EMERSON EXCHANGE 2025

ACCELERATING INNOVATION

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1-1665 - Building a Strong Tank Farm Wireless Radar Network to Save Time and Inventory Costs

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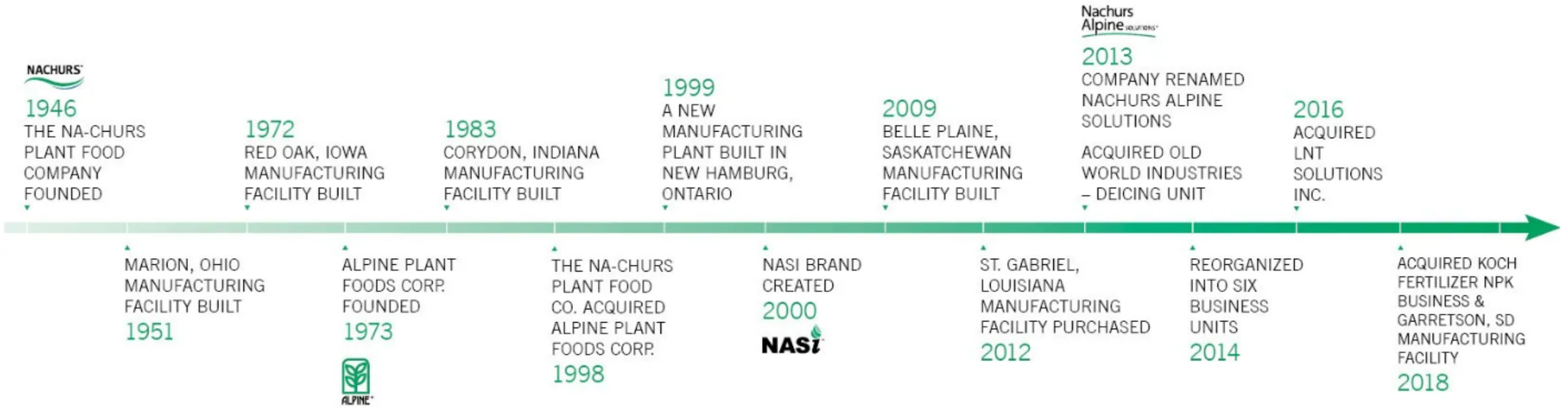
Agenda

KARMAN DADIALA	Nachurs Alpine Solutions - Overview
KARMAN DADIALA	Tank Farm Overview
KARMAN DADIALA	Inventory Requirements
CHERYL MENZIES	Wireless Trial
CHERYL MENZIES	Wireless Solution
KARMAN DADIALA	Summary

Nachurs Alpine Solutions

- ALPINE Liquid Fertilizers is the Canadian division of Nachurs Alpine Solutions® (NAS), who is a leading manufacturer of liquid fertilizers in North America - providing quality products since 1946. NAS has manufacturing plants in New Hamburg, Ontario; Belle Plaine, Saskatchewan; Marion, Ohio; Corydon, Indiana, Red Oak, Iowa and St. Gabriel, Louisiana. NAS markets specialty precision liquid in-furrow starters, foliar fertilizers, and micronutrients for field and specialty crops under the ALPINE brand in Canada. Nachurs Alpine Solutions is owned by Wilbur Ellis.

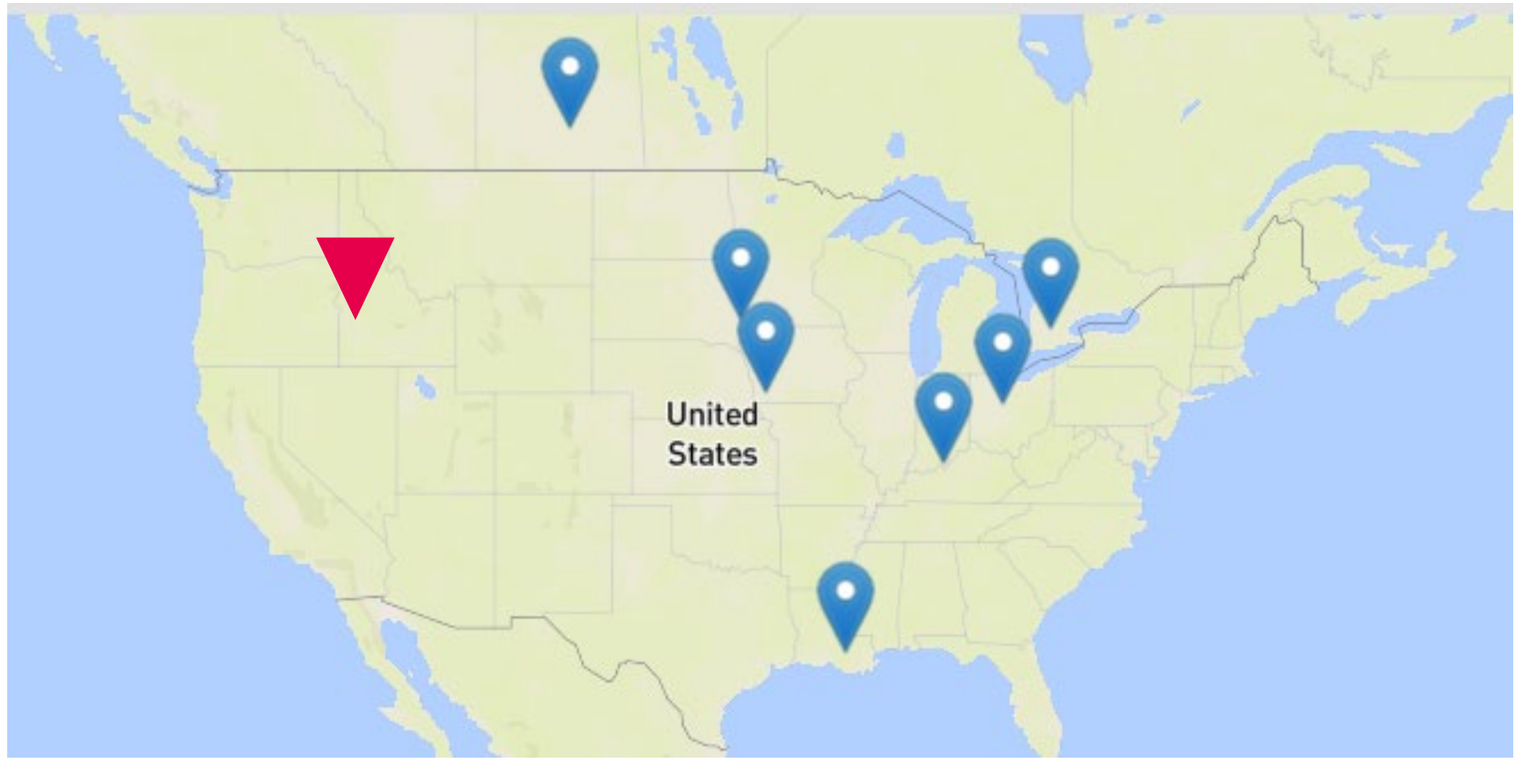
Nachurs Alpine Solutions - History



Nachurs Alpine Solutions - Locations

- Marion, OH, US – Corporate Office
- New Hamburg, ON, Canada
- Corydon, IN, US
- St Gabriel, LA, US
- Belle Plaine, SK, Canada
- Garretson, SD, US
- Red Oak, IA, US

- Future Location - Boise, ID, USA



Tank Farm Overview

- 104 Outdoor Tanks
  - Concrete silos
  - HDPE
  - Stainless steel
- 28 Indoor Tanks
  - HDPE
  - Stainless steel
- Storing raw materials and finished goods
  - Acids
  - Bases
  - Neutral, non-corrosive

Nachurs Alpine Inventory Issues

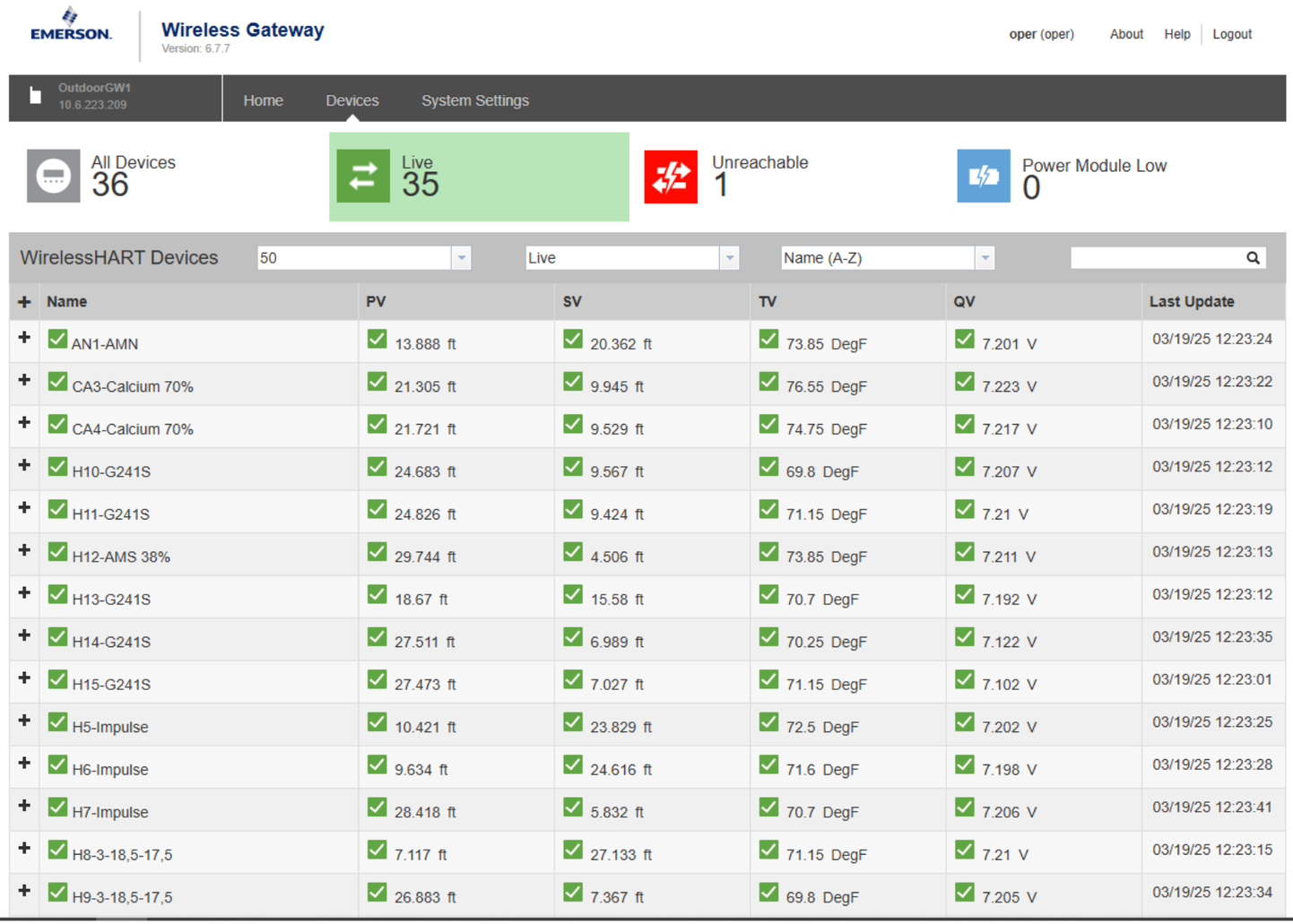
- Recurring "slippages" on certain products
  - Mismatch in theoretical inventory vs actual "on-hand"
- Lack in confidence with manual checks
  - Temperature, equipment, operator
- Over-filling storage tanks
- Inventory cost $5-10 CAD/liter
- Labour intensive
  - Operator manually check levels daily or weekly consumes several hours that could be better spent on other tasks
- Unreliable level measurements lead to inaccurate inventory reporting, potentially resulting in missed customer orders due to insufficient stock.

Nachurs Alpine Inventory Management Challenges

- High density tank farm (104 tanks total)
- Ammonia and other residual process vapours + steam
- Relocating current tank farm 100 m to the west in a new containment pad
- Some tanks have aluminum domes

Transition to wireless radars

User interface



+	Name	PV	SV	TV	QV	Last Update
+	AN1-AMN	13.888 ft	20.362 ft	73.85 DegF	7.201 V	03/19/25 12:23:24
+	CA3-Calcium 70%	21.305 ft	9.945 ft	76.55 DegF	7.223 V	03/19/25 12:23:22
+	CA4-Calcium 70%	21.721 ft	9.529 ft	74.75 DegF	7.217 V	03/19/25 12:23:10
+	H10-G241S	24.683 ft	9.567 ft	69.8 DegF	7.207 V	03/19/25 12:23:12
+	H11-G241S	24.826 ft	9.424 ft	71.15 DegF	7.21 V	03/19/25 12:23:19
+	H12-AMS 38%	29.744 ft	4.506 ft	73.85 DegF	7.211 V	03/19/25 12:23:13
+	H13-G241S	18.67 ft	15.58 ft	70.7 DegF	7.192 V	03/19/25 12:23:12
+	H14-G241S	27.511 ft	6.989 ft	70.25 DegF	7.122 V	03/19/25 12:23:35
+	H15-G241S	27.473 ft	7.027 ft	71.15 DegF	7.102 V	03/19/25 12:23:01
+	H5-Impulse	10.421 ft	23.829 ft	72.5 DegF	7.202 V	03/19/25 12:23:25
+	H6-Impulse	9.634 ft	24.616 ft	71.6 DegF	7.198 V	03/19/25 12:23:28
+	H7-Impulse	28.418 ft	5.832 ft	70.7 DegF	7.206 V	03/19/25 12:23:41
+	H8-3-18,5-17,5	7.117 ft	27.133 ft	71.15 DegF	7.21 V	03/19/25 12:23:15
+	H9-3-18,5-17,5	26.883 ft	7.367 ft	69.8 DegF	7.205 V	03/19/25 12:23:34

Field Trial

- In 2019 - Field trial with wireless radars inside six (6) concrete silos with aluminum domes on highest volume and highest margin product

The Solution

- Purchased 5 x 3308 and one gateway in late 2019 with remote antenna
- Purchased 1/month under maintenance budget
- In 2020 added wired radar with THUM for lime tank
- Oct 2021 added additional 11
- Added 1410S/781 for Inside Tanks
- Upgraded to new 1410S/781 for Outdoor Tanks

- Currently have ~50 wireless level transmitters

Issues with Gateway and Connections

+	S2-S0018126	17.203 ft	9.297 ft	93.2 DegF	7.23 V	05/20/24 16:46:22
+	S3-S0018125	3.491 ft	23.009 ft	90.05 DegF	7.185 V	05/20/24 16:53:00
+	S4-S0018127			94.55 DegF	7.212 V	

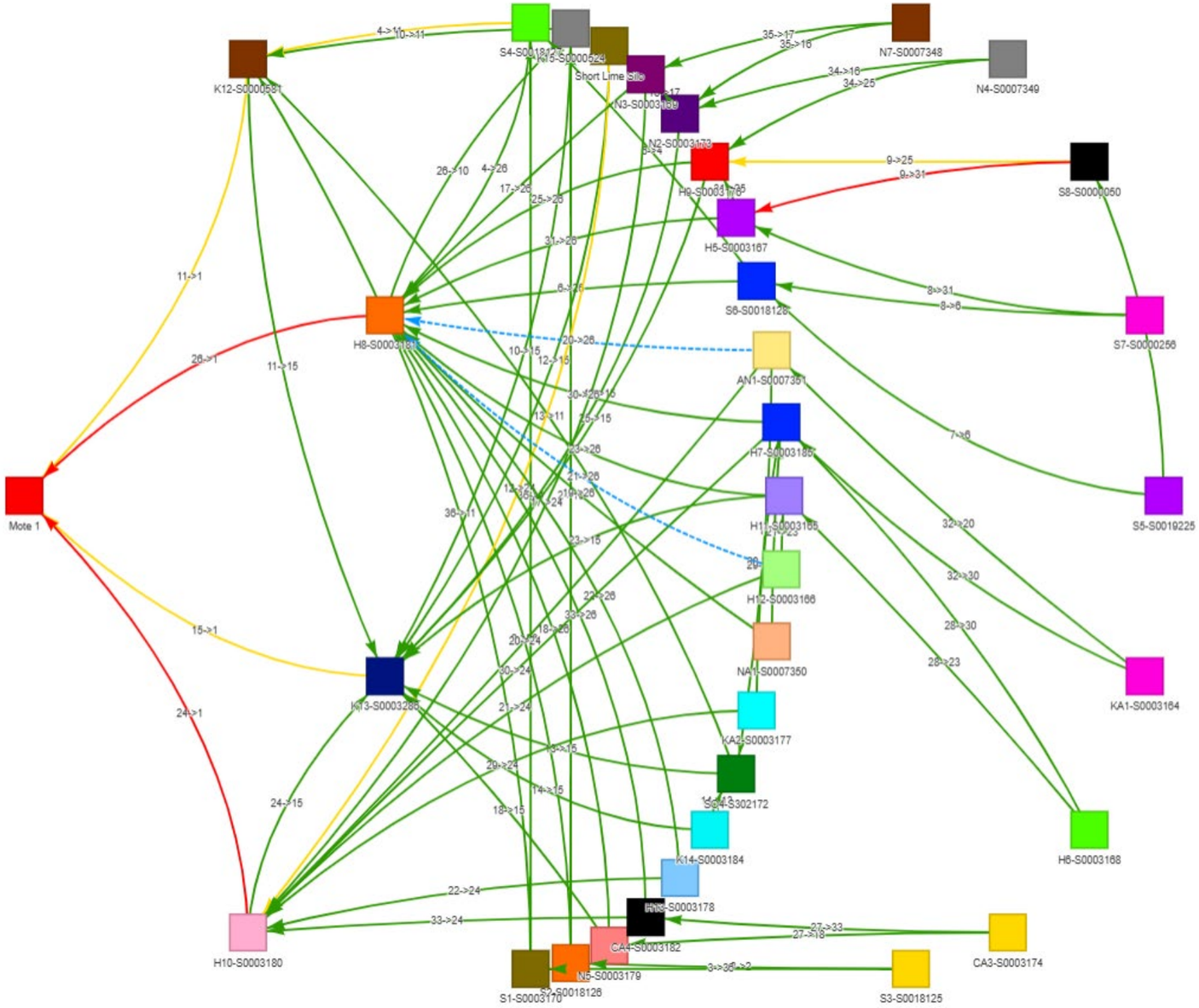
Device Information

Node	MAC	Device Type	TagName	Desc	Long Tag	Overall Reliability	Joins	Links	mxQ	Uptime	State	Update Rates (sec)
1	00-17-0D-00-00-4C-C3-00						1	57	0	7-01:12:05	Oper	
2	00-1B-1E-26-6E-0F-A3-6E	3308	S0018126		S2-S0018126	28.1428571428571	2	10	3	01:06:16	Oper	ID 0: 60 ID 1: 300
3	00-1B-1E-26-6E-0F-A2-E2	3308	S0018125		S3-S0018125		0	0	0	00:00:00	Idle	
4	00-1B-1E-26-6E-0F-A3-09	3308	S0018127	S4	S4-S0018127		0	0	0	00:00:00	Idle	
6	00-1B-1E-26-6E-0F-A2-FA	3308	S0018128		S6-S0018128	99.679223556506	4	14	4	4-22:43:12	Oper	ID 0: 60 ID 1: 300
7	00-1B-1E-26-6E-0F-A4-AA	3308	S0019225		S5-S0019225	99.5888834073343	5	10	3	4-22:41:12	Oper	ID 0: 60 ID 1: 300
8	00-1B-1E-26-6E-0F-AD-75	3308	S0000256		S7-S0000256	100	1	10	3	7-00:58:05	Oper	ID 0: 60 ID 1: 300
9	00-1B-1E-26-6E-0F-A8-67	3308	S0000050		S8-S0000050	100	1	15	5	7-00:58:31	Oper	ID 0: 60 ID 1: 300
10	00-1B-1E-26-6E-0F-AC-57	3308	S0000524		K15-S0000524	100	1	13	3	7-01:04:59	Oper	ID 0: 60 ID 1: 300
11	00-1B-1E-26-6E-0F-AA-71	3308	S0000581		K12-S0000581	100	1	12	3	7-01:05:40	Oper	ID 0: 60 ID 1: 300
12	00-1B-1E-26-4F-3F-1E-D5	775	LIME BIN		Short Lime Silo	100	1	10	4	7-00:54:06	Oper	ID 0: 60 ID 1: 60 ID 2: 60
13	00-1B-1E-26-6E-0F-B4-B3	3308	S302172		SO4-S302172	100	1	11	3	7-01:07:14	Oper	ID 0: 60 ID 1: 300
14	00-1B-1E-26-6E-0F-B9-6A	3308	S0003184		K14-S0003184	100	1	25	4	7-01:07:55	Oper	ID 0: 60 ID 1: 300
15	00-1B-1E-26-6E-0F-B8-D3	3308	S0003286		K13-S0003286	100	1	34	7	7-01:07:37	Oper	ID 0: 60 ID 1: 300
16	00-1B-1E-26-6E-0F-B9-34	3308	S0003173		N2-S0003173	100	1	12	4	7-01:01:14	Oper	ID 0: 60 ID 1: 300
17	00-1B-1E-26-6E-0F-B9-4B	3308	S0003169		N3-S0003169	100	1	10	3	7-01:01:42	Oper	ID 0: 60 ID 1: 300

Network Map

Network map shows lines between devices on the network that represent path stability between connected devices, keep in mind this is a Hierarchical look at how the network formed and not meant to represent the physical layout of the network.

Green lines = stabile high-quality path
Yellow = marginal
Red = poor
Blue dash = device has not sent a health report for stability.



Original Gateway Location

New Gateway Location

Diagram Tools

Nachurs Alpine - AMS Wireless SNAP-ON

File | Home | Network | Settings

New | Import | Delete | Rename — Editing

Transition Network | Show Network Coverage | Start Diagnostics | Analyze and Split Networks | Check Network Layout | Enable Stress Testing — Analysis

Stress Test 100%

Palettes

Networks (1) OutdoorGW1 18%

KA2-Safeway KA 70%

KA1-Safeway KAn 70%

NA1-Nitric Acid

AN1-AM

N5-AMN

N7-Aqua

N4-Aqua-Aqua

H7

H6-In

H5-Impulse

H9-3

H8-3-18,5-

SO4-Sulfuric Acid

45%

NAP-H-15-

K12-K15-KOH 45%

40.40%

Short Lime Silo

OutdoorGW1

S8-Empty

S6-G241S

S2-G24

S7-10-34-0

S5-10-34-0

S3-G24

S1-G24

Report Diagram

Ready

Status: Active Last Update: 2025-02-04 3:19:18 PM

Results

- Accurate inventory
- Saving up to two hours per day avoiding manual checks
- All inventory is displayed on a clean interface and can be accessed anywhere on site within network range
- Tanks being relocated starts this year and will take two years. No re-wiring!
- Amazing battery life on units as well as consistent and reliable servicing as needed (calibration, etc)

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