

# ***An Asset Management Approach for EPA/CARB SF<sub>6</sub> Regulations***

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## **Agenda**

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- Background
- A Quick Overview of EPA & CARB Regulations
- Paper Process & Revised Paper Process
- Electronic SF<sub>6</sub> Smart Form Tool
- User Experience Scenario: The “Life” of A Gas Cylinder
- Quality Assurance Methods
- Lessons Learned
- Conclusion

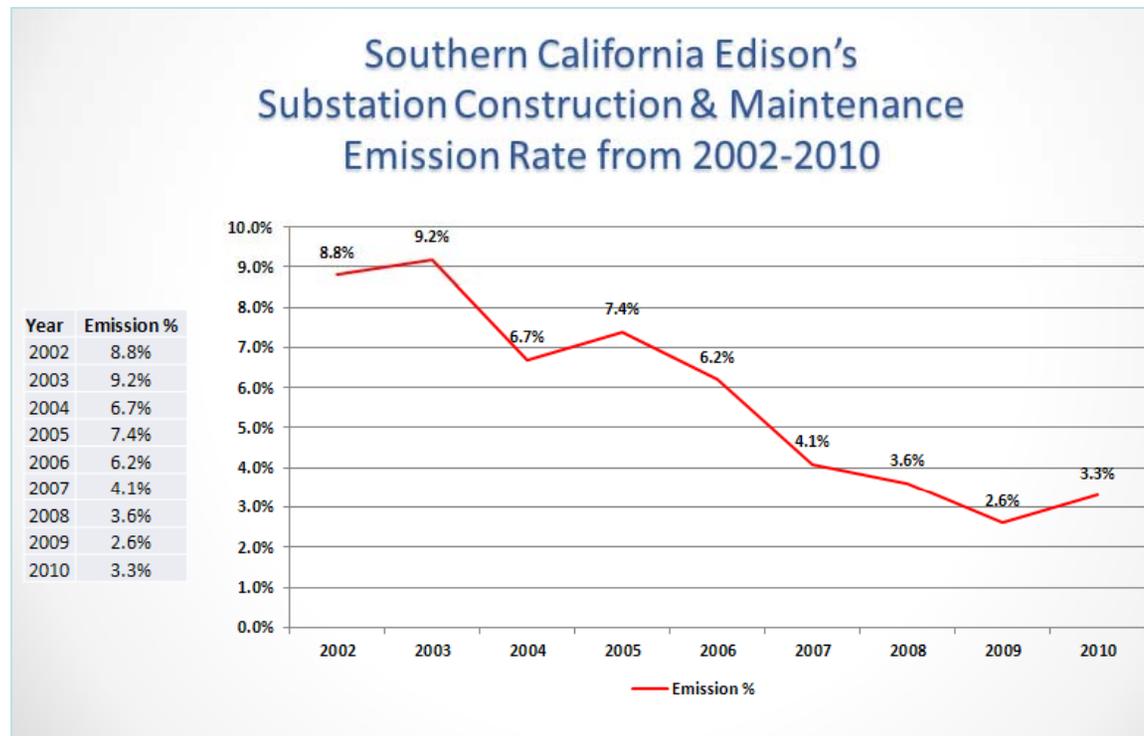
## ***Purpose***

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Present an approach for entities to model in an effort to aid them in meeting reporting requirements in an increasingly more stringent greenhouse gas regulatory climate

## Background

- Involvement in US EPA's Voluntary SF<sub>6</sub> Emission Reduction Partnership for Electric Power Systems since 2001
- SCE's SF<sub>6</sub> Gas Management Program established in 1998
- Program has yielded reduced emissions



**SCE's Substation Construction & Maintenance Emission Rate Chart demonstrating SF<sub>6</sub> Emission Rate from 2002-2010**

## A Quick Overview of EPA & CARB Regulations

Regulatory Requirements	EPA	CARB
Mass-balance equation elements	X <sup>1</sup>	X
SF <sub>6</sub> equipment asset management information (serial number, manufactured date, location, etc.) <sup>2</sup>		X
Chronological records of dates on which SF <sub>6</sub> was transferred into or out of active GIS equipment <sup>3</sup>		X
Pounds of SF <sub>6</sub> transferred into or out of active GIS equipment <sup>4</sup>		X
Weight of each SF <sub>6</sub> container as it is added or removed from inventory		X
SF <sub>6</sub> container asset management information (unique identification number, size, location)		X
Maximum allowable annual SF <sub>6</sub> emission rate of 1% by 2020		X

<sup>1</sup> Includes hermetically sealed SF<sub>6</sub> equipment

<sup>2</sup> Includes hermetically sealed SF<sub>6</sub> equipment

<sup>3</sup> Does not include hermetically sealed SF<sub>6</sub> equipment

<sup>4</sup> Does not include hermetically sealed SF<sub>6</sub> equipment

## Paper Process & Revised Paper Process

Reports	Paper Process	Revised Paper Process
Residual SF6 Gassing Report	X	X
Recycled SF6 Gassing Report	X	X
Reclaimed Gas Report (for SF6 Containers)	X	
Annual Inventory Report	X	
Cylinder Storage Log		X
SF6 Gassing Report		X
Reclaimed SF6 Gassing Report		X
Residual Gas Report (for SF6 Containers Sent Externally)		X
Recycled Gas Report (for SF6 Containers Sent Externally)		X
Quarterly Inventory Report		X

- Paper Process sufficient to meet EPA Requirements only
- Revised Paper Process able to meet EPA/CARB Requirements, but issues exist with data collection and data management

- How do we mitigate issues with the Revised Paper Process concerning data collection by field crews and data management by office personnel?

## SOLUTION:

Electronic SF<sub>6</sub> Smart Form Tool

## ***Electronic SF<sub>6</sub> Smart Form Tool***

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- What is the SF<sub>6</sub> Smart Form Tool?
  - Electronic field tool that
    - ❖ Aids in data gathering for field crews
    - ❖ Interfaces with SAP to create SAP Measurement Documents for data management
  - Contains pre-populated data from SAP Asset Management System
  - Has measures to facilitate report selection
  - Creates multiple reports seamless to the user
  - Facilitates reporting to regulatory entities as data comes from SAP-BI Reporting system (similar to other reports such as NERC PRC reporting)

# Electronic SF<sub>6</sub> Smart Form Tool – Main Menu

The screenshot shows a web application window titled "Main Menu - SF6 Forms". The header includes the Southern California Edison logo and the text "SF<sub>6</sub> Forms". On the right side of the header, it displays "Form Version 3", "Data Version: 2012-04-09 7:00", and a button labeled "Update Data (Internet req.)".

The main content area is divided into four columns, each with a title and an icon:

- Gassing/Removing**: Icon showing a green cylinder being gassed into a piece of equipment and an orange cylinder being removed.
- Gas Consolidation**: Icon showing two green cylinders being consolidated into one orange cylinder.
- Quarterly Inventory Report**: Icon showing a clipboard with a checklist labeled "INVENTORY".
- Cylinder Storage Log (Ins and Outs)**: Icon showing a stack of green cylinders on a pallet.

At the bottom of the interface, there are two buttons:

- [View Submitted Forms \(All types\)](#)
- [View SAP SF6 Report Data](#)

# Electronic SF<sub>6</sub> Smart Form Tool – CB Gassing Report

Gassing Form - SF<sub>6</sub> Forms

**SF<sub>6</sub> Gassing Report (CB)** Close  
 (Pounds of SF<sub>6</sub> Transferred into CB)

*The amount in pounds of SF<sub>6</sub> transferred into the Circuit Breaker (CB)*  
*A gassing report must be filled out each time SF<sub>6</sub> is added to a CB*

SCE Username: LLOYDRP  
 Date: 04/04/2012 MM/DD/YYYY Today  
 Substation: ALPHA

**Equipment Information**

Equipment Name: CARDINAL 220KV CB  
 Voltage: 230.00 kV  
 Manufacturer: LLOYD  
 Manufacturer Date: 5/10/2011 MM/DD/YYYY  
 Model Number: 230KVCB  
 Serial Number: 4567890123  
 Name Plate Insulating Quantity: 242

Reason for Adding SF<sub>6</sub>: New Installation  
 Moisture After Adding Gas: 25 ppm  
 Purity After Adding Gas: 99 %  
 Initial Gas in CB from Manuf.: 120 lbs

**SF<sub>6</sub> Gas Cylinder Information**

Number of Cylinders Used: 1

Cylinder Owner	Bar Code Number	Weight Before Adding Gas	Weight After Adding Gas	Net Weight of Gas Added
Other	ABC123	210	130	80
<b>Total SF<sub>6</sub> Gas Added</b>				<b>80</b>

Data pre-populated based on Asset Management System

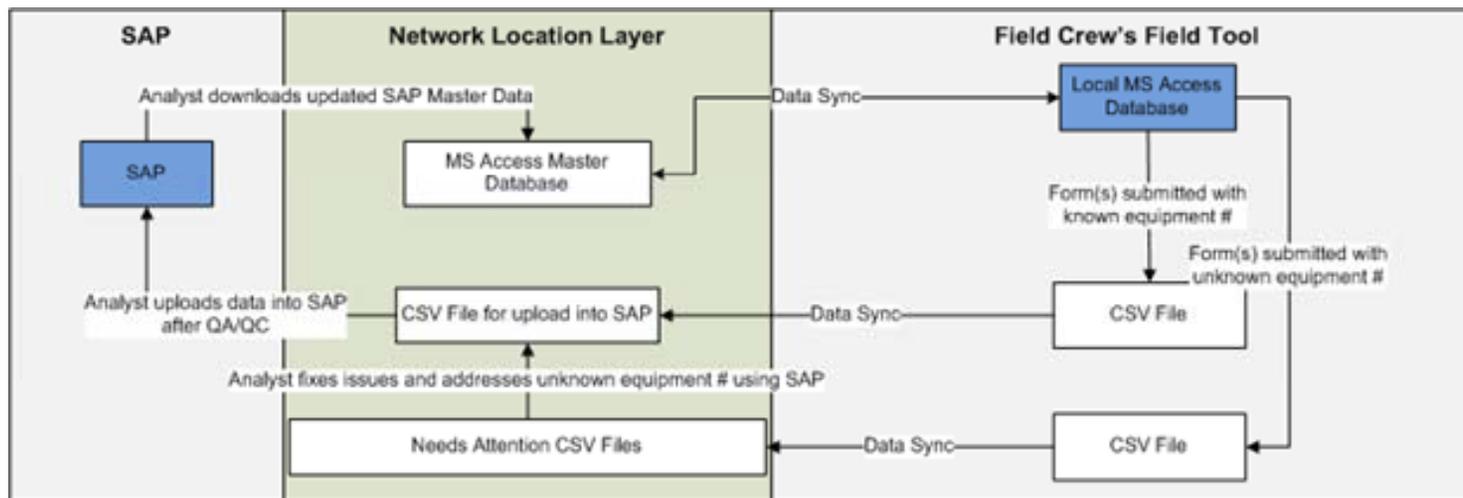
Drop-down allows only specific options to maintain consistency.

Tracks mass-balance equation element "gas purchased from equipment manufacturers inside equipment" (dynamic field appears only if "New Installation" is selected for Reason for Adding Gas)

Due to mandatory fields, all fields must be populated before report submittal

## Electronic SF<sub>6</sub> Smart Form Tool – Hybrid Interface

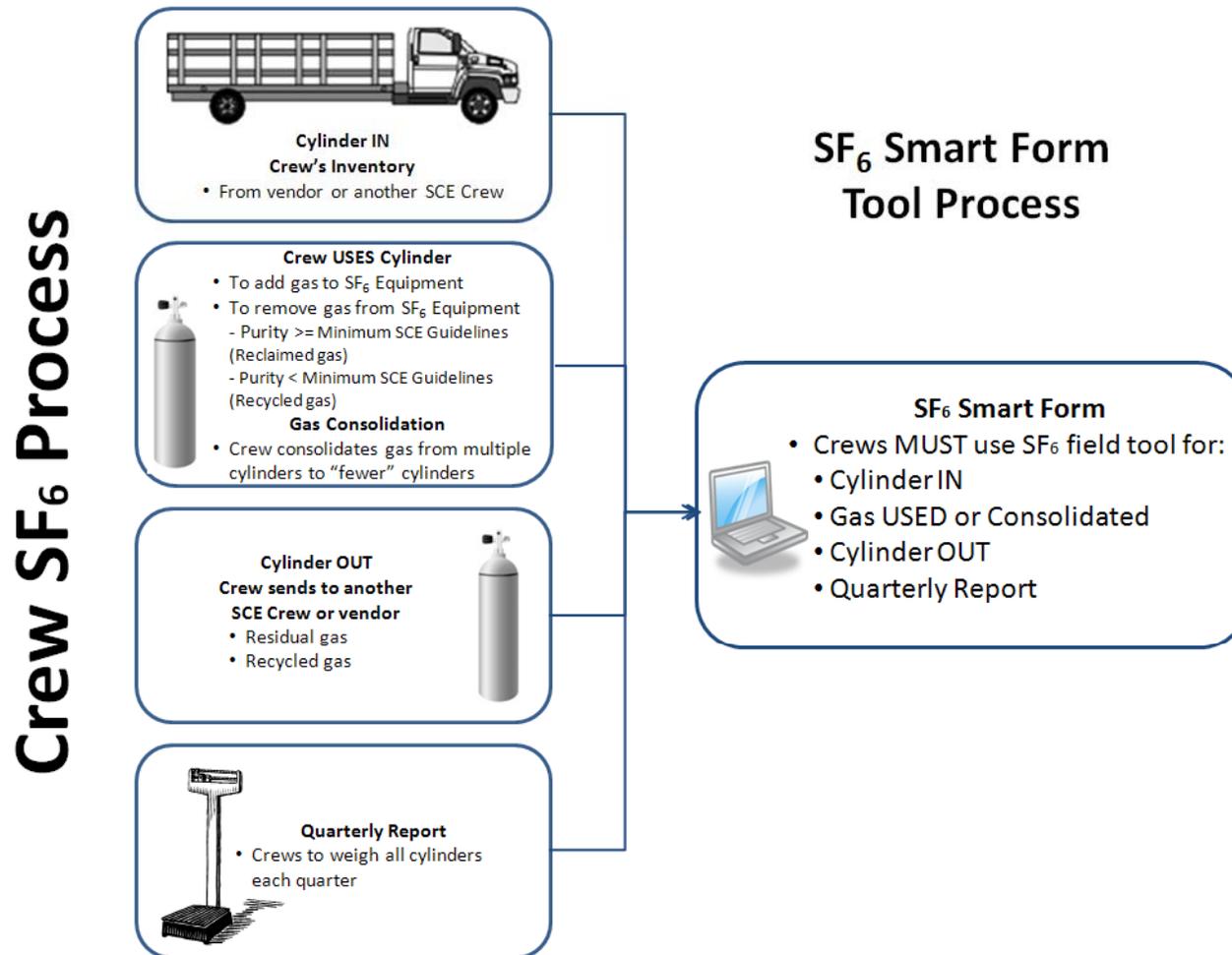
- What is the back-end design for how the SF<sub>6</sub> Smart Form Tool works?



SAP Hybrid Interface transfer data between field tool, a "Gatekeeper" layer (Network Location Layer), and SAP

## User Experience Scenario

- By policy, Fields Crews must utilize the SF<sub>6</sub> Smart Form Tool when they handle SF<sub>6</sub> gas



## Quality Assurance Methods

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- Missing Gas Analysis
  - (“Weight Before Adding Gas”) + (“Net Weight of Gas Added”) on *current* Gassing Report must equal “Weight Before Adding Gas” on *future* Gassing Report
  - Difference between Reference Reports must be accounted for by Gassing Reports (Cylinder IN, Quarterly Inventory, and Cylinder OUT are collectively known as Reference Reports)
- Missing Reference Reports
  - All cylinders have at least a Cylinder IN (and a Cylinder OUT when cylinder is no longer in inventory)
  - Cylinders on Quarterly Inventory Report must have Cylinder IN (and a Cylinder OUT when cylinder is no longer in inventory)
- Requires close collaboration with field crews if missing data is identified

## ***Lessons Learned***

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- Free text fields for field crew data entry in the tool can create problems for office personnel managing the data
- Paper process could not support increased data tracking required for CARB requirements
- QA Methods aid in recognizing issues early so that a resolution can be reached

## Conclusion

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- Paper Process met EPA requirements, but was not sufficient for CARB requirements
- Revised Paper Process required too much effort on Field Crews and Office Personnel
- Electronic SF<sub>6</sub> Smart Form Process met needs and brought additional benefits
- User Experience Scenario shows importance of SF<sub>6</sub> Smart Form Tool in all gas handling activities
- Quality Assurance Methods aid in ensuring accurate data is required for reporting
- Potential Future Development
  - Real-time SAP interface
  - Bar Code scanning

See “An Asset Management Approach for EPA & CARB SF<sub>6</sub> Regulation” Paper posted on EPA Voluntary SF<sub>6</sub> Emission Reduction Partnership for Electric Power Systems Website with this presentation for further details