

H2 Stations In California



HTAC – NOVEMBER 18TH, 2014



Getting Stations Permitted & Constructed

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Codes & Standards

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- **California Fire Code**
 - First to adopt NFPA 2 (2011 Version)
 - DOE has been instrumental
 - LH2 is the next frontier
- **CA Permitting Guidebook**
 - Out for public comment very soon
 - Feed into H2USA effort

Supporting Station Permitting

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- Community Outreach & Response
- Tracking & Troubleshooting

Last Updated	Permit Status	Station & Task Name	Who has the ball?	Project Capacity (kg/day)	Stn. Developer	Address	Start Date	Estimate/ Operation Date	Station Deadline	Progress Status	Pie Visual	Comments	Commissioning
		Permit Report Card:											
Permitted to Build*		14								32		pre-funding/contracting	
Permit apps submitted		7								14		Funding/contracting/site control complete	
Permit app to be submitted		37								1		Permitting Complete	
		Includes one bus-only station (Oakland). All others = light duty								4		Construction Complete	
										9		Commissioned and open	
												*Includes one bus-only station (Oakland)	
10/28/14		Diamond Bar - SCAQMD	Station Developer	180	Air Products	21865 E. Copley Drive, Diamond Bar, CA 91765	06/02/10	12/01/14		Commissioning		Commissioning process has resumed in earnest. Assuming all proceeds as expected, commissioning expected to be complete in November.	63%
10/28/14		Irvine - UCI (upgrade)	Station Developer	180	Air Products	19172 Jamboree Rd., Irvine CA 92612	06/02/10	01/30/15		Permit - Submitted		Addressing final comments. Key challenge remaining = power supply approach. UCI has changed its requirements - both parties working toward a resolution.	
10/28/14		Irvine - Walnut Ave.	Station Developer	180	Air Products	5410 Walnut Ave., Irvine CA 92604	06/02/10		12/31/14	Permit Submitted		Received full comment package back from City on 10/7/14. Developer working the response, expect to re-submit early November. Review uncovered a planning issue - the project will require a CUP. This is a 3-4 month process.	
10/28/14		Lawndale - Inglewood Ave.	Station Developer	180	Air Products	15606 Inglewood Ave., Lawndale, CA 90260	06/02/10		12/31/14	Design		Detailed Site Plan in process. On target for early November submittal to City.	
10/20/14		Los Angeles - Beverly Blvd	City/County	180	Air Products	7751 Beverly Blvd., Los Angeles, CA 90036	06/02/10	12/31/14	12/31/14	Permit Submitted		Fire, Electrical have been approved. Building is ready to issue once real estate documentation is buttoned up (the site's old documentation needs to be updated - a minor issue).	
10/28/14		Los Angeles - West LA 2	Station Developer	180	Air Products	11261 Santa Monica Blvd., Los Angeles, CA 90025	06/02/10	01/20/15	12/31/14	Under Construction		Construction has begun (Contractor on-site October 20th). Turnkey taking place this week (C	

Lessons Learned

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- Developers should connect with City Staff early
- Biggest Issue = Site Control
- Local Communities are generally very supportive
.....But Education is Key
- Aesthetics matter

Getting Stations Commissioned

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Selling H2 to Retail Consumers

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- **Regulatory Driver**
 - Dispense hydrogen by the kilogram “as soon as possible”
 - Motor fuel dispensers must receive a *Certificate of Approval* before they may be used in commerce in California
- **Setting**
 - National Institute of Standards and Technology Handbook 44
 - Modifications adopted by CDFA included new accuracy classes
- **Next Steps taken:**
 - Fabrication and evaluation of reference standards
 - Joint CARB/DMS statewide field testing program
 - Results promising to date

California's New 2014 Accuracy Classes* and Tolerances for Hydrogen Fuel

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Accuracy Class	Acceptance Tolerance	Maintenance Tolerance
2.0	1.5%	2.0%
3.0 installed before 2020*	2.0%	3.0%
5.0 installed before 2020*	4.0%	5.0%
10.0 installed before 2018*	5.0%	10.0%

* No new installations after the end of the designated calendar year unless regulations are further amended. Existing installations allowed to operate until decommissioned.

2014/15 California Test Schedule

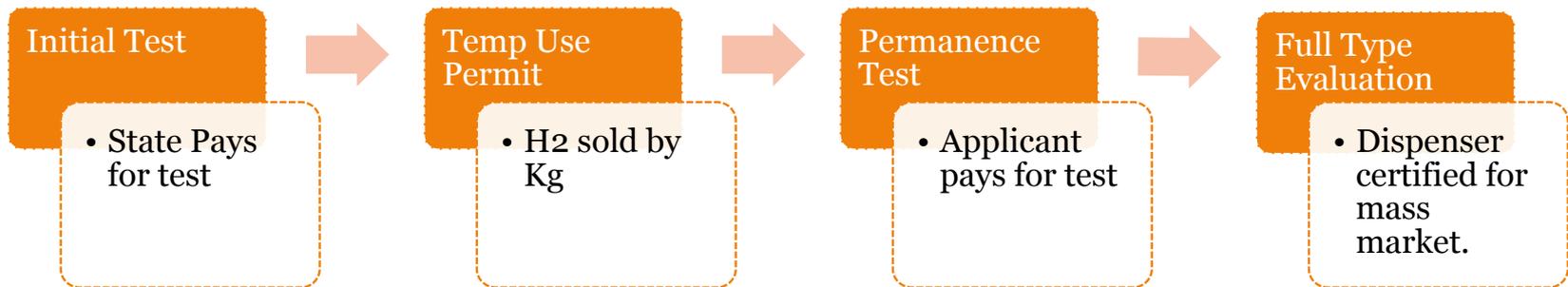
As of October 30, 2014 and Proposed

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Testing Order	Station	Expected Evaluation Outcome	Initial Test Date	Permanence Test Date
1	Emeryville	Temporary Use Permit	March 3 – 7, 2014	N/A
2	Thousand Palms	Accuracy Assessment / Temporary Use Permit	March 24 - 28, 2014	TBD
3	Torrance	Accuracy Assessment (PVT)	April 1 – 4 , 2014	N/A upgrade planned in 2015
4	Burbank	Accuracy Assessment (PVT)	April 14 - 18, 2014	N/A upgrade planned in 2015
5	CSULA	Temporary Use Permit	April 21 – 25, 2014	New initial test Oct 20-24
6	Newport Beach	Temporary Use Permit	May 5 - 9, 2014	New initial test requested early 2015
7	West Los Angeles	Temporary Use Permit (35Mpa)	May 12 - 16, 2014	TBD
8	Diamond Bar	Full Type Evaluation	Dec 8- 12, 2014	Feb 2015
9	Anaheim	Full Type Evaluation	March , 2015	May , 2015
10	West Sacramento	Full Type Evaluation	Oct 8 - 10, 2014	Dec, 15 – 19, 2014

Some Metrology Conclusions To Date

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- To date - No tested dispenser meets the 1.5/2% NIST standard
- The three temporary new accuracy classes appear warranted
- Some current dispensers are capable of meeting the new classes
- First Temporary Use Permits have been issued, and H₂ has been sold by the kg!

Verifying Safe Fueling

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- **HySTeP device in process, thanks to H2First and DOE**
 - HyStEP Device: capable of performing key tests defined in CSA HGV 4.3
 - **Purpose: Help validate station fueling according to SAE J2601 protocols**
 - Benefit: Reduce need for repeat OEM vehicle visits to validate fill protocol performance
 - Device features 35 And 70 Mpa capabilities:
 - 4 – 7 kg capacity tank or tanks
 - Pressure and temperature sensors
 - Appropriate temperature and pressure relief devices
 - IrDA capability
 - Vent stack for testing

HyStEP Next Steps

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- **HyStEP device California delivery date November 2015**
- **Form California Project Team - Implementation**
 - Stakeholders – OEM, technology suppliers, operators, regulatory agencies, etc.
 - Data deliverables, template
 - Determine “legal consequences” of testing
 - Assemble testing team and budget
 - Determine station testing schedule
 - Determine potential “handoff “ to private entity

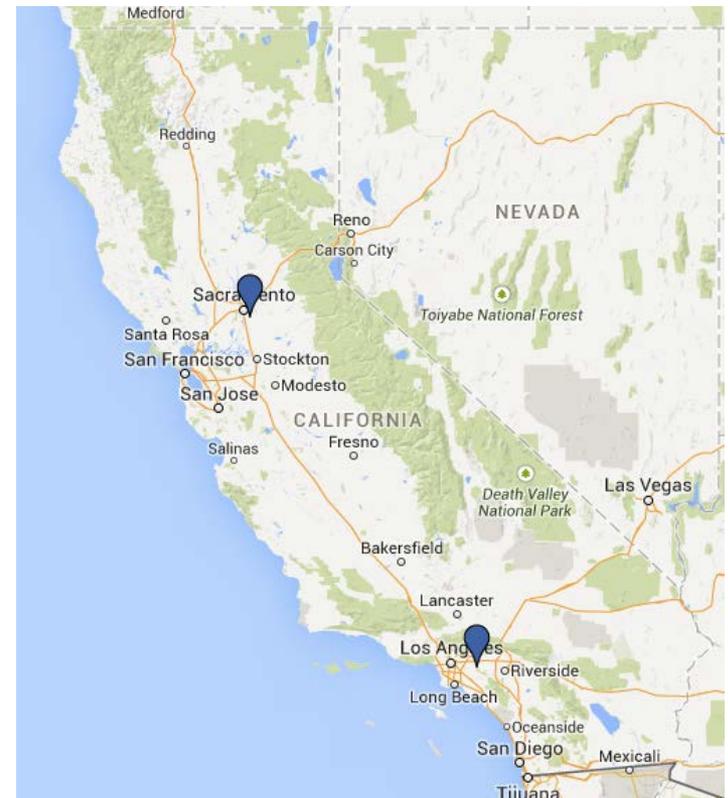
Hydrogen Purity at the Station

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Every Station has potential to deliver bad H₂

- California Code of Regulations requires – fuel meet SAE J2719
- California Department of Food and Agriculture authority to field test
- CEC funding condition requires 6 month full suite testing minimum
- Experience dictates the need for
 - Sampling at more frequent intervals
 - Possibly an onsite “Contamination Detector”

Two Testing Labs in the State:



Keeping Stations Open

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Economics

- O&M funding until volumes support operating expenses

Regularly Scheduled Maintenance is critical

- Weak Link = Compressors

Dependable Quality Monitoring

Back-to-Back-to-Back Fueling Challenges

- Mercedes Customer dinner example

● ● Burbank >

● ● Emeryville >

● ● Fountain Valley >

● ● Harbor City >

● ● Newport Beach >

● ● Richmond >

● ● Torrance >

● ● West LA >

● Online ● Offline ● Limited

More stations coming soon!

If you are a station owner or operator and would like to have your station added, please contact [Ben Xiong](#) at 916-375-8034

System Reliability Ideas

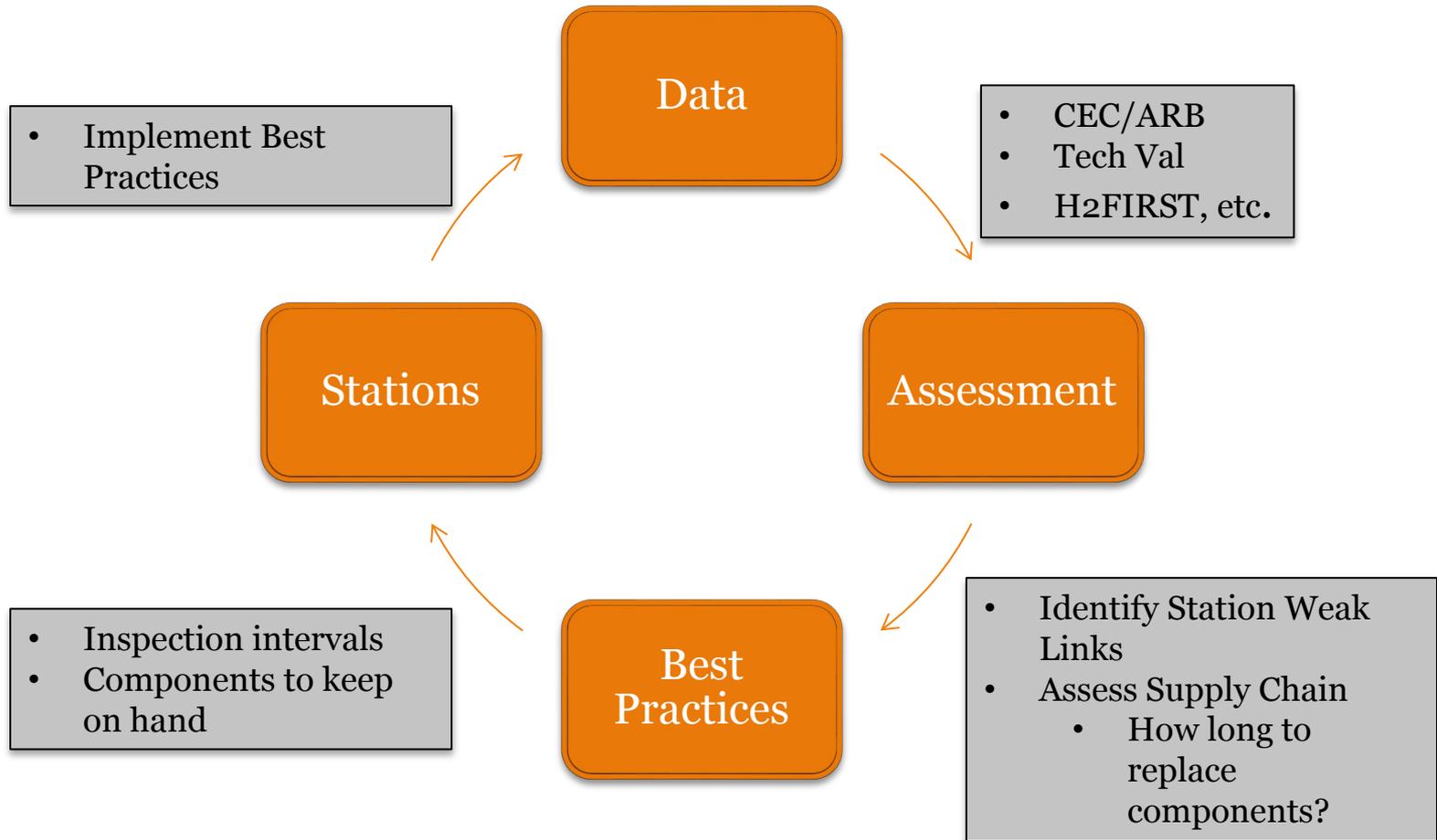
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CEC O&M Funding = O&M Data. Use to:

- Identify Station Weak Links/Operations Costs/etc.
- Assess Supply Chain – how long to replace components?
- Establish Best Practices for:
 - Inspections and maintenance
 - # of (and which) components to be keep on hand

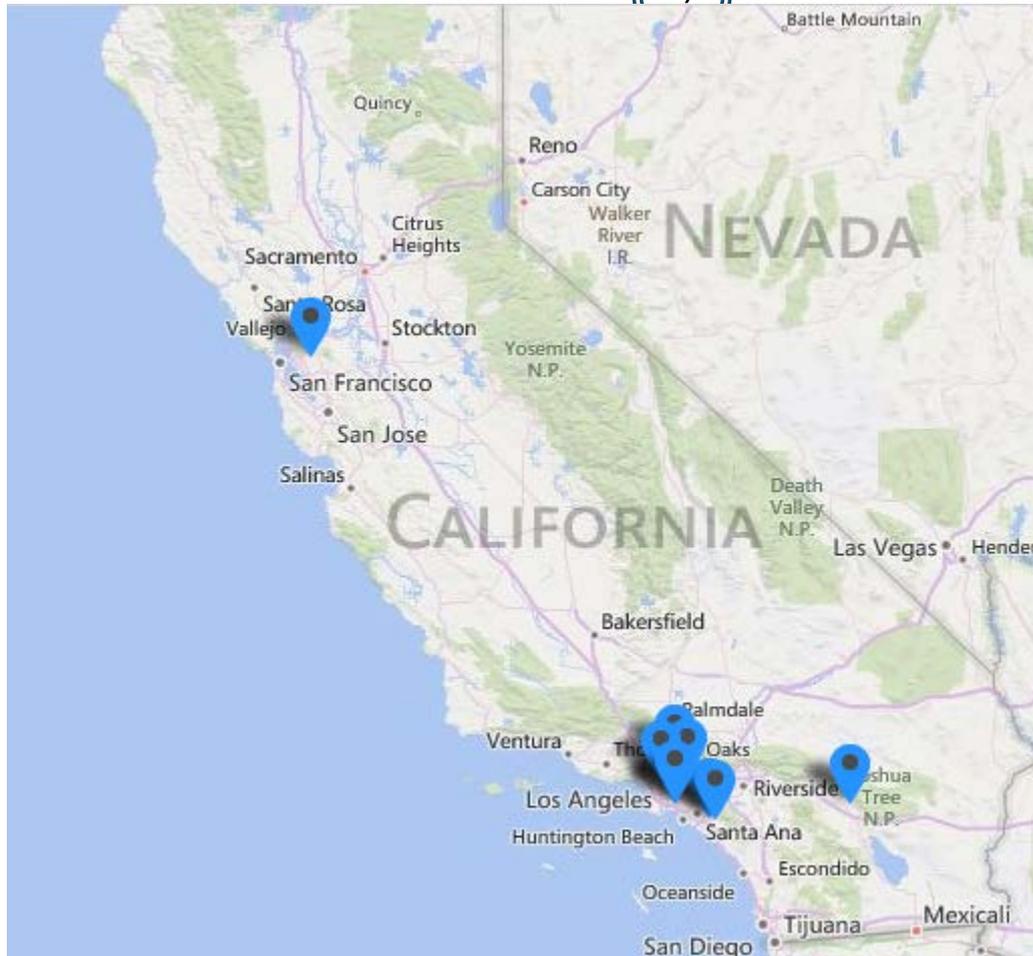
Leveraging CA Station Data – Reliability

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Network Snapshot – as 11/14/14

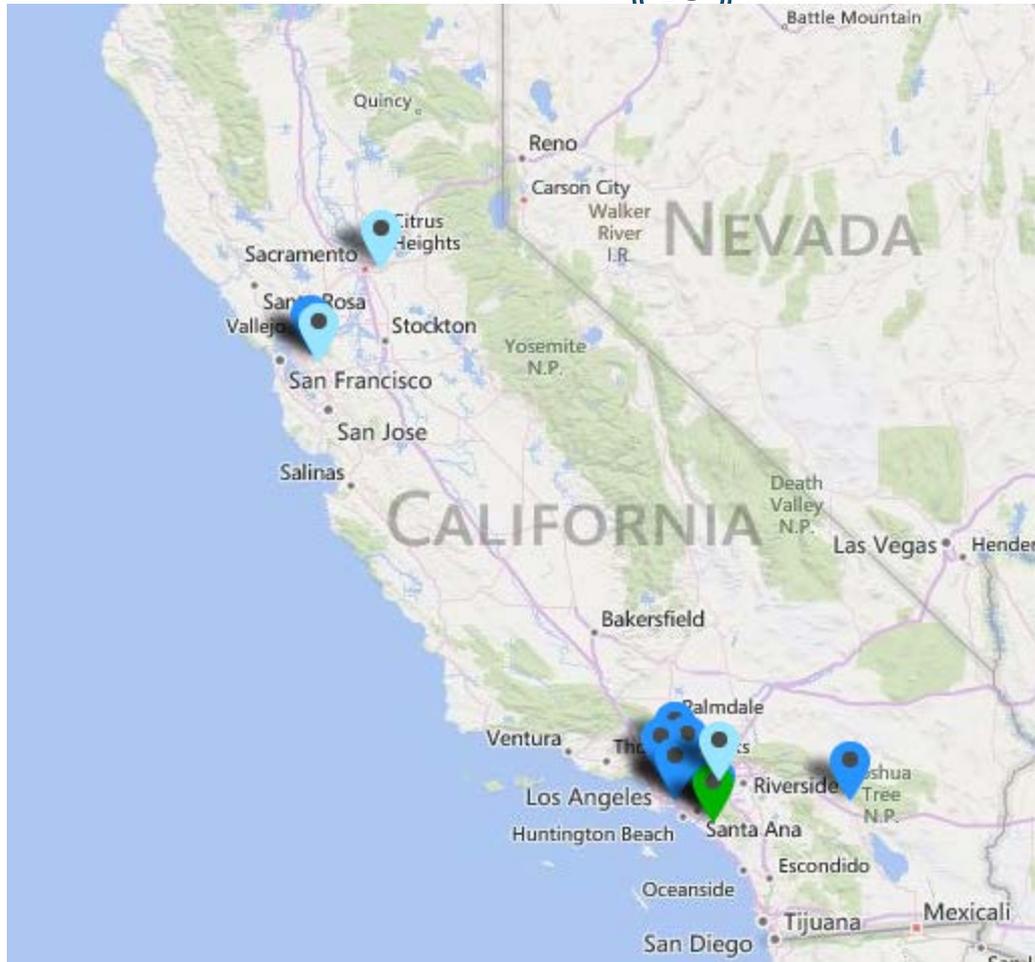
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- Select All
-  1. Open (9)
-  1b. Under Repair (1)
- 2.  Commissioning (3)
-  3a. Under Construction (2)
-  4b. Permit In-Process (9)
-  4c. Pre-Permitting (34)
-  Upgrade (3)

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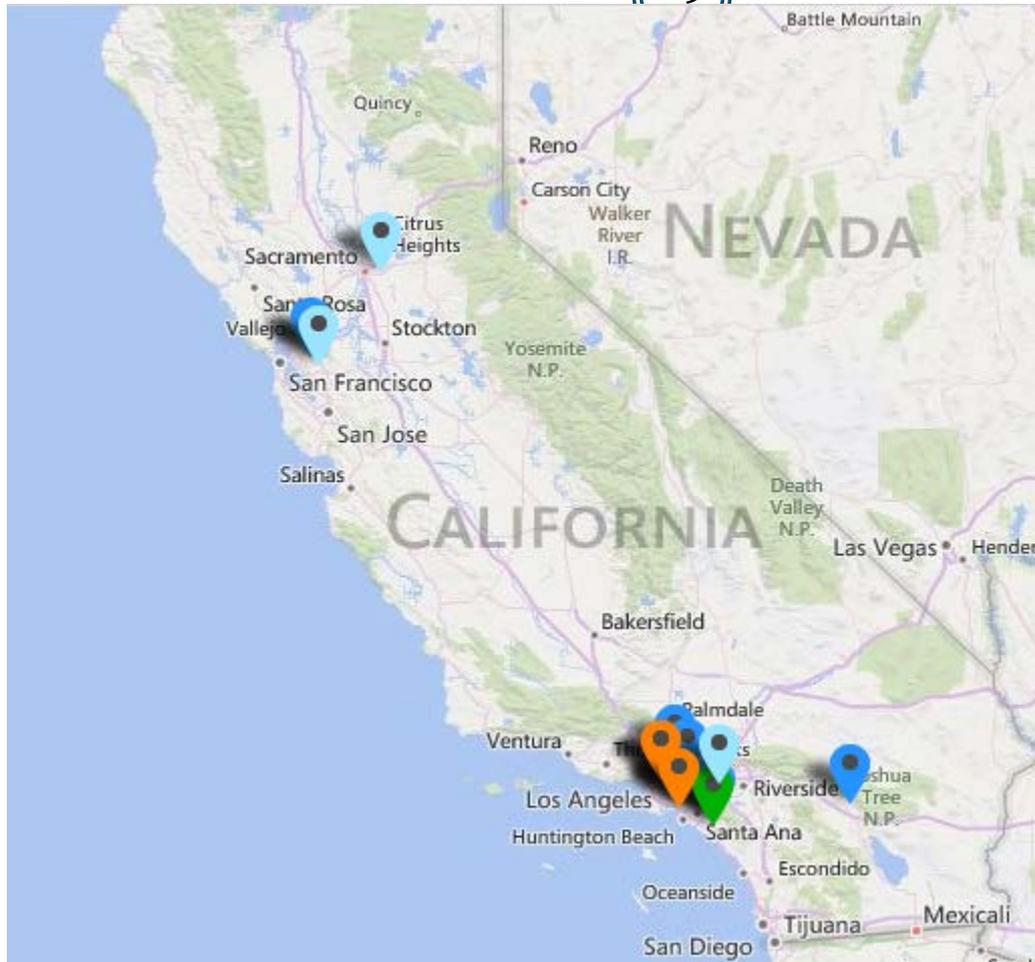
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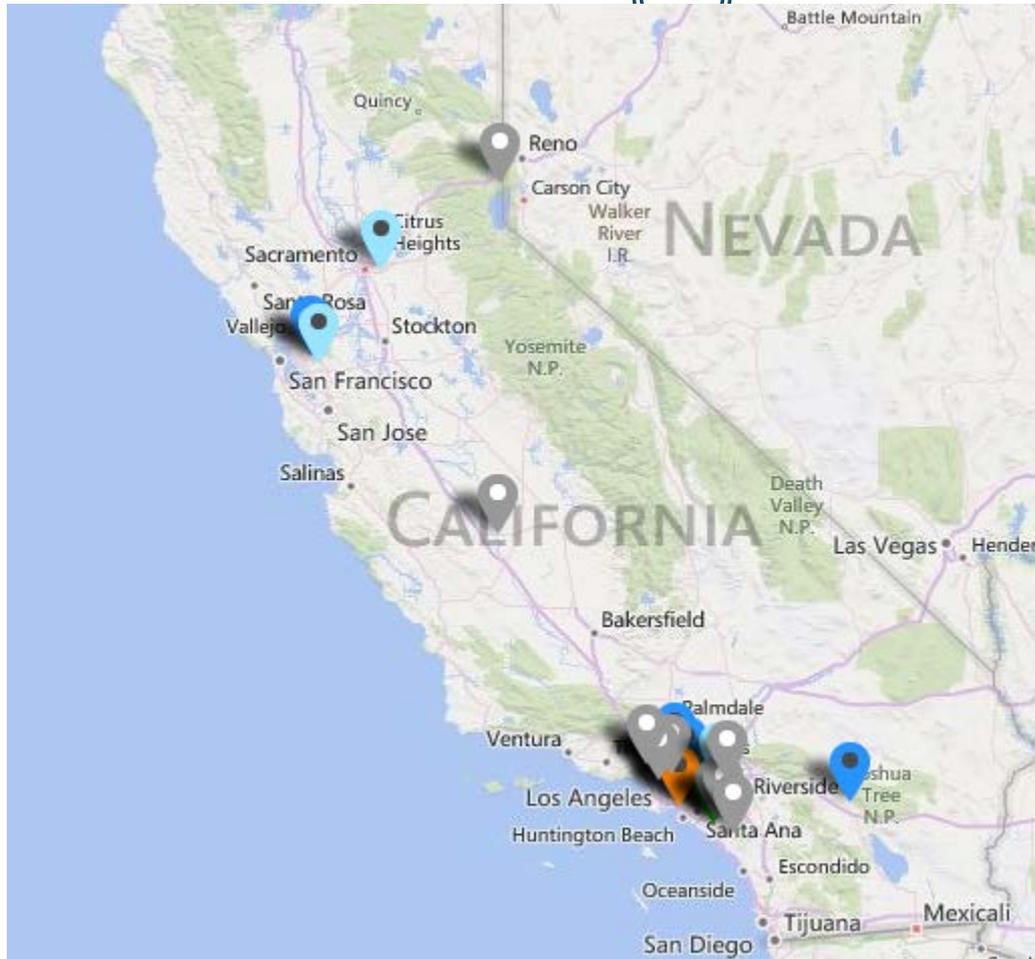
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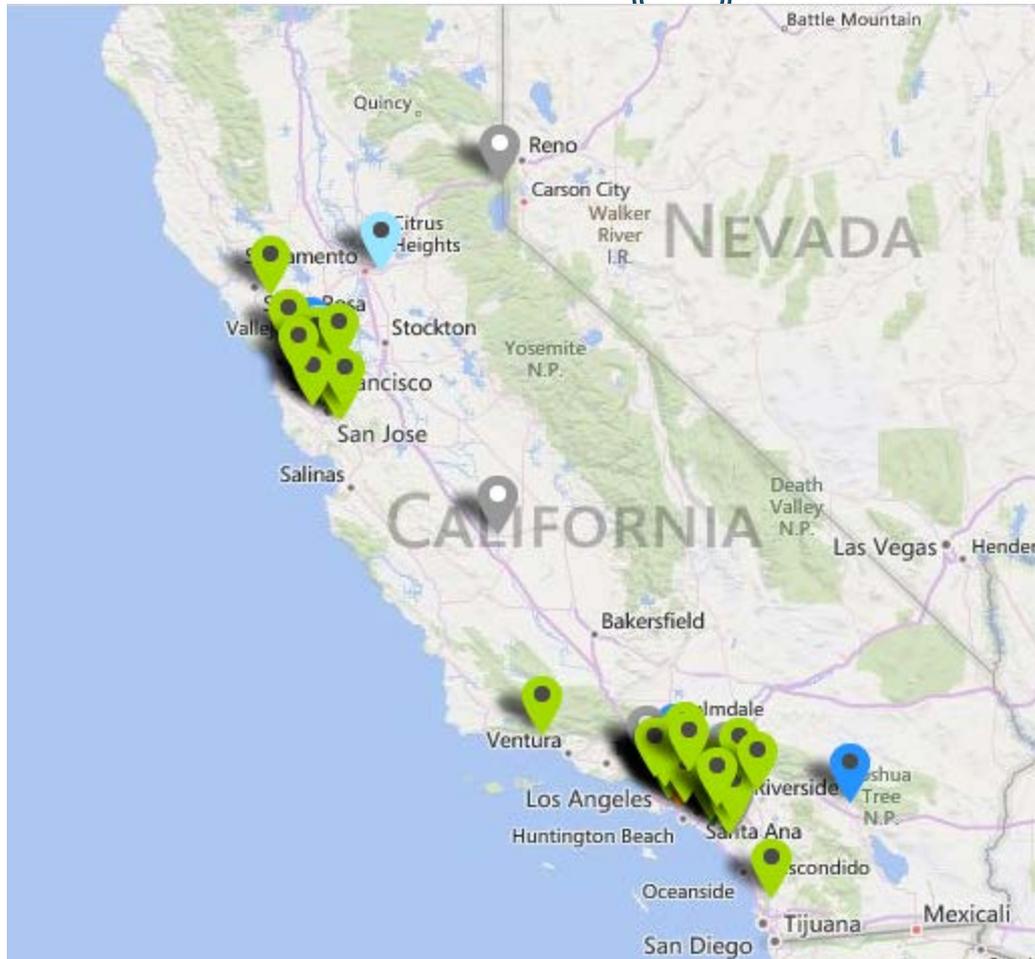
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Thank You

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