dates are all tentative !

2019 AUGUST

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Hazmat Transport on Moving Truck for Excursions

49 CFR § 171.1: Hazardous Materials Regulations (HMR)

Thanks to Bob Zook and Eric Williams for this information

(d)*Functions not subject to the requirements of the HMR.* The following are examples of activities to which the HMR do not apply:

(5) Transportation of a hazardous material in a motor vehicle, aircraft, or vessel operated by a Federal, state, or local government employee solely for noncommercial Federal, state, or local government purposes.

49 CFR § 177.870

(e)*Articles other than Class 1 (explosive) materials on passenger-carrying vehicles.* The gross weight of any given class of hazardous material other than Class 1 (explosive) materials shall not exceed 45 kg (99 pounds), and the aggregate weight of all such other dangerous articles shall not exceed 225 kg (496 pounds).

For gas cylinders (separate information), aggregate weight limit is 75 kg of gas.
Equal to ~15 150 cu ft cylinders or 45 50 cu ft cylinders

- We should have no difficulty transporting what we need by truck from Boise (or transit to Boise)
- Eric Williams will prepare a memo on NOAA letterhead and verify the above information
- Carry a detailed inventory of hazmat on the truck
- Ensure proper labeling of all hazmat