Bringing E85 Fuel Dispensing to LBNL

Berkeley Lab’s Involvement in the California Air Resources Board’s Research and Development Testing Program for E85 Vapor Recovery Systems

by

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Background on Berkeley Lab

- DOE Research Facility
- Managed by UCOP
- 200 acre site
- ~3,800 Workers
- 21 Divisions and Departments
  - Computing Sciences
  - General Sciences
  - Life and Environmental Sciences
  - Physical Sciences
  - Operations (EH&S, Facilities, Human Resources)
- Unclassified research
Fuel Consumption Requirements

Executive Order 13149 (April 2000)

*Greening the Government Through Federal Fleet and Transportation Efficiency*

—Goal: *Reduce annual petroleum consumption at least 20% by end of FY2005, relative to FY1999*

- Higher fuel economy
- Changes in vehicle types
- Changes in behavior
- Use of alternative fuels
Baseline Data for Berkeley Lab

• Over 315 vehicles in fleet
  — Mixtures of sedans, light duty, medium duty, and heavy duty

• ~73,150 gallons of unleaded fuel dispensed
Alternative Fuel Objective

• Add E85 fuel dispensing capability to existing motor pool facility
• Design goal
  — Single nozzle
  — 4,000-gallon above ground storage
  — Integrate into PetroVend system for inventory tracking and dispensing control

Regulatory Challenge

• Transferring and dispensing not allowed unless the system includes both Phase I and II CARB Certified Vapor Recovery Systems
Where to Turn for Answers

- **Regulated Community & Professional Organizations**
  - National Ethanol Vehicle Coalition
  - San Diego Regional Transportation Center
  - Vandenberg Air Force Base

- **Regulatory Agencies**
  - BAAQMD
  - CARB

  "Test site designation may be requested by the applicant, or by another person, for facilities other than the certification test site(s), for the purpose of research and development, or independent evaluation of a system prior to its certification. Approval of such a test site shall be at the discretion of the Executive Officer.” (ref: Section 13.1.6 of CP-201)
Establish Regulatory Strategy for Designing Station

- Submitted R&D test site request to CARB
  - Approved in May, 2003
  - Conditions attached
  - Few specifics of design known at this point
- Filed Authority to Construct permit application with BAAQMD
  - Approved in September, 2003
  - Conditions attached
  - Began construction in October
  - Began dispensing in June, 2004
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Station Layout

Vapor Processor?  Dispenser  Fuel Tank
Original Configuration

- Hoover 4,000-gallon aboveground tank w/Husky 4885 P/V valve
- Baker Industries spill containment
- Phase I Vapor Recovery
  - Emco Wheaton vapor adaptor (A99) & cap (A76)
  - Hazlett HC-2 ball check valve
- Guillotine 3” submerged fill pipe
Original Configuration

- Gasboy 1520-9 dispenser
- OPW 11VF-47 nozzle
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Original Configuration

- Phase II Vapor Recovery
  —Hirt VCS-200

Fuel distributor

—Petro-Diamond, Inc.
"Operational" Meant Quarterly Testing

Example #1: Nozzle test
“Operational” Meant Quarterly Testing

Example #2: Pressure/Vacuum Valve test
Fuel Transfer Incident in Early 2005

- January
  - Fuel overfill shut down station
  - Minor spill, but concerns about design
- March
  - Complete review by certified professional engineer
    (James Ray of RHL Design Group)
- April
  - Ray report
    - Numerous recommendations
    - More notable recommendation: BAAQMD Phase II exemption for “Facilities which can demonstrate to the APCO that at least 90% of the vehicles refueled at the facility in any (time period) are owned by a common operator and equipped with onboard refueling vapor recovery (ORVR).” (ref: BAAQMD Regulation 8-7-112.9)
  - Request extension to R&D test site authorization
Fuel Transfer Incident in Early 2005 (cont)

- May
  - R&D extension granted by CARB
  - Apply for Phase II exemption with BAAQMD
- June
  - Approval by BAAQMD for Phase II exemption
- August
  - Completed recommended and authorized station modifications
  - Resumed operations, including quarterly CARB vapor testing
Current Configuration

- Removed components include
  - Hirt VCS-200 vapor processor
  - Vapor return lines to tank and vapor processor, including condensation trap and second P/V valve
- Replaced component
  - OPW 11A conventional nozzle
  - Goodyear 559N hose
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Current Configuration
How is Berkeley Lab doing?

FY2005 Data
- ~270 vehicles (total)
  - ~70% run on gasoline
  - ~40% use E85

Fuel Consumption
- 54,033 gals unleaded
- 10,970 gals E85
  (offline for seven months!)
How is Berkeley Lab doing?

- One of only a handful of government facilities that met the 20% reduction goal of EO 13149.

- Met reduction goal by FY2004 when the combined reduction within DOE was only 1.8%!
Upcoming Issues for Berkeley Lab

- Vapor recovery certification
- More flexible fuel type vehicles
- Fuel availability and quality

Acceptance of E85 as a viable alternative

“Ethanol can replace gasoline with significant energy savings, comparable impact on greenhouse gases”

Berkeley Lab Design Team

- Facilities
  - Bill Llewellyn
  - Don Prestella (retired)
  - Richard Stanton
  - Chuck Taberski

- Environment, Health and Safety
  - Rob Campbell (ex-staff)
  - Robert Fox
  - Gary Piermattei
  - Patrick Thorson

Contact information on individuals can be found through the Berkeley Lab phone book at www.lbl.gov