DISCOVER-AQ California Site Survey Report (16-19 July 2012)

This document outlines details obtained during a tour of ground sites operated by the California Air Resources Board (CARB) and the San Joaquin Valley Unified Air Pollution Control District (SJV APCD). This was followed by a tour of the NASA Palmdale facility. The visit was conducted from 16-18 July 2012.

Participants:

NASA Team: Jim Crawford, Ken Pickering, Mary Kleb, Lucille Crittenden
California AQ representatives: Neil Adler, Nathan Trevino, Jin Xu
DISCOVER-AQ Investigators: Jay Herman, Nader Abuhassan, Joel Schafer
Partners: Kathy Lantz, Tony VanCuren, Yongjing Zhao, Sonya Collier, Hwajin Kim, Caroline Parworth, Chris Cappa

Summary Table of DISCOVER-AQ Plans (sites are listed in order visited).

Site Name	**Spiral** Y/N	**Pandora** Y/N	**Aeronet** Y/N	**Missed Approach?**	**other DISCOVER-AQ Augmentation**
Fresno - Garland	Y	Y	Y	Maybe	AMS/SMPS (Zhang), Drum Sampler/Nephelometer (VanCuren)
Madera City	N	Y	Y	N	
Madera - Pump Yard	N	N	N	N	
Fresno - Skypark	N	N	N	N	
Clovis - N. Villa	N	N	Y	N	
Fresno - Drummond	N	N	Y	N	
Parlier	N	Y	Y	N	
Tranquility	Y	Y	Y	N	
Huron	Y	Y	Y	N	MPL?
Hanford	Y	Y	Y	Y	MPL?
Corcoran	N	Y	Y	Y	
Visalia	N	N	N	N	
Visalia APT	N	N	Y	Y	EPA trailer (roadside proximity)
Porterville	Y	Y	Y	Y	NATIVE/UMBC/EPA, Millersville, NOAA, Drum Sampler (VanCuren)
Bakersfield – Cal.	N	N	Y	N	
Shafter	N	Y	Y	N	
Oildale	N	N	N	N	P-3B overflight, Mobile lab (Leifer)
Bakersfield Airport	Y	Y	Y	Maybe	EPA, MPL? UCI (Kim)? Drum Sampler (Van Curen)?
Edison	N	N	N	N	
Arvin – Di Giorgio	N	Y	Y	N	P-3B overflight

General action items:

1. Must decide whether to employ hot spots or expand router capability at sites. Current plan is to buy switches to expand router ports whenever possible.

2. Shipment and placement of Pandora instruments will need to be arranged. Current plan is for Pandoras to be shipped in September to Fresno-Garland and Bakersfield-California Ave locations for staging. ARB/APCD offices are willing to help get the Pandoras prepositioned at the sites prior to installation in the October-November timeframe. Need to know if Aeronet needs similar help.

3. We still need to negotiate obtaining high resolution (1 minute) data from ARB.

Site Name: Fresno Garland (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10251)

Contact: Neil Adler (916-323-3231), Patrick Seames (559-243-8574), Scott Scheller (559-228-0854)

Potential Instruments:

AMS & SMPS (Qi Zhang)
Drum sampler & nephelometer (Tony VanCuren)
Pandora (Jay Herman)
Aeronet (Brent Holben) – currently operating

Space: Ample space available both in the lab and on the roof

Power: Abundant power on roof and in lab

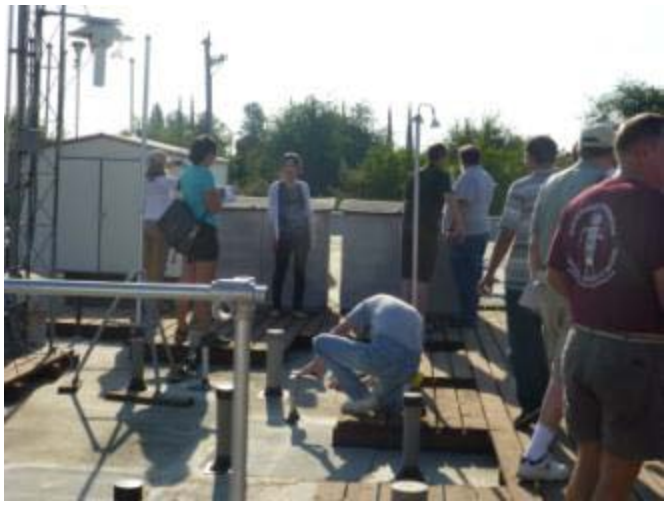
Internet: Hardwire connections available both on roof and in lab. Internet security must be negotiated if hardwire connections are to be used. Hotspots had adequate reception and present a possible alternative.

Horizon: Fine

Comments:

- Evening and weekend access to the lab will be needed (Zhang group). We would like to negotiate a key and clearance for unaccompanied access if possible. If this is not possible, then we need to negotiate a contact and schedule for "after hours" access.
- SMPS will be venting butenol.
- Personal safety as this site is a concern. Investigators should be in pairs if at all possible and valuables in vehicles should not be left visible in plain sight
- When working on roof, investigators are requested to stay on decking.
- Roof top storage is available. Tables and chairs are available. Nice bathroom here.

Shipping POC: California Air Resources Board
Patrick Seames(?)/Norman (?) (need clarification here…)
Attn: DISCOVER-AQ Contact (?)
3727 N. 1st Street, Suite 104
Fresno, CA 93726

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Site Name: Madera City

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben) – very likely for installation

Space: Ample space available both in the shelter and on the roof

Power: 20 amp receptacles on roof (enough for Pandora and Aeronet)

Internet: Have DSL, need to negotiate access. Hotspots had adequate reception and present a possible alternative.

Horizon: Good

Comments:

- Located between a Juvenile court/detention center and an elementary school
- We can be issued a key for access during experiment. Rooftop access was from inside the shelter.

Site Name: Madera Pump Yard (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=20211)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments: Site eliminated from consideration

Space: NA

Power: NA

Internet: NA

Horizon: NA

Comments:

- Instrument shelter was not well configured for hosting rooftop instruments.
- Plan for instruments at Madera City eliminates the need for anything at this site.

Site Name: Fresno Skypark (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10245)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments: Site eliminated from consideration

Space: NA

Power: NA

Internet: NA

Horizon: Many nearby trees, poor visibility

Comments:

- Instrument shelter not well configured for rooftop instruments.
- Plan for instruments at Madera City eliminates the need for anything at this site.

Site Name: Clovis (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10248)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben)

Space: Adequate space on the roof for remote sensors.

Power: Power receptacles available on roof.

Internet: Need to upgrade router to have more available ports if intending to use local internet. Hotspots had adequate reception and present a possible alternative.

Horizon: Fine

Comments: A good site but proximity to Garland site (6.5 km) lowers probability we would use it. Location is next to animal shelter and police department. Local traffic early and late in day could cause local effects. Roof access was from outside trailer. Main gate locked from 5pm to 6am.

Site Name: Fresno Drummond (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10244)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben) - likely

Space: Adequate space on the roof for remote sensors.

Power: Adequate power available.

Internet: Direct line, need to negotiate access. Hotspots worked

Horizon: Horizon adequate for direct sun measurements but not good for scans. High fencing section makes it more difficult to get a good horizon.

Comments:

- PM2.5 measurements will be added to this site prior to DISCOVER-AQ.
- This site would not be used if Parlier is chosen for remote sensors.
- Security should be OK. Located immediately behind a fire station that is staffed 24/7.

Site Name: Parlier (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10230)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben)

Space: Roof space is limited, but could be made to work.

Power: There are power surges when water pumps turn on (for a few seconds). Need a UPS here.

Internet: Router heavily subscribed, need more ports. Hotspots worked

Horizon: Trees too close for Pandora profile scans. Horizon is not acceptable for Aeronet from the measurement trailer (big trees to the east?). This will only work for Aeronet if one can be placed on one of the trailers on the far side of the old runway using solar power only and sat transmissions (see photo below). Also, trees obstructing measurement trailer horizon can be seen in this photo as well.

Comments:

- Secure site is in the middle of Kearney Ag Center (research area).
- If EPA brought a trailer, horizon problem could be mitigated by setting up away from trees.

Site Name: Tranquility (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10242)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben) – likely for installation.

Space: Ample space available both in the lab and on the roof

Power: Ample power for remote sensors

Internet: Hotspots did not work inside the trailer, but could be placed inside Pandora on roof. Routers were fully subscribed. Expanding router capability is best solution. Aeronet may need to transmit if internet/hotspot is a problem.

Horizon: Excellent

Comments: This site also has CO2 and methane observations.

Site Name: Huron (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10247)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)
Aeronet (Brent Holben)
MPL?

Space: Rooftop location not ideal. Need to place sensors somewhere else.

Power: NA

Internet: Both hotspots worked, but Verizon would not display a web page. AT&T was fast.

Horizon: School roof is not good for Aeronet, however a trailer in the field would work. The water tower is good in terms of horizon and security, but installation would be challenging, especially in terms of power. Aeronet could transmit and use solar power.

Comments: Need to coordinate with city manager to find a location for the remote sensors. The water tower behind city hall appeared ideal and would be secure assuming access and power can be provided. We would have to use hotspots here.

Important contacts:

Gerald Forde (City of Huron, city manager) gforde415@yahoo.com, 559-945-2241. Want to work through Nathan Trevino to find a solution with Gerald Forde.

Anita Choperena (Gerald Forde's assistant) 559-945-2241, ext 16

Huron school, principal Javier Gonzalez, 559-945-2926, jgonzalez@chusd.k12.ca.us

NOTE: After the visit, Nathan Trevino was contacted by the Huron City Offices. They are requesting a letter from NASA detailing our plans and requirements. We will send this letter as soon as we determine whether there is EPA interest in deploying a trailer to this location.

Site Name: Hanford

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)
Aeronet (Brent Holben) – definite installation.
Potential backup for NATIVE/UMBC? (Thompson/Hoff)
MPL?

Space: Ample space available both in the lab and on the roof

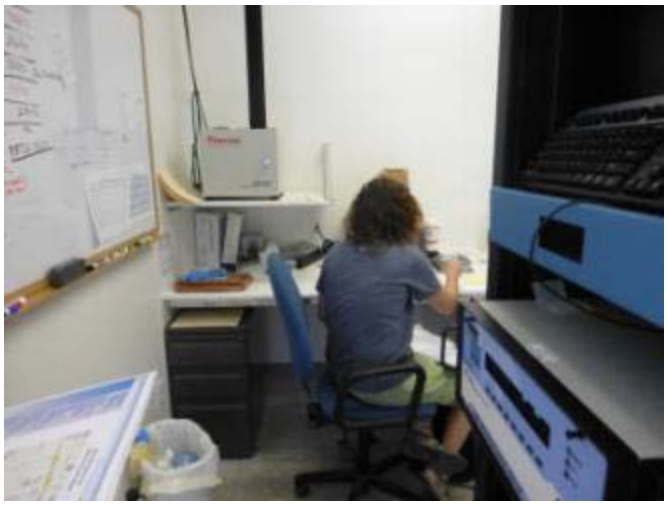
Power: Ample power for remote sensors

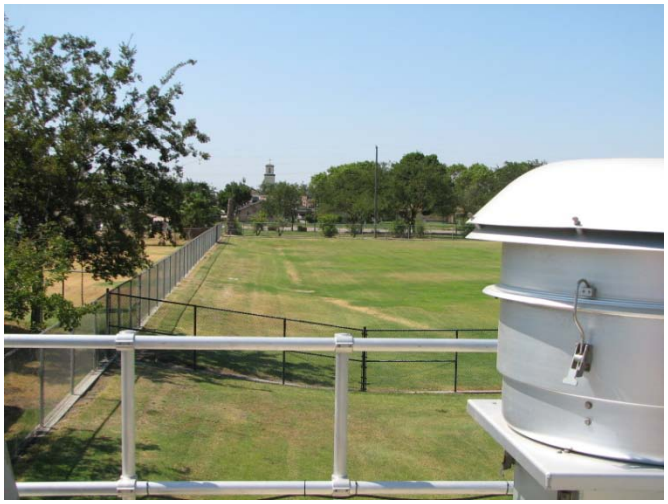
Internet: Need to upgrade router to have more available ports if intending to use local internet. Hotspots had adequate reception and present a possible alternative.

Horizon: Excellent

Comments:

- Located behind a school.
- NWS nearby where NOAA has a radiation package and a Dobson O3 spectrophotometer.
- Local NWS forecaster can help with flight planning (Steven Mendenhall, 559-584-3752, steven.mendenhall@noaa.gov)
- Tentative decision to move the Corcoran spiral to this site.
- Airfield adjacent to NWS offices could be used for missed approach





Site Name: Corcoran (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=16719)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben) – installation easy if NATIVE located here, otherwise need another installation base. School site would probably work too.

Potential backup for NATIVE/UMBC? (Thompson/Hoff)

MPL?

Space: NATIVE and/or EPA would need to locate at airport. Remote sensors could locate at school.

Power: Would need to negotiate with airport. Should not be a problem at school.

Internet: Hotspots worked at both airport and school

Horizon: Acceptable

Comments:

- Both airport and school are possible locations for sensors. Logistics need to be worked through school and airport.
- Reid Potter, airport manager, 559-289-4649, reid@lakelanddusters.com
- School representative showed interest in outreach (Marie Cates, school district chief business officer, 559-992-8888, mcates@corcoran.unified.com)
- Some concern was expressed regarding security of instruments at the school site. Students had already been accessing the shelter rooftop.
- Would still like to conduct missed approach here, but tentatively moving spiral to Hanford.
- If airport is not used for trailers, recommend putting Aeronet and Pandora at school site


LAKELAND
DUSTERS
AVIATION INC.

Site Name: Visalia (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=54568)

Contact: Neil Adler (916-323-3231), Scott Scheller (559-228-0854)

Potential Instruments: NA

Space: Rooftop space inadequate.

Power: NA

Internet: NA

Horizon: Inadequate. Significant tall tree blocking sky to S and SW.

Comments: This site was eliminated from contention due to poor horizon.

Site Name: Visaila airport (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=54000)

Contact: Nathan Trevino

Potential Instruments:

EPA trailer (Long/Szykman) – Near road site with three NO2 measurements (photlytic, optical, and FRM)

Aeronet (Brent Holben) – Measurement trailer roof is inadequate. Alternate trailer (see photo) would be fine if allowed to use it.

Space: Nearby fields are available for a trailer

Power: Would need to be negotiated

Internet: Hotspots worked at this site

Horizon: Adequate

Comments: This site was viewed as inadequate in general. No AQ obs being made here, thus only under consideration if other sites did not work out. EPA interest in this site might be enhanced by proximity to roadway, missed approaches by P-3B, and sodar at this site.

Site Name: Porterville (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=10243)

Contact: Nathan Trevino (559-230-5861)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben) – easy installation if NATIVE located here. If NATIVE is not here, can remove one of the wobbly yellow guard rails and install a mounting pole in the existing flanges (see photo).

EPA (Long/Szykman) – NO2 (CRDS) integrated with NATIVE

NOAA (Dutton/Lantz)

Tethered Balloon (Rich Clark)

NATIVE/UMBC (Thompson/Hoff)

Space: Room in the parking lot for trailers. Adjacent field ideal for balloon radiation measurements.

Power: adjacent to several buildings, power expected to be adequate.

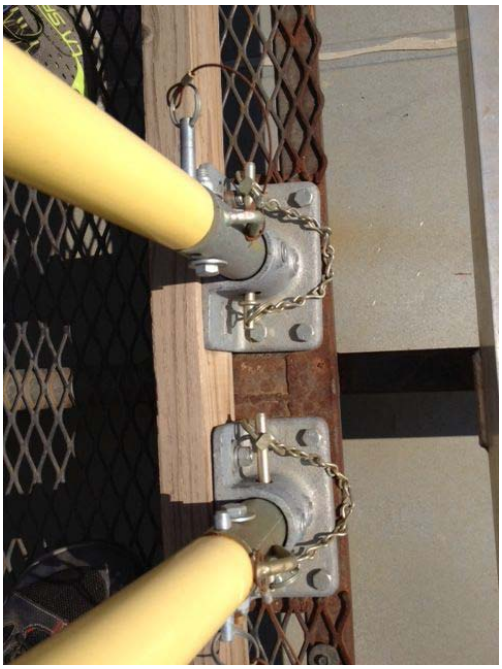
Internet: Hotspots worked, AT&T faster. Trailer uses a booster here.

Horizon: Ideal

Comments:

- Are balloon operations allowed in close proximity to airport? Rich Clark looking into this…
- Trailers located in parking lot of Sequoia Nat. Forest Office. Will be requesting assistance from their air quality expert, Trent Procter, 559-784-1500, ext 1114, tprocter@fs.fed.us
- Local airfield contact: Jim McDonald, 559-782-7540, jmcdonald@ci.porterville.ca.us

NOTE: Initial discussion with Trent Procter was very optimistic. He knows the owner of the adjacent land and will help us negotiate. A site plan will be submitted to Trent for consideration.



Site Name: Bakersfield California Ave (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=15255)

Contact: Neil Adler (916-323-3231)

Potential Instruments: This site eliminated in favor of Bakersfield Municipal Airport site

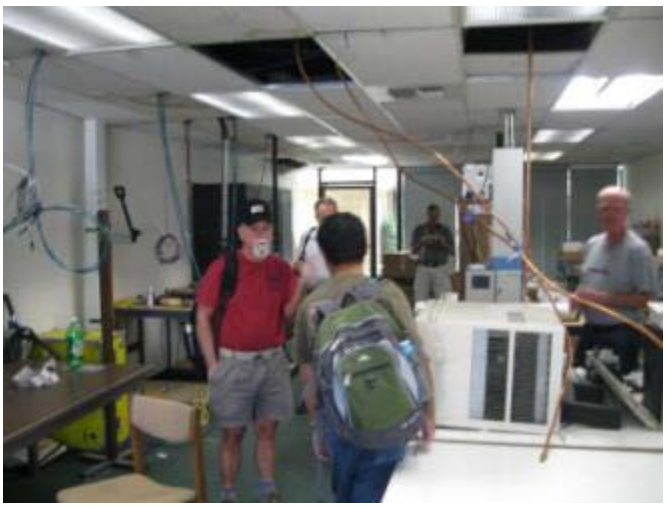
Space: adequate

Power: adequate

Internet: Some concern because under transition. Hotspots worked fine.

Horizon: adequate, but would prefer to be on far end of roof to eliminate obstructions

Comments: The spiral originally planned for this site is being moved to the SJV APCD site at the airport.



Site Name: Shafter (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=15248)

Contact: Neil Adler (916-323-3231)

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben) – likely installation if the mini-tower base support can be used (see photo)

Space: adequate

Power: adequate

Internet: Serviced by a modem, need to use hotspots. Hotspots worked fine.

Horizon: excellent

Comments:

- Security a concern, do not visit alone or at strange times. Rooftop access ladder showed evidence of forced entry, raising questions about safety of instruments.
- Distance from rooftop to lab below is 21', must be less than 24' for Pandora to put instrument inside building. This would require a small hole to be drilled in the conduit for power cables leading from roof to lab below. Need permission from building owner to do this. Will only pursue this if other sites encounter problems.

Site Name: Oildale (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=15243)

Contact: Neil Adler

Potential Instruments:

Leifer, UCSD (Park mobile lab in this location)

Space: Not suited for rooftop instruments. No roof access, not secure.

Power: NA

Internet: Hotspots worked at this site.

Horizon: Inadequate

Comments: This site was found to be inadequate for remote sensors. Plenty of open space.


CDL DRIV
WANTE

Site Name: Bakersfield Municipal (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=15258)

Contact: Nathan Trevino

Potential Instruments:

Pandora (Jay Herman)
Aeronet (Brent Holben) – definite installation
EPA (Long/Szykman) – Photolytic and FRM NO2
UCI (Saewung Kim)?
UC Davis (Tony VanCuren)?
MPL?

Space: Room for extra racks in shelter, plenty of space for remote sensors.

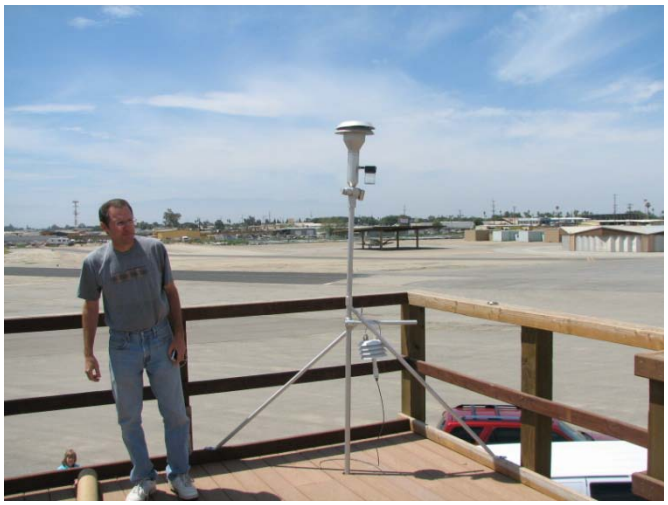
Power: Adequate

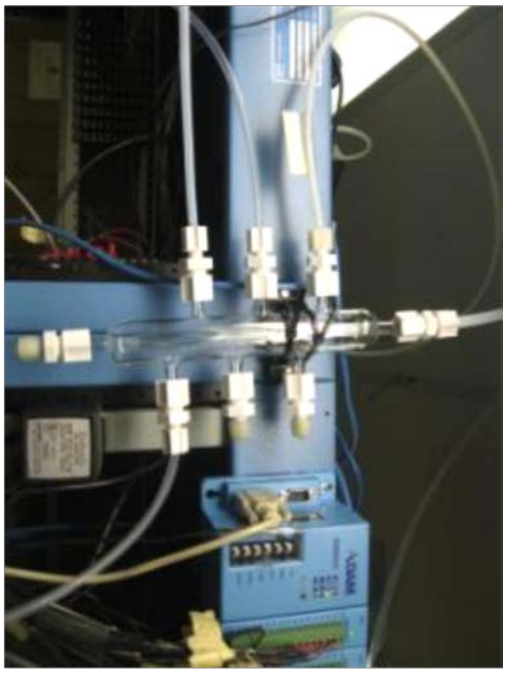
Internet: Hardwired, but need more access ports. Upgrade of router would fix the problem. Both hotspots worked, AT&T faster.

Horizon: excellent

Comments:

- This will now be a spiral site, replacing California Ave.
- Access needs to be negotiated, since it is gated. Security is not a concern.
- Jay allowed to drill access hole for Pandora



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GOOD ENV. GAS CAL
NOx (200E) CAL 5-23-12
CO (48A) CAL 5-23-12
NMHC (55) CAL
N MHC COLUMN COND
H2 GEN SERVICE
MET-CAL 6-11-12
BAMS PM2.5 CAL
BAMS PM10 CAL
PROBE LINES CLEANED
2535
49.3
35.7
1243-11
JJ8350

Site Name: Edison (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=15242)

Contact: Neil Adler

Potential Instruments:

Space: Not suitable for rooftop instruments. No roof access.

Power: NA

Internet: NA

Horizon: Inadequate

Comments: Site has been eliminated from contention.

Site Name: Arvin (http://www.arb.ca.gov/qaweb/site.php?s_arb_code=15249)

Contact: Neil Adler

Potential Instruments:

Pandora (Jay Herman)

Aeronet (Brent Holben) – school would be an excellent location for installation, otherwise undecided.

Space: Adequate

Power: Adequate

Internet: Hotspots worked

Horizon: Excellent

Comments: Security at this location is a major concern (bullet holes in shelter). Would only use this location if instruments could be placed on auditorium roof of adjacent school.

Contact: Lomar P. Boatman (Principal/Superintendent) pboatman@digiorgio.k12.ca.us
661-854-2604

NOTE: Initial phone call to school principal was very positive. Details on our requirements have been sent to him.


Home of The Dragons

DISCOVER-AQ Dryden Hangar Site Survey
Luci Crittenden
Palmdale, California
19 July 2012

Team met with Frank Cutler who provided us a great tour of the Dryden facility at Palmdale. Many questions were asked with a lot of answers immediately provided and other answers are being researched with Bob Garcia, Wendy Givens, and Karen Richard who were not available on the day of our visit. No showstoppers were apparent.

Topics discussed and areas visited included:

- Hangar parking for the P-3 and the B-200 - probable location is in the area behind the 747 Sophia
- Fuel – for faster delivery service, must provided the fueler with the quantity desired and the time of delivery the day before; contract fuel using the aircard (Bob Garcia)
- Badging – POC (Anne Odenthal) foreign nationals with no green card must be escorted; can't submit for badging until 90 days out; foreign nationals must be in the system 45 days out; contractor badges from other centers accepted; badges only issued until 3pm each day but someone always in the security office
- Laboratory space for scientists – no problem; can use the Airborne Science Lab; power and workbenches not an issue
- Gases storage area – location available (POC: Karen Richard)
- Work area for the Wallops and Langley maintenance guys – will coordinate a location (Bob Garcia)
- Launching aircraft – no Dryden personnel available; Wallops should send an extra maintainer or perhaps use the Langley B-200 guy to launch both aircraft
- Internet in the building – not an issue, guest lines available
- Shipping – point of contact provided (Wendy Givens)
- Vehicle parking – no issue, large parking lot, no parking permits required
- Vehicle use – van available to shuttle air crew to hotel to pick up rental cars
- Project room – large one available (room 211) with internet and projection capability on the 2nd floor; plan to use from 4-5pm each day
- Aircraft parts storage – location will be marked off on hangar floor
- Airstairs – several stairs available; those that fit the DC-8 should work for the P-3
- Hangar hours of operation – 6am until midnight normally, but not an issue for badged personnel
- Ramp access – being researched as part of badging (Bob Garcia)
- Ramp drivers course – probably is one required – being researched (Bob Garcia)
- Field closures – none known off, have several available runways
- Costs for hangar usage – none (One-NASA)
- Flight planning facility – at pilot's office area; also has a project frequency (373.15 and 135.825)
- Aircraft tugs, aircarts, etc – available … also forklifts & cherry pickers available

The above-listed requirements are reiterated (with relevant contact names) in the list below emailed from Frank Cutler on 24 July 2012.

All,

Based on our July 19th meeting here are the facilities & operations requirements we discussed. Please respond to all with any clarifications or additional requirements.

1. Mission series shall operate out of the NASA Palmdale DAOF during the period January 15,2013 – February 15, 2013 plus add one week margin.
2. Mission staff will be on site generally between 0500 and 1900, 7 days a week.
3. Aircraft supporting the mission series will be the Wallops P3, Langley Kingair, Dryden ER2.
4. Aircraft will be stored overnight inside hangar and move to outside ramp each morning.
5. Airborne Science Lab shall be made available to the science teams and their equipment during the mission period. (Mission leads to coordinate with Karen Richards)
6. Conference Room 211 shall be scheduled to support a daily 1600-1700 science team teleconference. (Mission leads to work with Anne Odenthal to schedule)
7. Require area designated for aircraft maintenance personnel (Kingair & P3) to reside.
8. Mission personnel shall submit for site badging using the Experimenters Worksheet (sent to mission leads for distribution). (Anne Odenthal to handle data input for badges)
9. Wallops & Langley shall provide sufficient maintenance personnel to support their aircraft operations.
10. Dryden shall provide a location for aircraft support spares and tools to be located.
11. Mission leads shall provide Karen Richards with all MSDS for chemicals/gases/hazardous materials to be shipped to the DAOF. (Lucille to coordinate)
12. Dryden shall provide fuel request instructions to the aircraft operations teams. (Bob Garcia to provide fuel ordering /payment procedures)
13. Aircraft operations teams will need ramp driver's training/licenses for the DAOF. (Bob Garcia to help organize)
14. DAOF to provide all aircraft AGE required to support aircraft operations. (Bob Garcia to work)
15. Instrument teams shall make all arrangements for shipping of science equipment to/from the DAOF. (Wendy Given will work with the science teams for accepting deliveries and helping with pickups)
16. Mission teams flight operations will need assistance with flyaway gate operations. (Bob Garcia to work)

Frank