

O&G Through the Years

2007 - 2020

Presented by....



David Ranum

Senior Project Manager

eMail: david.ranum@TRICORDconsulting.com

Cell Phone 512 492-5521



FIVE OGI PROJECTS: 2007 - 2020

- A Texas Refinery (2007-2008)
- Ft Worth, TX Natural Gas Facilities (2010-2011)
- Natural Gas Processing Plants in Spain (2012)
- California Natural Gas Production Sites (2015)
- OGI Program Set-Up at a California Refinery (2020)

Texas Refinery (2007 – 2008)



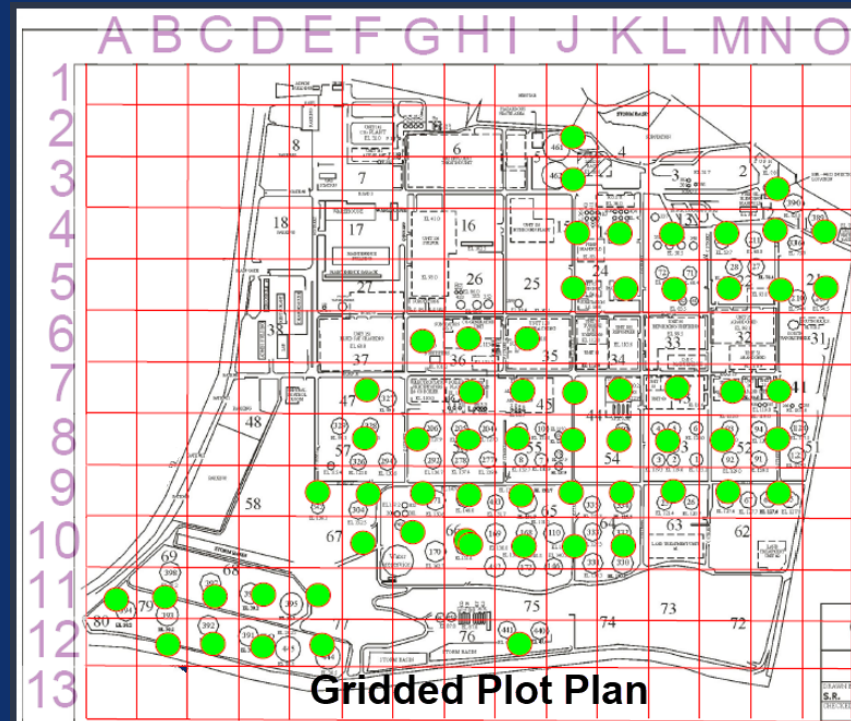
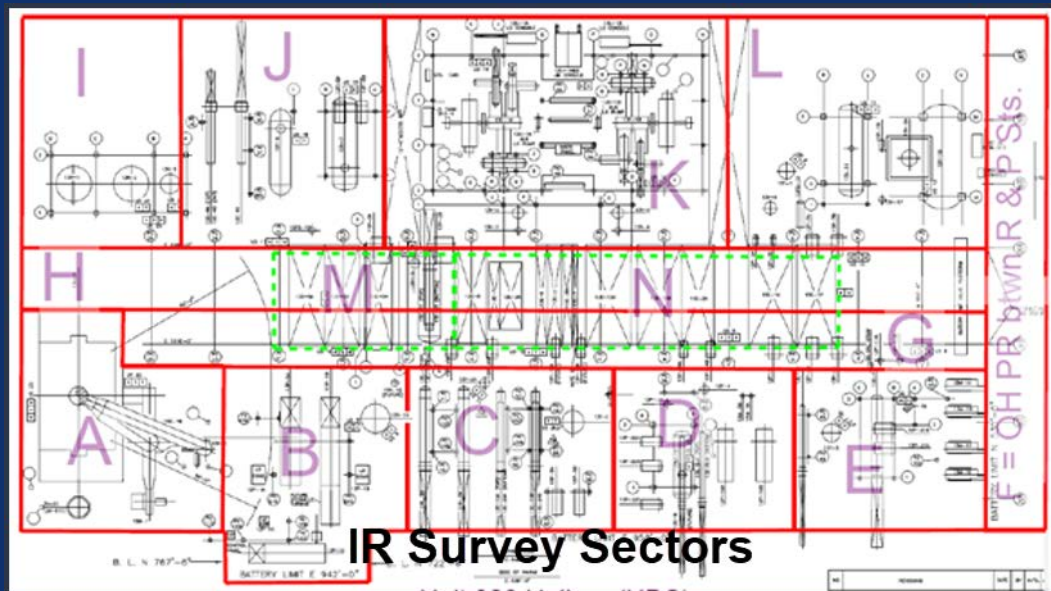
Project Scope

Complete refinery-wide OGI survey in two phases

- Phase I – OGI survey of all components in LDAR program
- Phase II – OGI survey of all non-LDAR components

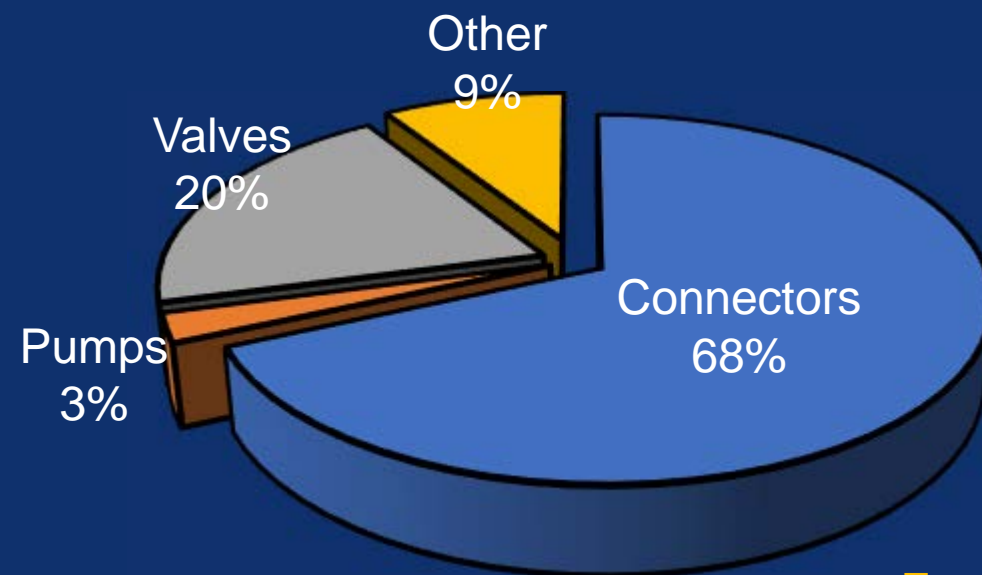
Phase I Approach

- Grid facility plot plan & identify VOC Grids
- Subdivide VOC Grids into IR Survey Sectors



Key Phase I Results

- *159 OGI Leaks*
 - *77% > 100,000 ppm*
- *Lowest OGI leak = 1,200 ppm*
- *Most Serious OGI leak → Immediate Unit Shutdown*
- *OGI Leaks By Component Type*



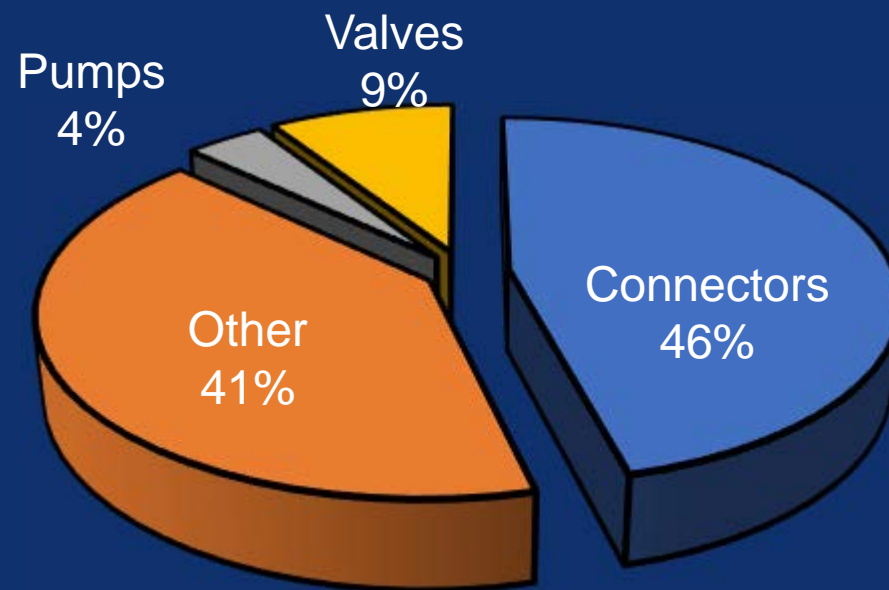
Phase II Approach

- *Most efficient to image everything within a grid.*
- *Used Survey Sector maps to track and record progress.*

Key Phase II Results

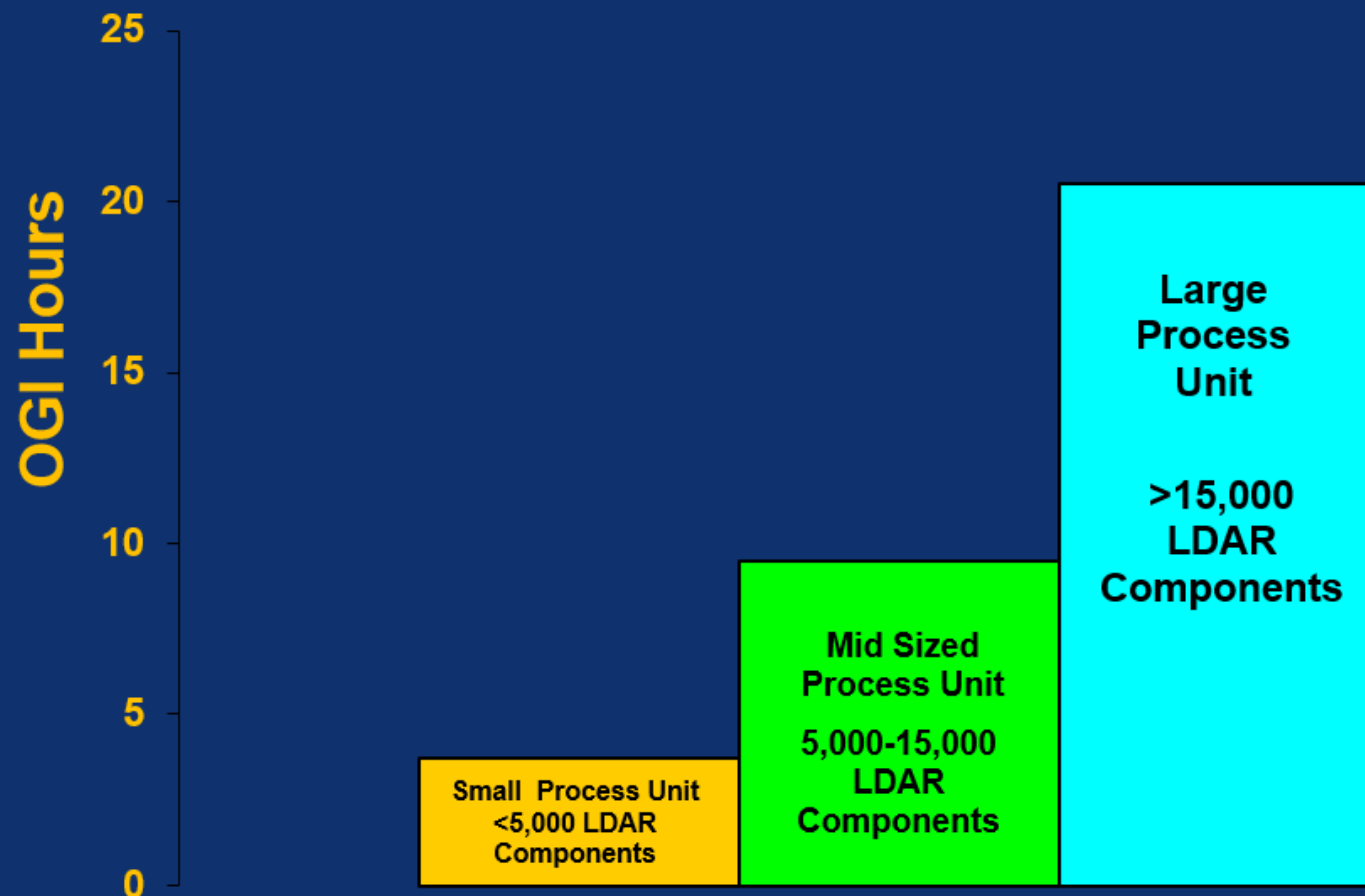
- *154 OGI Leaks*
 - *74% > 100,000 ppm*

- *OGI Leaks By Component Type*



Key Phase II Results continued....

OGI Scan Time vs. Unit Size



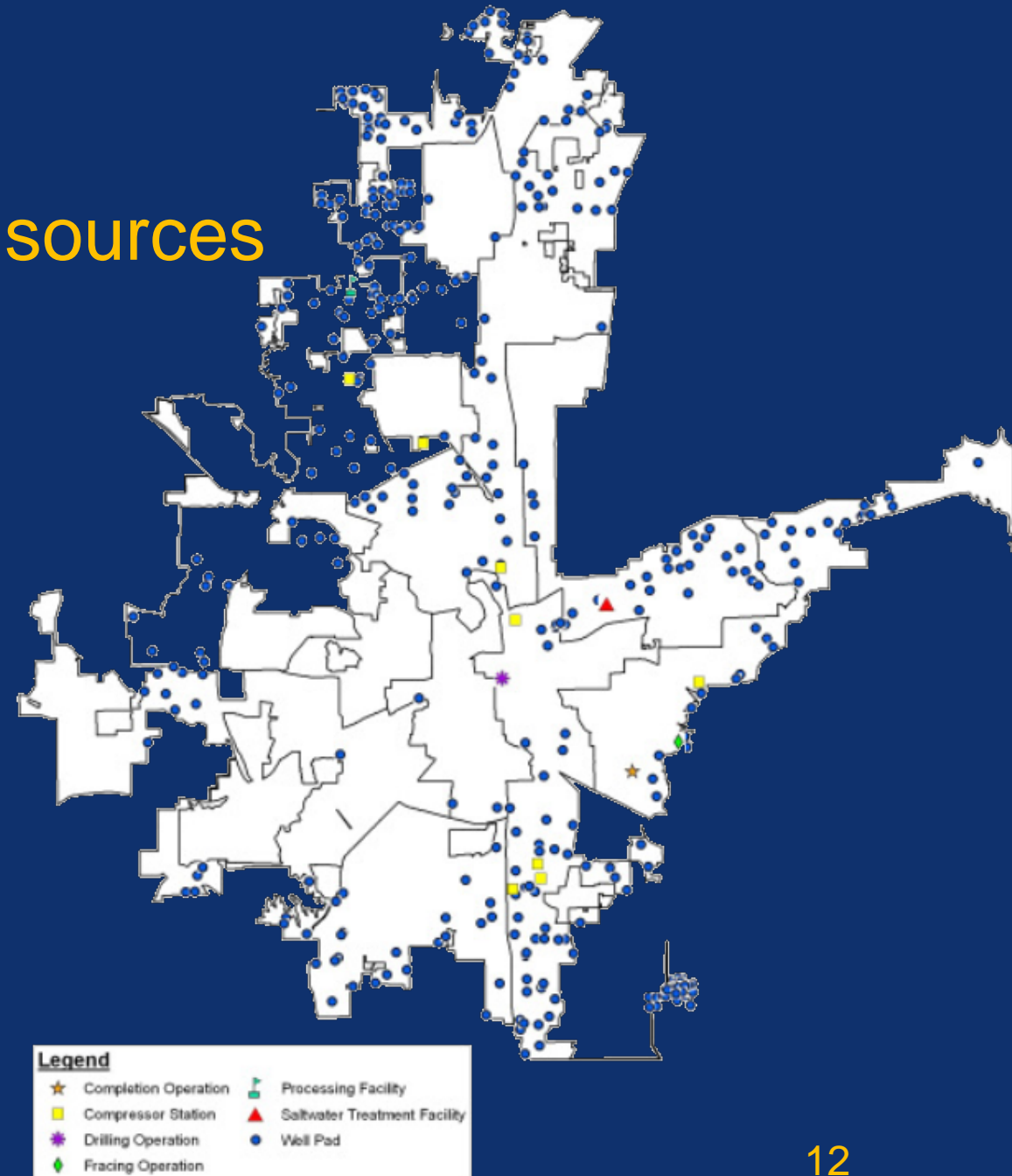
Fort Worth Natural Gas Point-Source Study (2010-2011)



Project Scope

O&G survey of 388 natural gas point sources

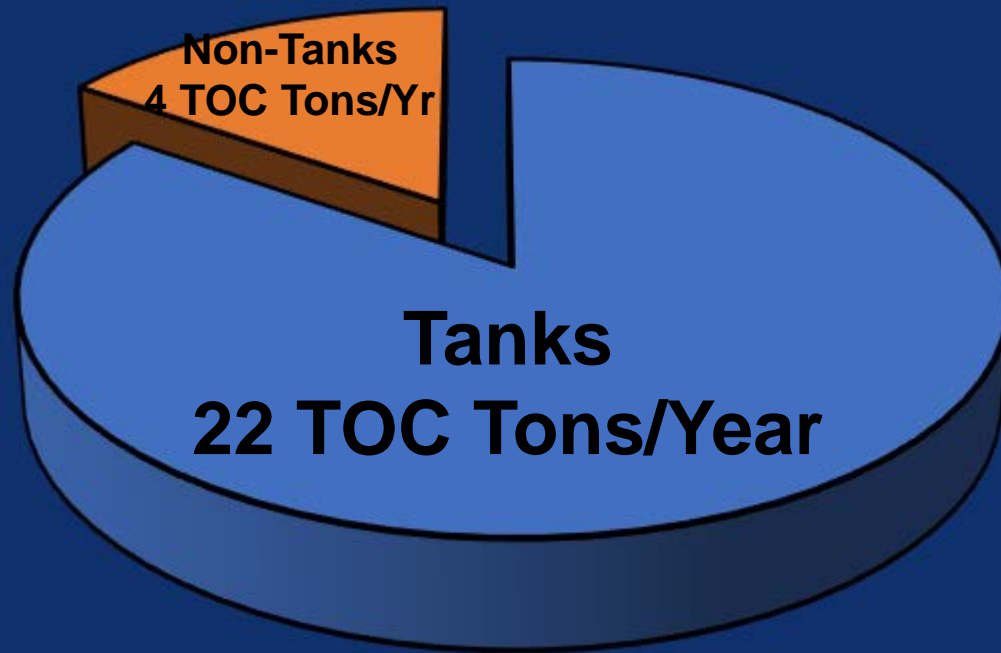
- Well Completion Operations
- Compressor Stations
- Drilling Operations
- Fracking Operations
- Gas Processing Plant
- Saltwater Treatment Facility
- Well Pads



Key Result

1,330 OGI Leaks

Storage Tanks = 85% of Emissions



Gas & Oil Processing Plants – Spain (2012)



Project Scope

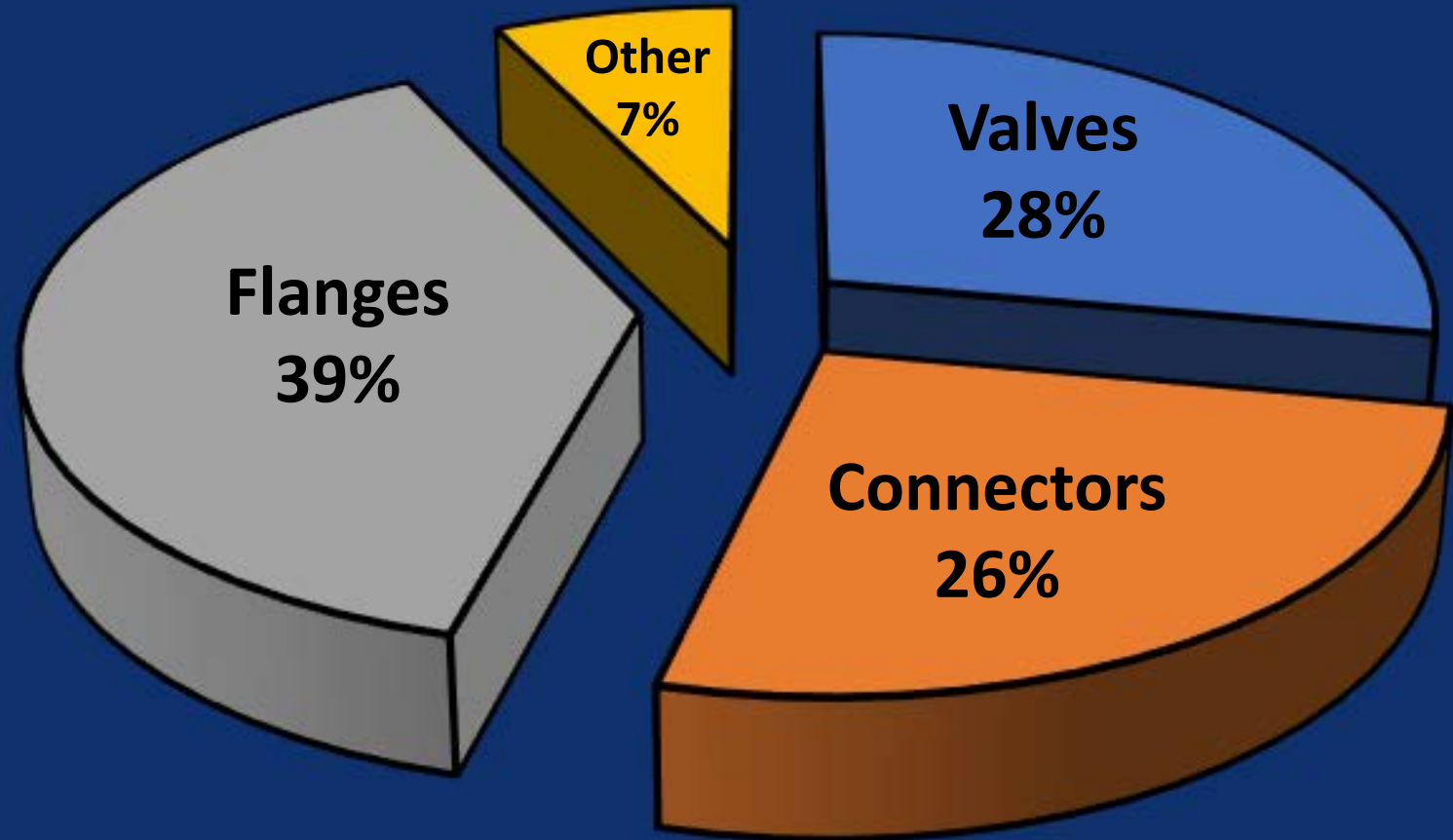
Conduct OGI Surveys

- 4 LPG facilities
- 1 Oil Refinery



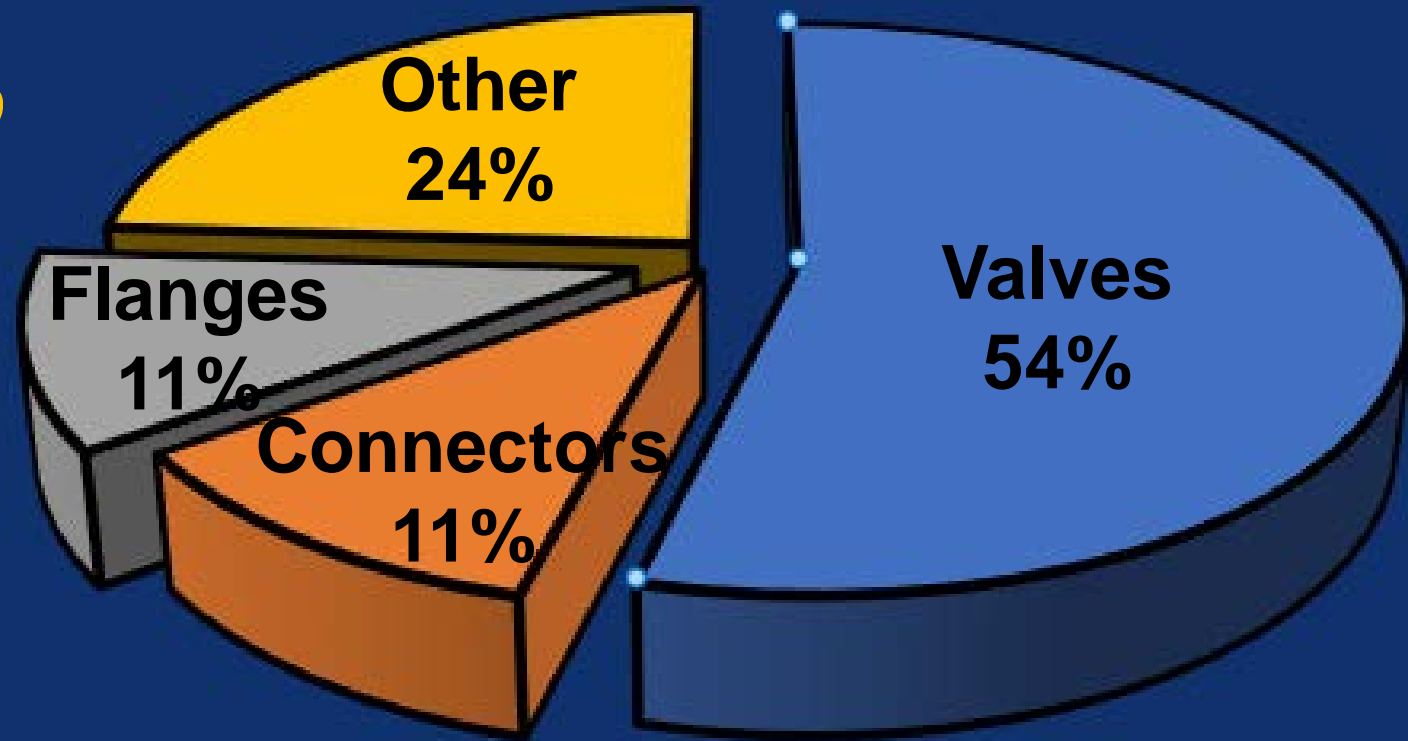
Key Result – LPG Facilities

- 395 OGI Leaks
- Leaks by Component Type
 - Flanges 39 %
 - Flanges + Connectors = 65%



Key Result – Oil Refinery

- 131 OGI Leaks
- Leaks by Component Type
 - Valves 54 %

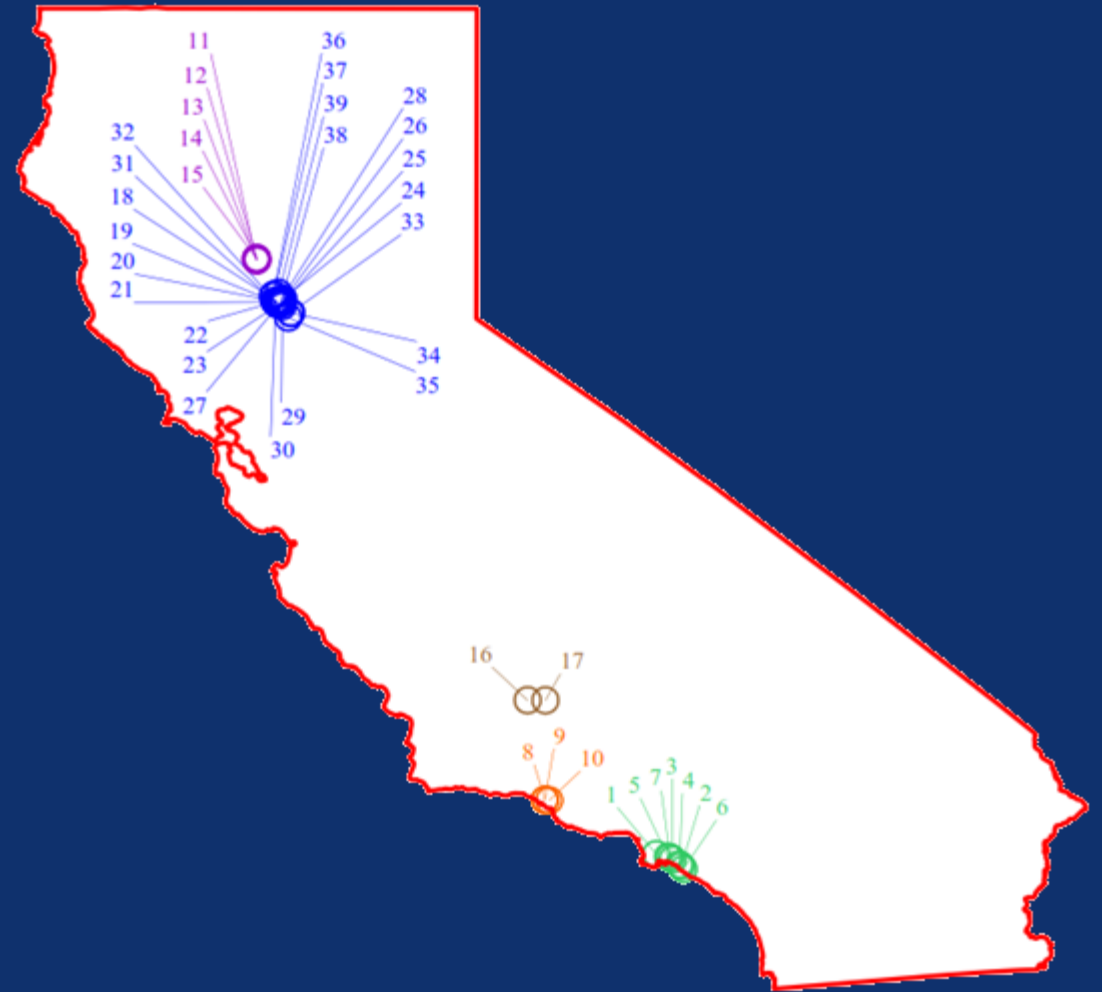


California Gas Production Facilities (2015-2016)



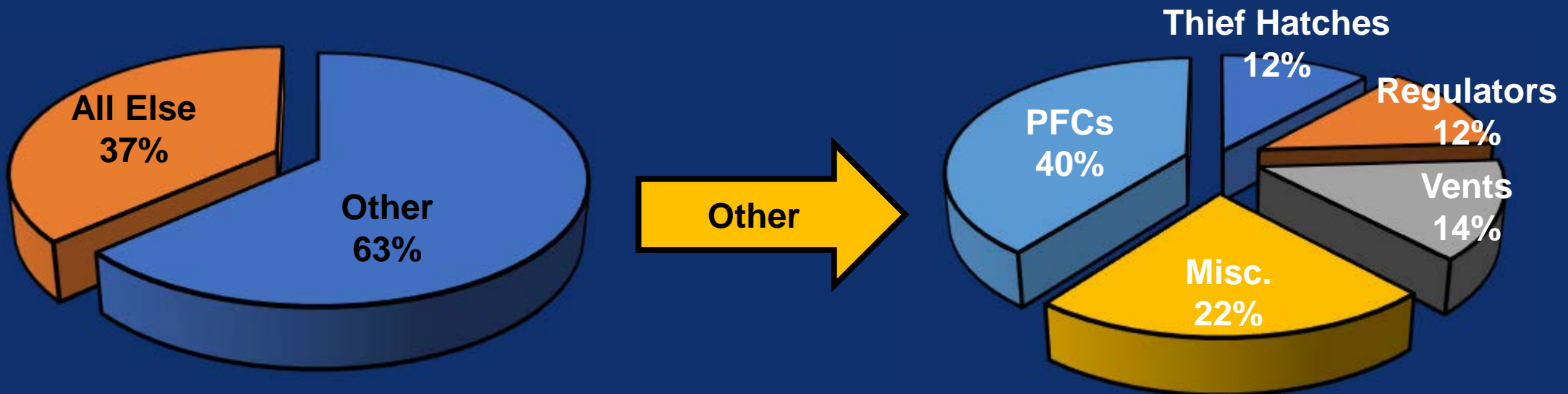
Project Scope

- Develop Emission Factors for Natural Gas Production Sites
 - OGI & Method 21 used to find leaks
 - Emissions quantified with Hi Flow Sampler

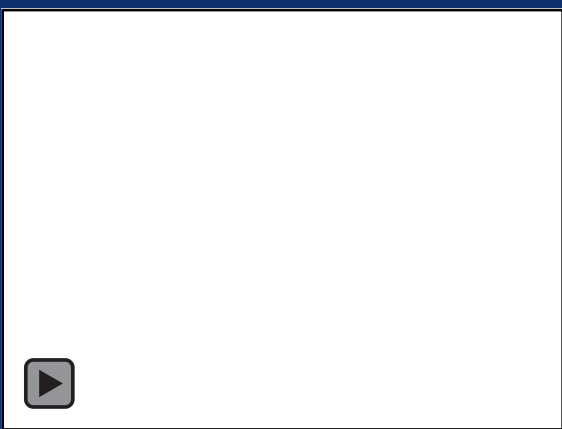
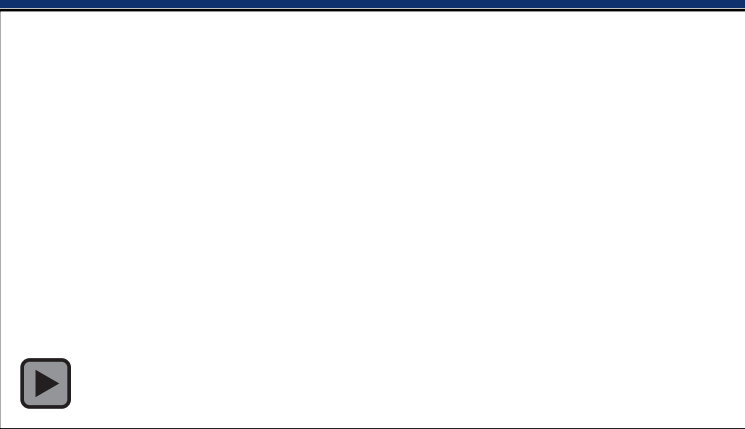


Key Results

- 204 OGI Leaks
- Leaks by Component Type
 - “Other” = 63 %
 - Pneumatic Flow Controllers = 40% of “Other”



OGI Examples



Refinery OGI Implementation (2020)



Basic Steps

- Purchase an IR Camera
- Complete Level I OGI training
- Establish Daily Demonstration Procedures
- Document and Mark OGI Survey Points
- Define an Imaging Schedule
- Design Recordkeeping Forms
- Create a Written Plan



In Summary....

- Texas Refinery (2007-2008)
 - 313 OGI Leaks – Most Leaks from Connectors and “Others”
 - Estimated Hours to Complete OGI Survey of a Refinery Process Unit
 - --20 hours, 10 hours and 4 hours for large, medium & small units
- Fort Worth Natural Gas Production Facilities (2010-2011)
 - 1,330 Leaks; 85% of Emissions from Storage Tanks
- Spanish Gas Plants and Refinery (2012)
 - LPG Facilities – Most of the 395 OGI Leaks from Flanges & Connectors
 - Refinery -- 50% of the 131 OGI Leaks from Valves
- California Gas Production Facilities (2015-2016)
 - Most of the 204 OGI Leaks from “Other” Components
- Refinery OGI Implementation (2020)
 - Basic Tasks in Setting Up a OGI Program at a Refinery

OGI Through the Years

2008-2020

Thank You!