Background – Where we are Today

- Legacy displays developed well before API 1165
  - Review showed strong practices in place
- Risk of major changes in legacy system outweighs the benefits
- Project underway to replace the legacy SCADA System
API 1165 Approach

- Brought in a team of former Operators

- Studied API 1165
  - Analyzed recommendations and compared to our current display standards and operating philosophy to develop a plan for implementation.

- Created a Display Style Guide
  - Used API 1165 Recommend Practice for Pipeline SCADA Displays as a guide
API 1165 Approach – Display Style Guide

- Written as a “contract” between the SCADA department and the Operations Center
  - Documents the style of SCADA displays
  - Key components include:
    - Display Design Approach (philosophy, layout and organization)
    - Display Styles (fonts, colors, etc.)
    - Naming conventions
    - Navigation
    - Display Templates
    - Symbol Library

- Going forward it will be used as a reference to maintain a consistent style throughout the system.
# Display Style Guide – Examples

## Data Quality Icons

<table>
<thead>
<tr>
<th>Color</th>
<th>RGB Value</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Red   | 234, 30, 30 | Indicates an object is active, engaged or in an abnormal condition. Used for a state requiring more attention. | • Valve in Open state  
• Unit in Run state  
• Analog value in a high-high or low-low alarm state  
• Statuses in alarm state |
| Green | 0, 234, 0  | Indicates an object is inactive, disengaged or in a normal condition. | • Valve in Closed state  
• Unit in Off state  
• Analog value in a normal state |
| Orange| 255, 135, 15 | Indicates an object is stale | • Object in Stale state |
| Yellow| 234, 234, 30 | Indicates an analog is in a warning alarm condition. | • Analog value in a high or low alarm state  
• Indication of a deviating value |
| Blue  | 30, 30, 234 | Indicates an object is off scan. | • Object in Off Scan state |
API 1165 Review Efforts

- Legacy system review
  - Piping schematic displays (~550)
  - Application tabular displays (~1500)
  - Leak detection displays

- Areas of improvement
- Incorporating new requirements
- Insuring consistency
API 1165 Review Efforts

- Reviewed incident reports
  - Categorized as “operational” with preliminary cause related to SCADA displays
  - Recommendations for reducing the opportunity for error

- Gathered information from the OC Training department
  - Identify any displays that are frequently found to be confusing to new Operators

- Gathered feedback from the Operators
  - Periodic display review for consistency and accuracy
  - Feedback was used to identify specific areas for improvement
Keeping the OC involved
- Display Team (all are former or current operators)
- Shift Representatives
- OC Update Meetings
- Ongoing feedback through periodic Display Reviews

Applying Human Factor lessons to other processes
(Operators use more than just SCADA)
- Shift Reporting
- Console Guidelines

SCADA Analyst support and buy-in
Taking advantage of new functionality
- Using reusable symbols or elements to enforce consistency
- Replacing hard-coded displays with dynamic displays to reduce the total number of displays

Doing additional HMI research
- Changed black background to grey

References other than API 1165
- *The High Performance HMI Handbook* by Bill Hollifield, Dana Oliver, Ian Nimmo & Eddie Habibi
- Magazines: PipeLine and Gas Technology

What is intuitive to generation Y?
Sample Display Comparisons – Current Station Receipt
Sample Display Comparisons – Analog Control pop-up

Current

Future (mock up)