

DCP Midstream Slug Catcher Data



Designing for Zero-Failure:
Bridging the Visibility Gap in High-Stakes Energy Infrastructure.

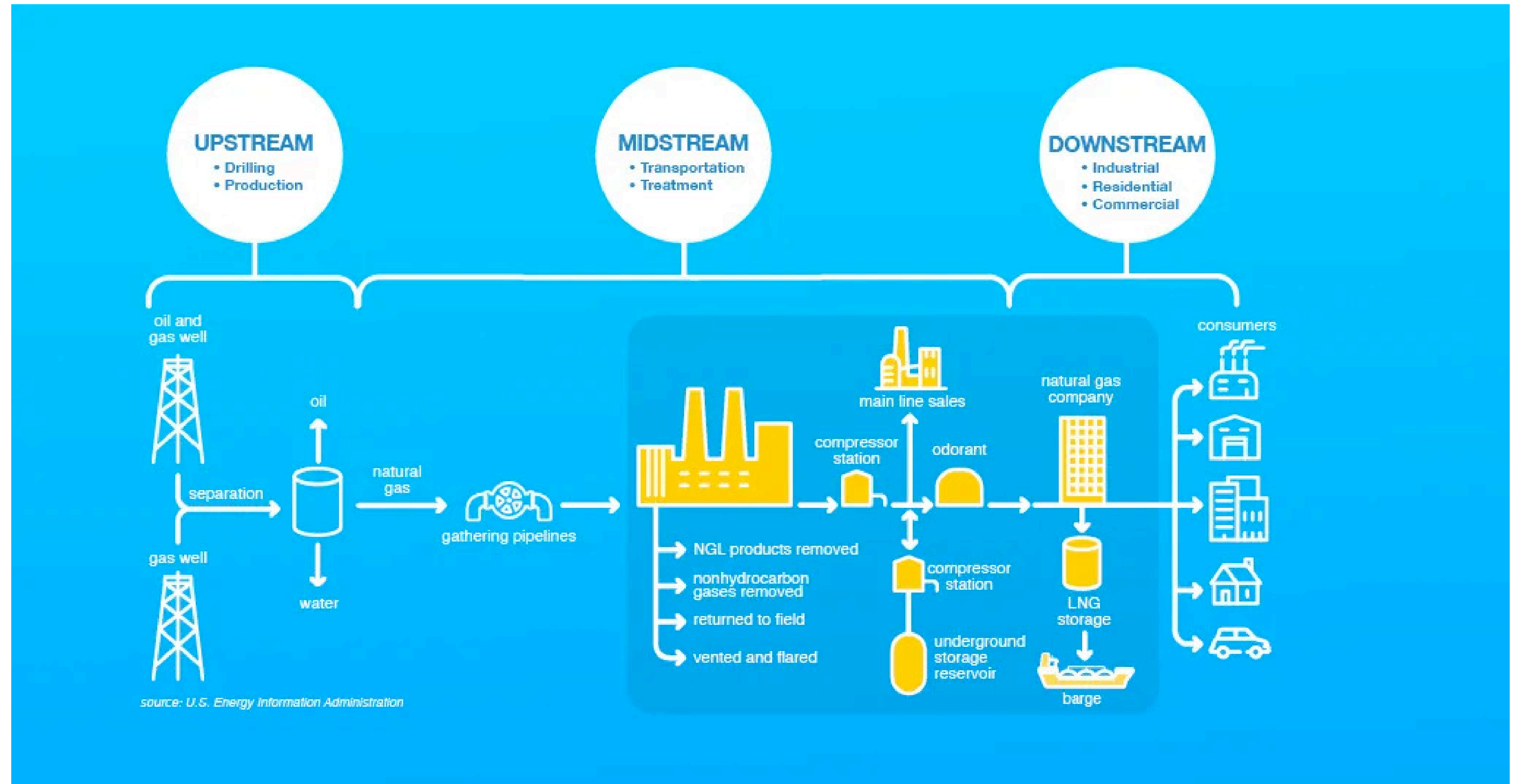


Joel Heaton
Lead UX Designer

Terms: Midstream

Midstream is the 'middleman' of oil and gas—processing and moving product. The UX challenge here was a visibility gap between the pipelines and the plants.

- Pipelines
- Processing plants
- Storage facilities.



The Stakes:

The 'Slug Catcher' is the first piece of equipment at the plant. If it overflows, it's a catastrophic event: hundreds of thousands of gallons of oil spilling, causing fire hazards and soil contamination.



 **798,000 Gallons**

of liquid surge of the plant is not prepared.
A single missed communication = catastrophic flood

Research & Validation:

Mixed-Methods Approach:

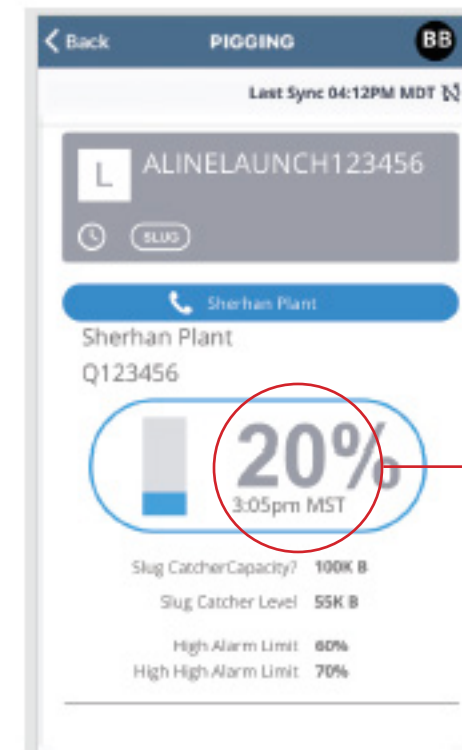
Interviewed 7 Operators
(including a 40-year veteran)
7 SCADA IT Experts

The mental model was correct,
but the tools were breaking.

100% Comprehension in Usability Testing

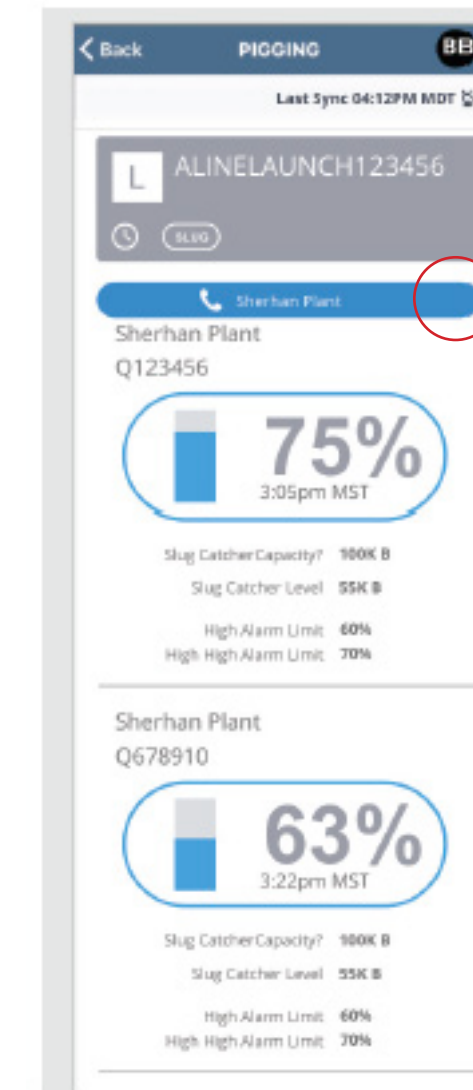
TASK 1

When to discuss levels with supervisors.



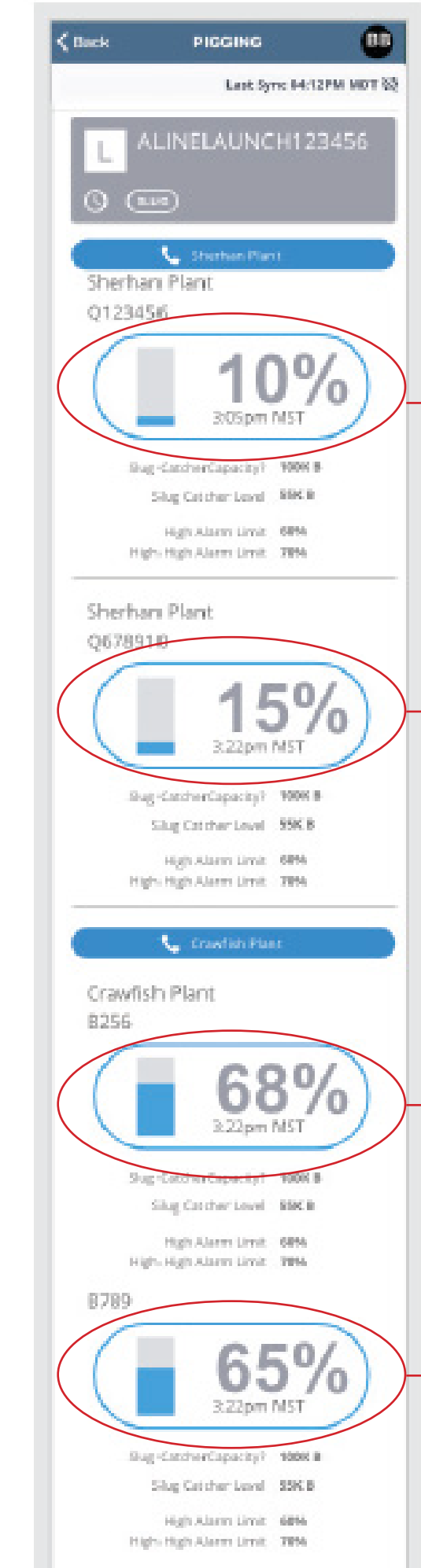
TASK 2

How to escalate high-risk levels.



TASK 3

How to identify available hardware (boosters/multiple catchers).



The Friction:

SCADA is a "failure"

It takes 15–30 minutes to get data, and connectivity in the field.

6 out of 7 Operators

specifically requested SC data on iOS via OPSTools because SCADA was unusable.

Fragmented

visibility across regions (North, Midcon, South, Permian) left plants "flying blind"

Operators didn't need more data; they needed reachable data.

Possible data points that Field Ops and Plant Supervisors said would be helpful in OneSight & OPSTools

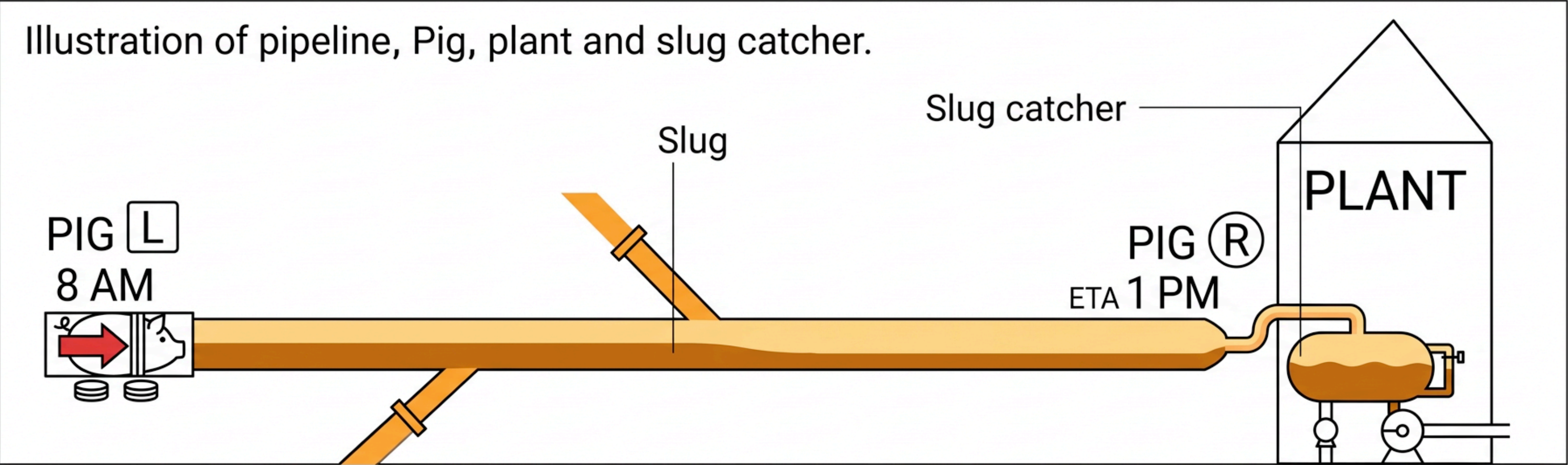
INLET LINE.	LINE COMING INTO PLANT.		
INLET LIQUID HANDLING UNIT.		YES	PI
FLOW RATE	INLET GAS FROM SLUG TO PLANT, BOOSTER	YES	PI
PULL DOWN RATE	RATE LIQUIDS ARE PUMPED OUT OF SLUG CATCHER.	RARE	X NO
DUMPLINE.	SLUG CATCHER DRAIN LINE		
EXPECTED LIQUID LEVEL	HYDRAULIC MODEL	X	NO
CONDENSATE LEVEL.	NORTH. JUST SE AT BOOSTER LEVEL	YES	PI
GAIN RATE	CALCULATION ON HOW FAST LEVEL IS INCREASING.	X	NO
VOLUME AVAILABLE	SC % OF LIQUIDS. CALCULATION. POSSIBLE?	?	
LIQUID HOLDUP PROVIDED	HYDRAULIC MODEL	X	NO
HYDROCARBON AMOUNT.	HYDROCARBON WATER		HYDRAULIC MODEL.
WATER AMOUNT.	"		HYDRAULIC MODEL.
SLUG CATCHER VOLUME	PLANTS USE % MOST CUT BACK FLOW @ 66% USED VESSEL CAPACITY.	?	PI POSSIBLE NOW
SLUG CATCHER CAPACITY.	STATIC # WE CAN GET FROM PHID OPERATIONS.	?	PI POSSIBLE NOW
SLUG CATCHER LEVEL	CONDENSATE LEVEL.	X	
SLUG CATCHER DRAINING UNIT.		X	
HIGH HIGH ALARM	DCS + OPERATIONS SOURCE EFFECTS?	YES	PI
MEASURED IN BARRELS?	HIGH ALARM IN % CONDENSATE IN BLS.		

The Process:

A 'Pig' pushes a 'Slug' (liquid/dirt) toward the plant. If the plant doesn't know it's coming, it floods.



Billy Ops, putting Pig in pipeline



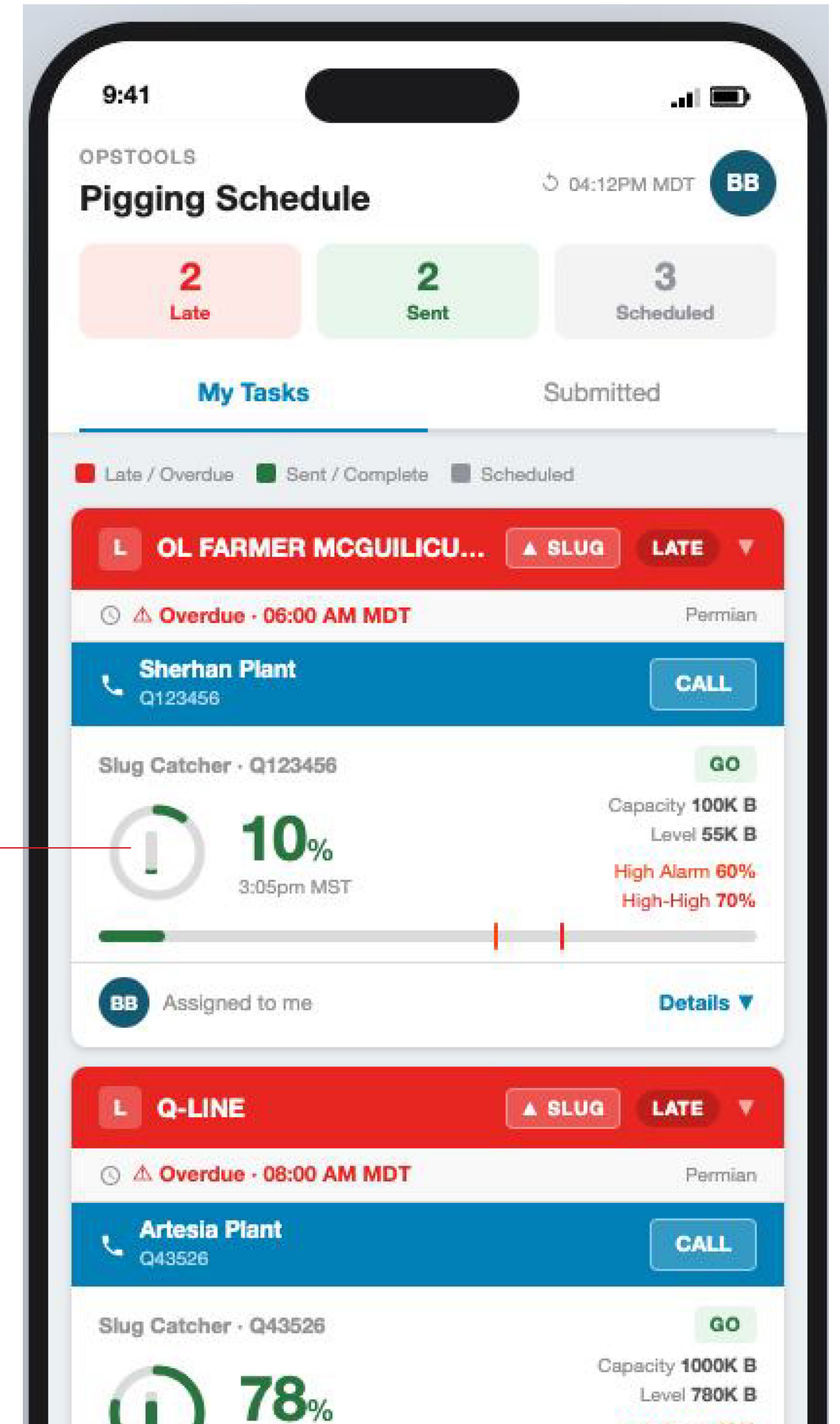
Bill, Pig and Joel

The Solution:

For Field Operators

A real-time UI that visualized tank capacity as a percentage. This gave field ops the immediate 'Go/No-Go' clarity they needed before launching a pig.

Slug catcher capacity showing Go/No-Go



OPSTools: Redesigned

Modern MUI card system with accurate color semantics and live Go/No-Go decision making.

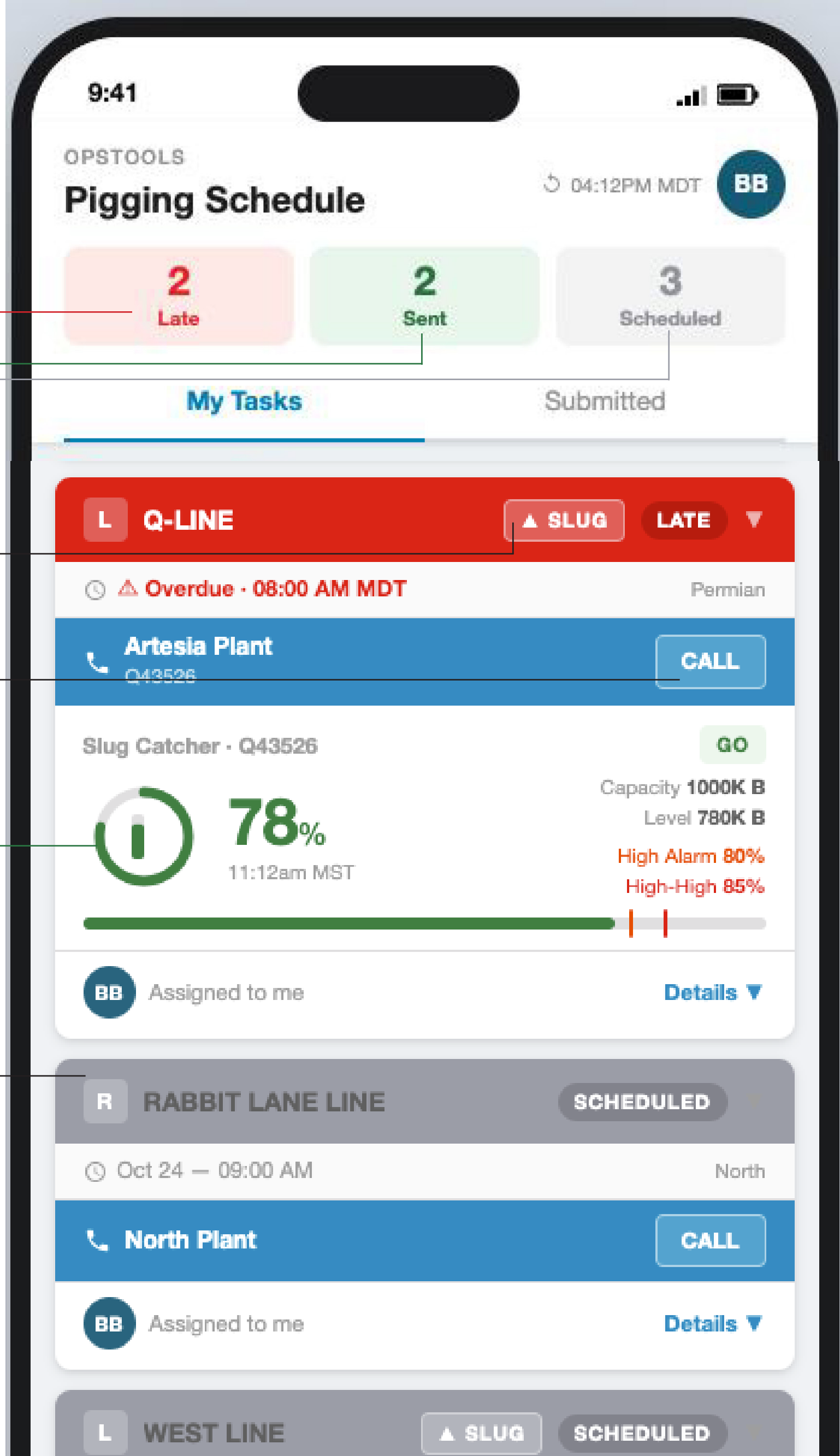
Red = Late / Overdue
Green = Sent / Complete
Grey = Scheduled

Slug Catcher connection IoT device

Call button for Plant

Green = Slug Catcher capacity from PI / SCADA

Grey = a scheduled task (may have data)



Desktop Sync:

For Plant Managers

I mirrored this for plant managers. By synchronizing the feedback loop, we removed the 'manual noise' and gave everyone a single source of truth.

The screenshot displays the OneSight Scheduling interface. At the top, there are navigation tabs: PRODUCERS, SCHEDULING (selected), LOGGD EVENTS, and PLANT PIGGING. A user profile for 'Welcome Barry BB' is visible in the top right. Below the navigation, there are filters for 'Task Status' and 'Team Member', and view options for 'Task View' and 'Month View'. The main area is a calendar grid with columns for 'Unassigned', 'Joel, H', 'Bill, B', and 'Brian, E'. The rows represent days: 'Mon Jan 14 TODAY', 'Tue Jan 15', and 'Wed Jan 16'. Tasks are shown as colored blocks with labels and progress indicators. For example, on Jan 14, Joel, H has a task 'AL-3-2 C' (red, 10% progress) and 'AL-5-2 PM' (green, 40% progress). Bill, B has a task 'AL-1-2 AM' (grey, 40% progress). Brian, E has a task 'AL-3-2 C' (red, 20% progress) and 'AL-2-2 AM' (grey, 40% progress). On Jan 15, Joel, H has 'AL-3-5 G' (grey, 40% progress) and 'AL-3-5 G' (grey, 40% progress). Bill, B has 'AL-1-2 PM' (grey, 40% progress). Brian, E has 'AL-1-2 PM' (grey, 40% progress) and 'AL-6-1 ZZ' (grey, 40% progress). On Jan 16, there are no tasks shown. A right-hand panel shows details for 'OL FARMER MCGUILIC... LINE EAST' at 'Sherhan Plant Q123456'. It includes a 20% progress indicator (Last Updated 4hrs) and a list of operational parameters: Shut Down Limit 85%, High Alarm Limit 80%, Current Working Vol 7K Gal., Pull Down Rate 4 Gal/min, Gain Rate 2 Gal/min, Transit Time 2H, Liquid Holdup Predicted 2.5k Gal, Hydrocarbon Amount 45 Gal, and Water Amount 360 Gal. Below this, 'Q43526' is listed.

Desktop Sync Redesigned

For Plant Managers

OneSight PRODUCERS • SCHEDULING • LOGGD EVENTS • PLANT PIGGING • Welcome Barry **BB**

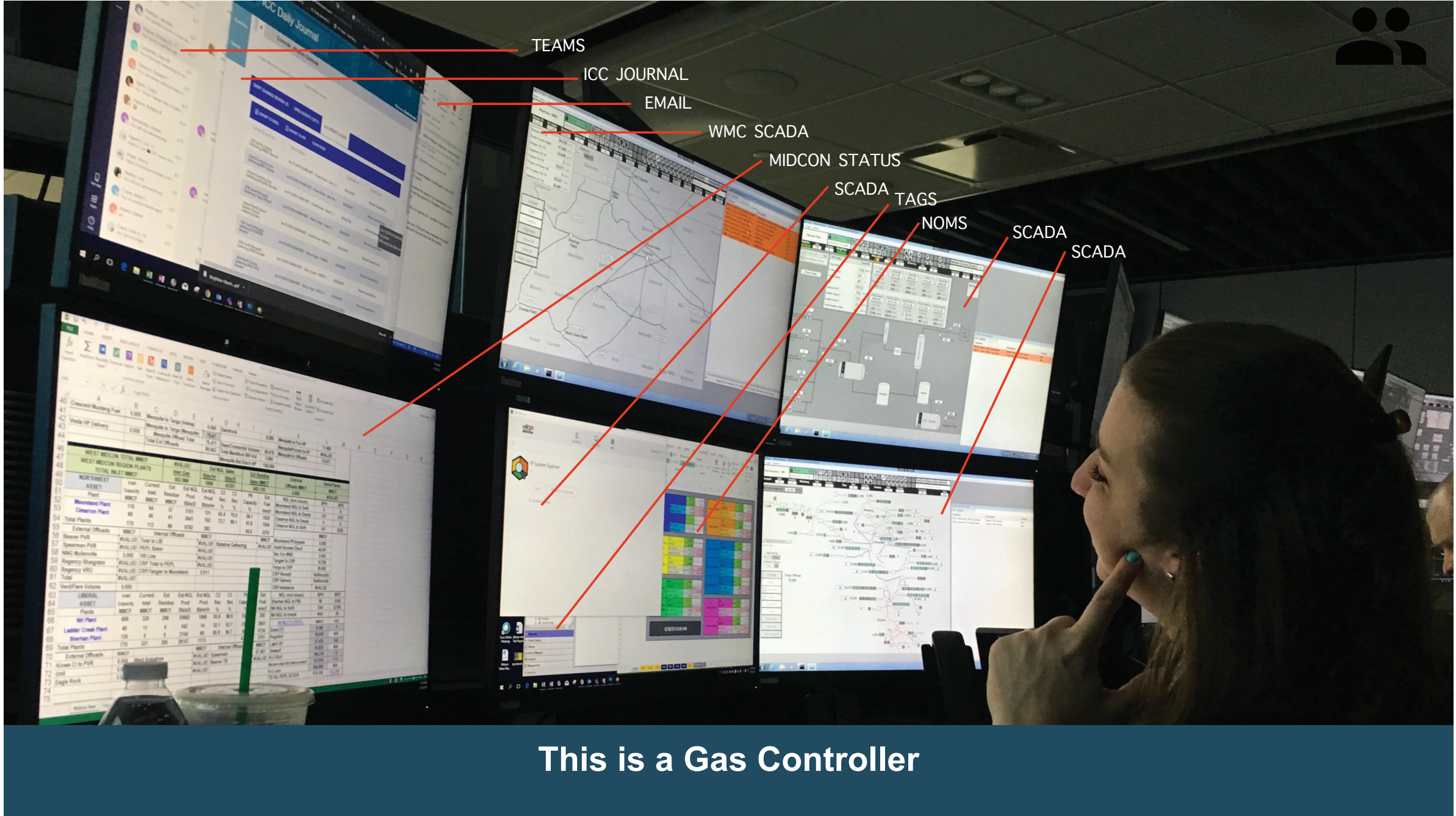
Scheduling Task Status • Team Member • **4 Late** **2 Completed** **3 Scheduled** Task View Month View

	Joel, H	Bill, B	Brian, E																			
Mon Jan 14 TODAY	<ul style="list-style-type: none">L AL-3-2 C 10% SLUGL AL-5-2 PM 78% 11:12 AM MOT SLUGR AL-5-2 PML OL FARMER MCGILIC... 10% SLUG	<ul style="list-style-type: none">R AL-1-2 AMR AL-2-2 PM	<ul style="list-style-type: none">R AL-3-2 C SLUGL AL-2-2 AM 40%R AL-2-2 PM 40%	<ul style="list-style-type: none">L OL FARMER MCGILIC... SLUG <p>Sherhan Plant Q123456</p> <p>10% Last Updated 4hrs</p> <table border="1"><tr><td>Shut Down Limit</td><td>85%</td></tr><tr><td>High Alarm Limit</td><td>80%</td></tr><tr><td>Current Working Vol</td><td>7K Gal.</td></tr><tr><td>Pull Down Rate</td><td>4 Gal/min</td></tr><tr><td>Gain Rate</td><td>2 Gal/min</td></tr><tr><td>Transit Time</td><td>2H</td></tr><tr><td>Liquid Holdup Predicted</td><td>2.5k Gal</td></tr><tr><td>Hydrocarbon Amount</td><td>45 Gal</td></tr><tr><td>Water Amount</td><td>360 Gal</td></tr></table>	Shut Down Limit	85%	High Alarm Limit	80%	Current Working Vol	7K Gal.	Pull Down Rate	4 Gal/min	Gain Rate	2 Gal/min	Transit Time	2H	Liquid Holdup Predicted	2.5k Gal	Hydrocarbon Amount	45 Gal	Water Amount	360 Gal
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Tue Jan 15	<ul style="list-style-type: none">L AL-3-5 GR AL-3-5 G	<ul style="list-style-type: none">L AL-1-2 PM	<ul style="list-style-type: none">L AL-6-1 ZZ 40%																			
Wed Jan 16				<p>Sherhan Plant Q43526</p> <p>20%</p>																		

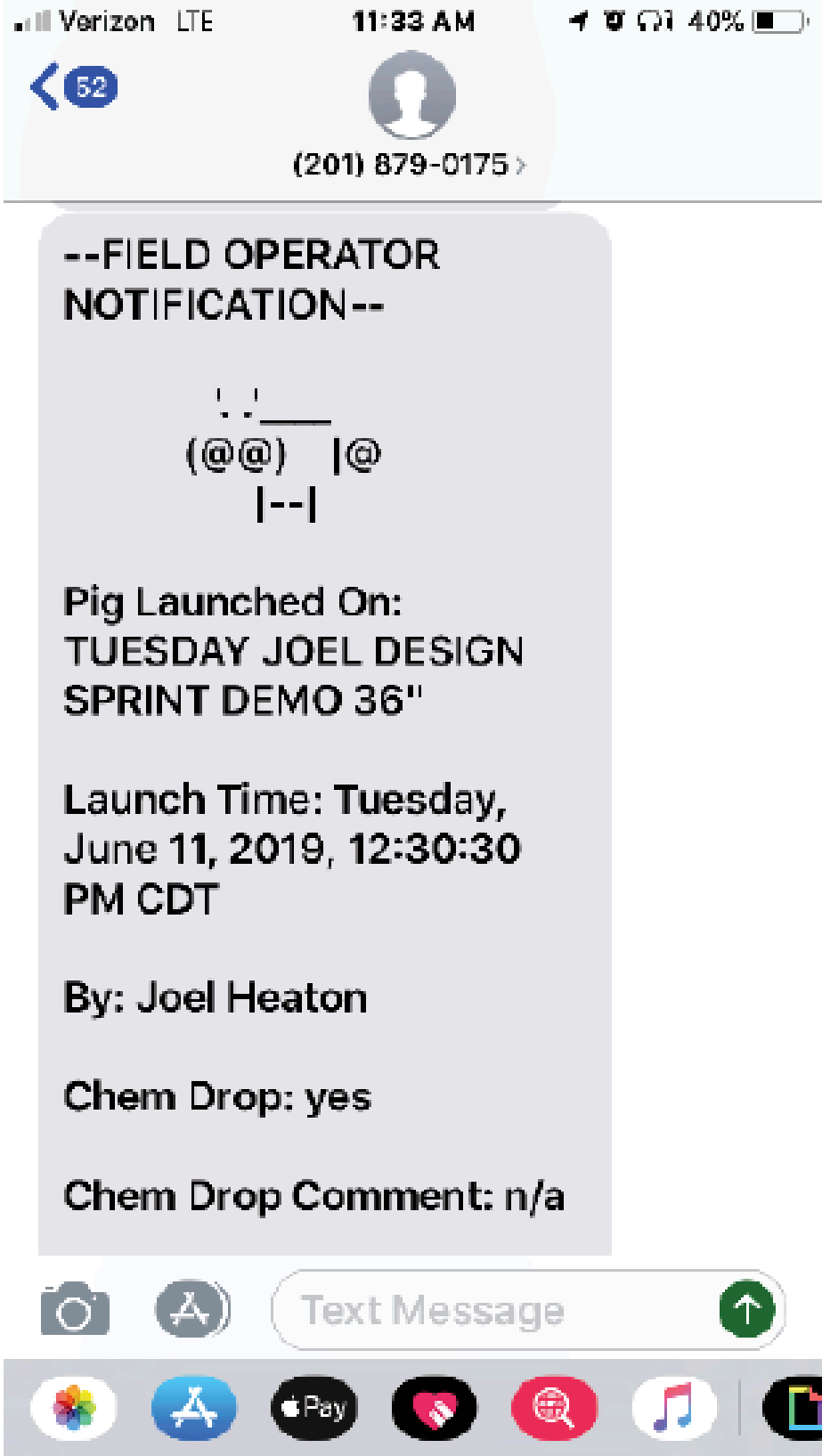
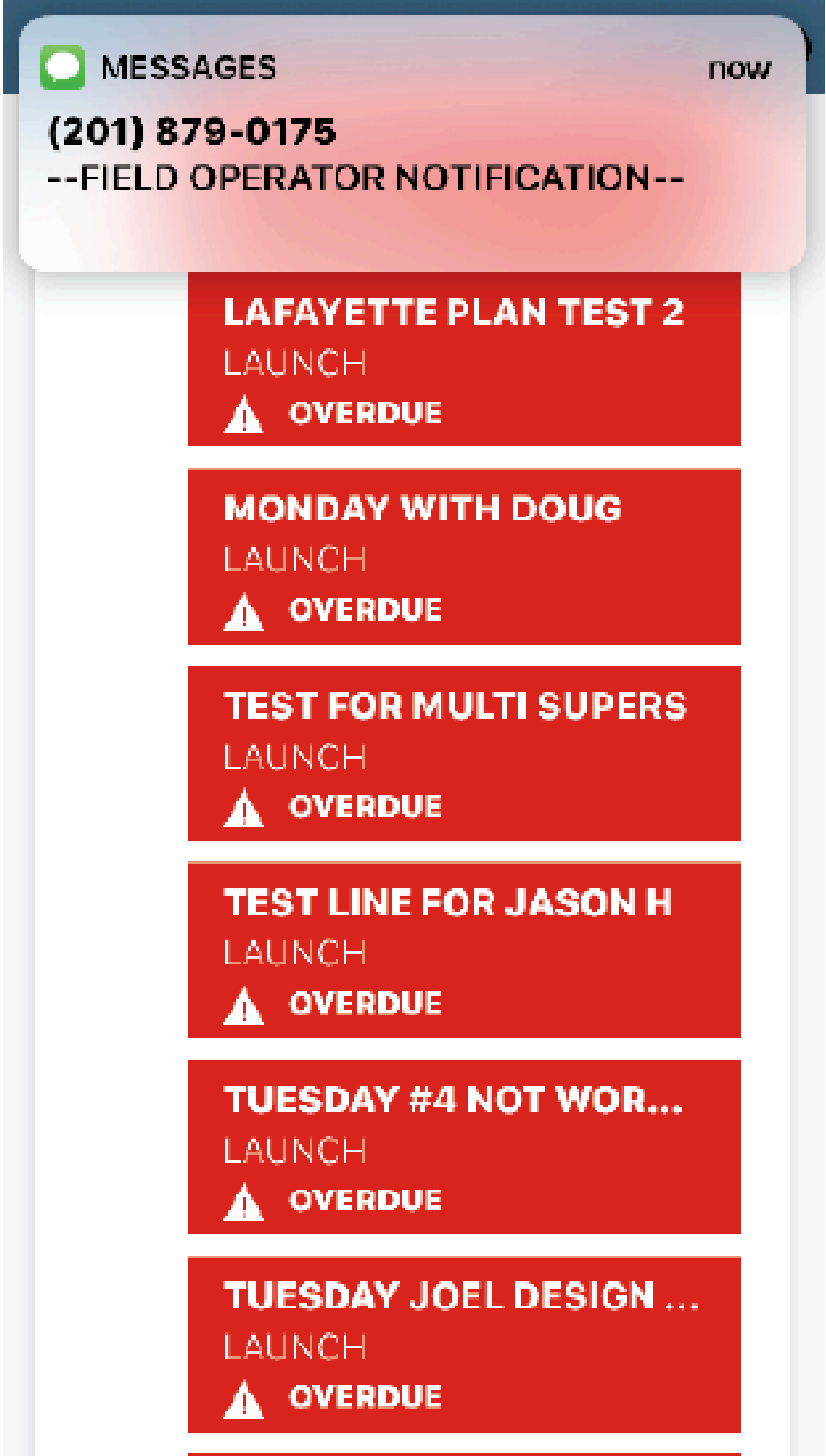
Gas Controller App:

For Gas Controllers

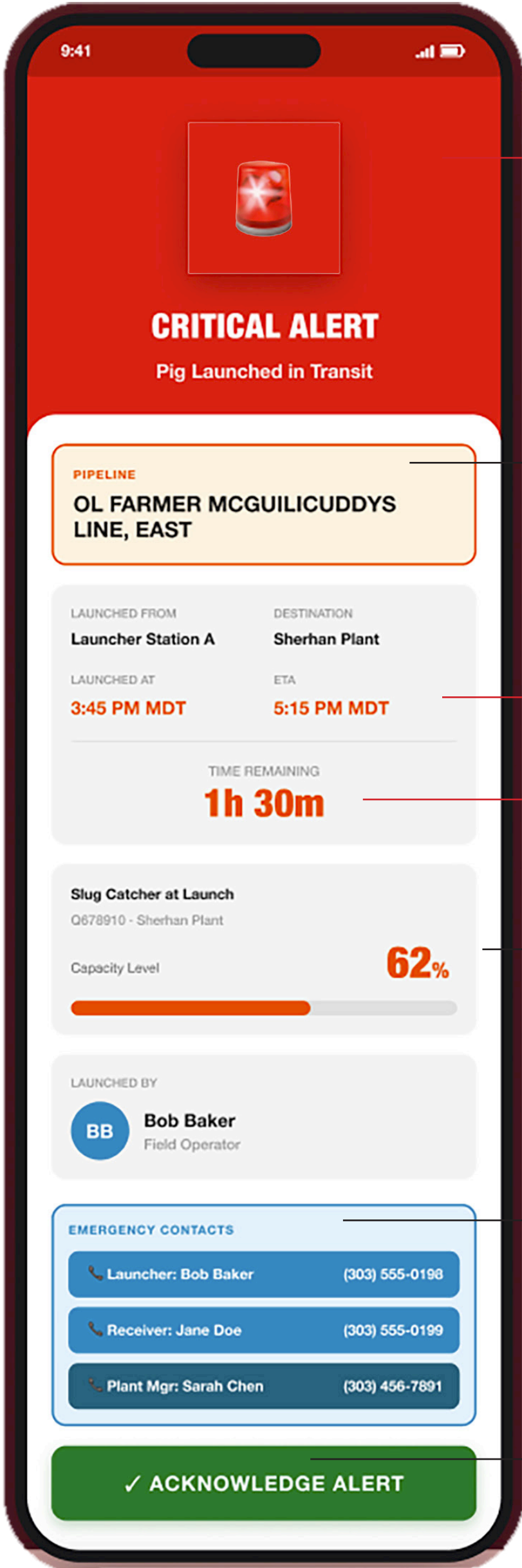
Gas controllers juggle 10 apps on 6 screens.
I designed automated text alerts so they could act on a message rather than staring at monitors all day.



Gas Controller with a sea of 10 applications on 6 screens.



Gas Controller App: Redesigned



Haptic! Ding! Alert!
(Similar to amber alert)

Pipeline

Launch time specs

Time to receive liquids

Slug Catcher data, capacity

Call buttons for:
Launcher
Receiver
Plant

CTA acknowledgment

Before: 10 apps, 6 screens, ASCII text messages, no structure

After: 1 Screen, triage view, Live data, one-tap call

The User

We identified our primary users: the Field Operator (safety) and the Plant Supervisor (capacity). Their core question was: 'Is it safe to send it?'



"The Field Operator or launch operator must communicate the launch. The Plant Ops and Supervisors "Must" know a pig is on the way."

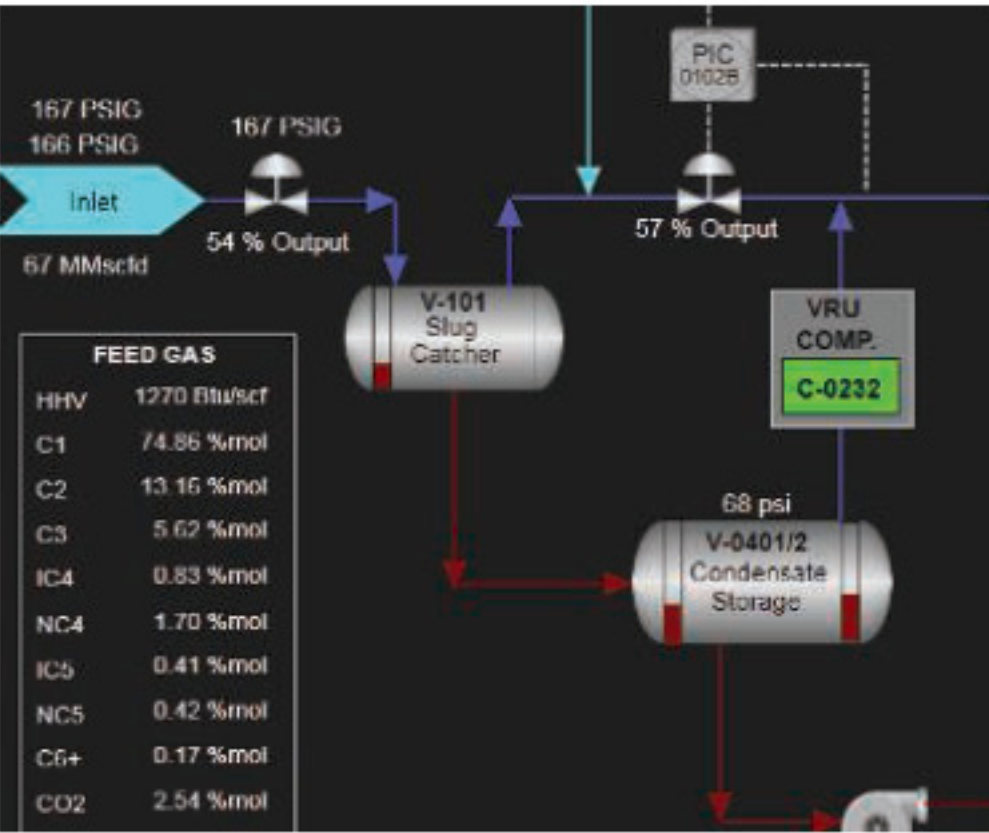
"Its go time, because if that tank is at 60% capacity 700k gallons will flood the plant! Period."

"The operator needs to know, Is it safe?, Can I send it?, Is there room in the tank?"

"The plant needs to handle the condensate and everything coming down the pipe"

Distillation:

I distilled complex SCADA metrics into a single, actionable percentage. This translated raw sensor data into immediate situational awareness.



SCADA Raw Data



Slug Catcher Capacity

One number.
One decision.

Go / No-Go

High Alarm 60%
High-High 70%

Before vs. After:

Before:

Pig Launch: Operators initiate the pigging process, sending an unmonitored liquid slug toward plant.

Fragmented Communication: Coordination relies on manual, “noisy” workflows—including paper logs, clipboards, and verbal hand-offs—that fail to provide a single source of truth.

Operational Visibility Gap: Legacy regional technology and inconsistent scheduling leave the plant “flying blind,” creating a high-risk environment prone to flooding and shutdowns.

After:

Precision Launch: Operators leverage real-time tank capacity data to confirm “Go/No-Go” status before initiating any pigging operation.

Unified Communication: Manual “noise” is replaced by a centralized UI component, synchronizing Field Ops, Plant Managers, and Gas Control through a single source of truth.

Total Situational Awareness: Integrated text alerts and desktop/mobile visibility eliminate the “flying blind” risk, ensuring the plant is prepared for every delivery and protected from flooding.

The Ecosystem:

Three products. One source of truth. Zero missed communications.

OPSTools

Mobile - Field Operator

Launches the pig

Checks Slug catcher levels

Go/No-Go decision

OneSight

Desktop - Plant Manager

Manages the pigging schedule

Sees all team tasks

Monitors slug catcher levels

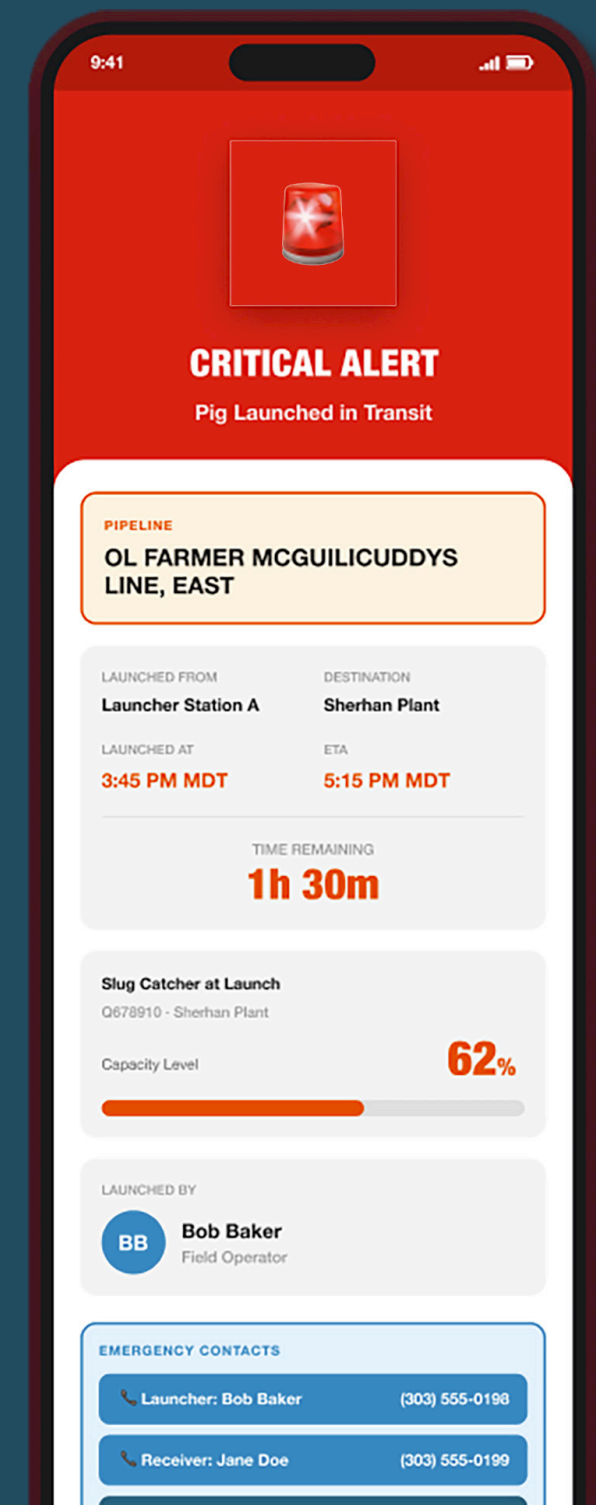
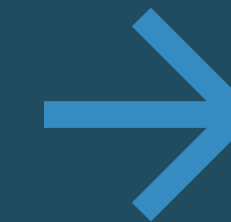
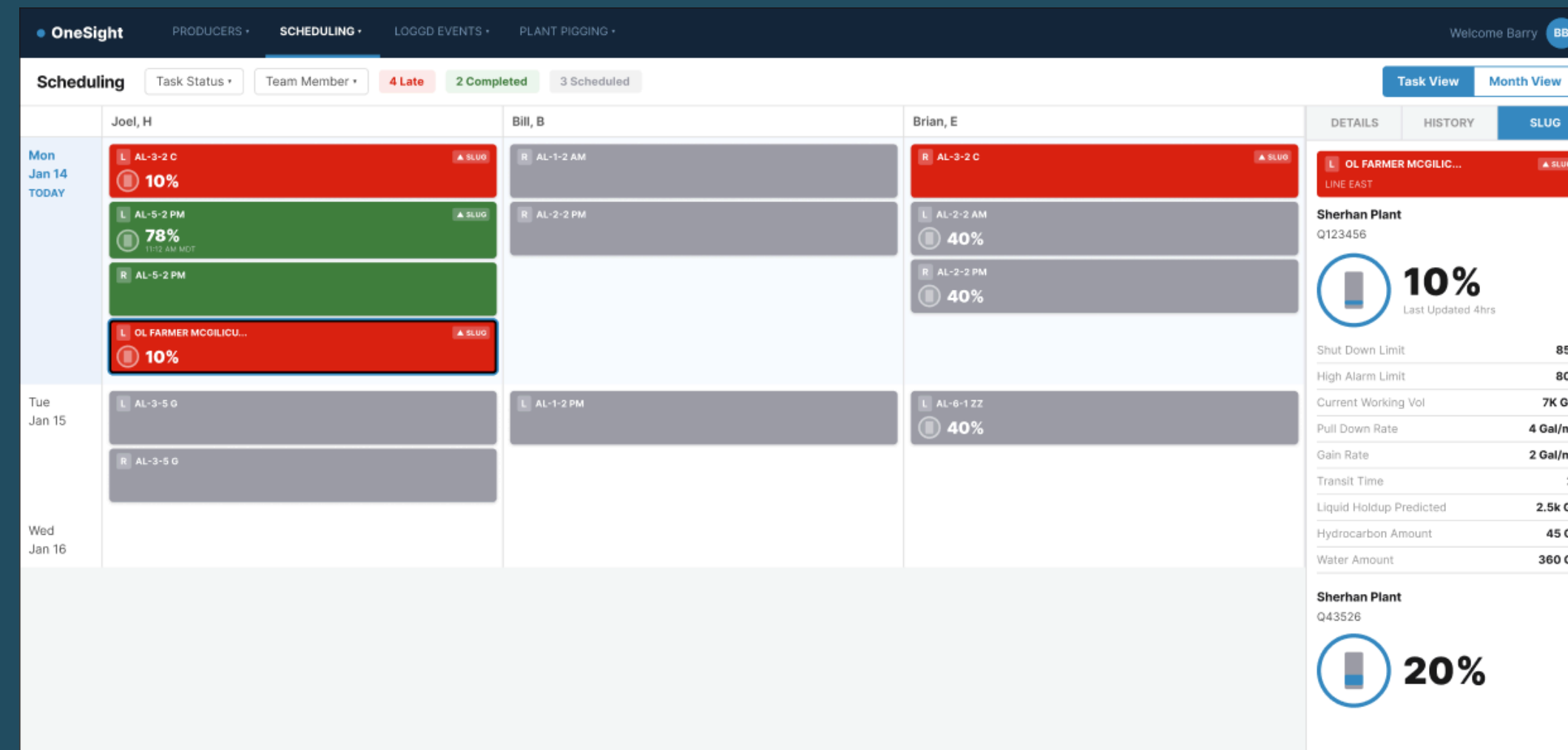
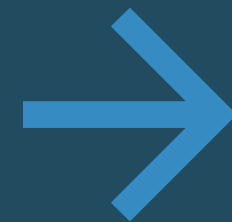
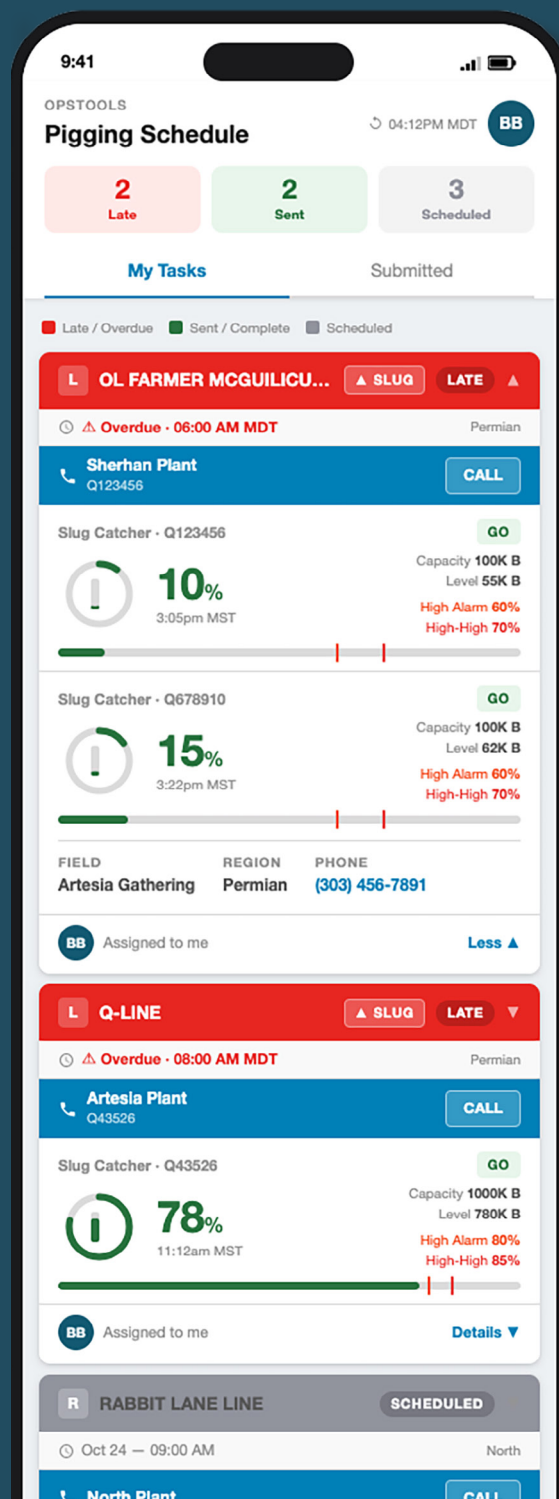
GasController

Mobile - Gas Controller

Receives inbound pig alerts

Monitors surge risk

Prepares slug catcher receiver



Shared design system • RED=Late • GREEN=Sent • GREY=Scheduled
SLUG=live slug catcher data
Go/NoGo gauge • Plant call bar

Validation

We standardized metrics to provide 'at-a-glance' awareness

"This is perfect! It lets the field know... They feel my pain."

"Same as PI a diagram that shows the tank capacity in %, showing how much was in there and how much space there was."

Technical Requirements

IOT Integration: Retrofit older tanks with IOT sensing units to bring legacy infrastructure into the real-time ecosystem.

Critical Safety Logic: Implement "High-High" alarm limits; note that currently only 50% of units support this, requiring a strategic investment in additional IOT hardware.

Standardized Metrics: Display Slug Catcher levels by percentage to provide universal "at-a-glance" capacity awareness.

System Mapping: Identify and integrate unique Equipment IDs for all slug catchers into SCADA for centralized tracking.

The Bottom Line:

By unifying the data stream, we replaced chaotic guesswork with **absolute situational awareness**. We ensured that safety is never compromised by a missed phone call.

Bridge the Hardware Gap: Retrofit legacy assets with IOT devices to bring 100% of slug catchers into the digital ecosystem.

Establish a Single Source of Truth: Replace fragmented texts and word-of-mouth with a real-time dashboard that connects every user—from the field to the NOC—in one accountable system.

Integrate the Data Loop: Map unique Equipment IDs and pipe segments directly into PI and SCADA to ensure metrics are accurate and synchronized.

Prioritize Accountability: Build a centralized scheduling and notification framework where every pig launch is visible, tracked, and confirmed by all stakeholders.