



GIS CASE STUDY:

**Eastern New Mexico Pipeline As-Built Survey,
Inspection, Mobile Data Gathering and Other Services**

Clarence Lamb - Project Director

SAFETY MOMENT



Mohave Rattlesnake (*Crotalus scutulatus*)

WHAT TO DO IN THE EVENT OF A SNAKE BITE

- Try to remain calm and inactive.
- Get to a hospital or doctor as soon as possible (have someone else drive).
- Loosen or remove any restrictive clothing or jewelry (e.g. shoes, watch) from the area near the bite.
- Watch the victim for signs of shock. Treat if necessary by lying flat with feet elevated and cover with warm clothes or blanket.
- Identify or photograph the snake only if it remains visible from a safe distance.

WHAT NOT TO DO

- Don't make incisions over the snakebite.
- Don't constrict the flow of blood.
- Don't immerse a limb in ice water.
- Don't elevate the bitten area (this will increase the flow of venom to other tissues).
- Don't run or carry unnecessary items as you go for help, to avoid elevating your pulse rate.
- Don't use your mouth to extract venom. Sucking out the venom is no longer a recommended practice, and wastes valuable time (commercial venom extractors like the Sawyer snake-bite kit may be somewhat helpful if used properly, but should not be relied on. The important thing is to get to a hospital as quickly as possible).
- Don't try to catch or kill the snake.
- Don't administer any pain medications or antihistamines unless instructed by a doctor or EMT.

SAFETY STATISTICS: 1997-2019



18+ MILLION SAFE MAN-HOURS WORKED

Zero OSHA: Recordable Incidents

- Lost Workday Case Rate of **Zero**
- DART Rate of **Zero**
- Lost Time Rate (LTR) of **Zero**

AUDUBON FIELD SOLUTIONS

Audubon Field Solutions, an Audubon Companies' affiliate, provides integrated pipeline engineering and field services to the oil and gas, petrochemical, refining, transmission, and power generation markets.

CAPABILITIES INCLUDE:

- Survey & Mapping
- Project Management
- Pipeline Engineering
- Pipeline Integrity Management
- Construction Management & Inspection
- GIS & Data Asset Management
- Right Of Way Services
- Environmental Services
- 3D Laser Scanning
- CAD

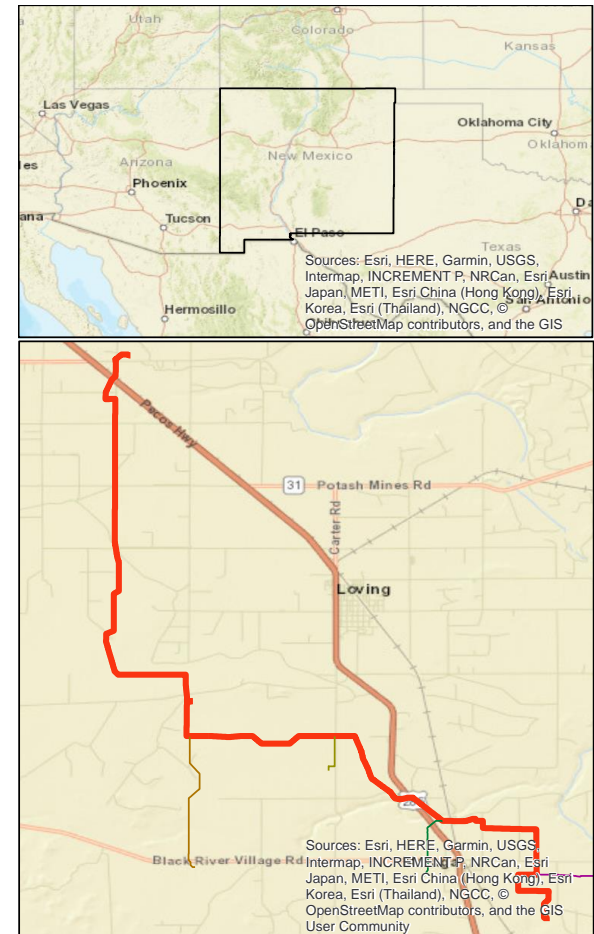


We support, consult, and validate the execution of turnkey projects in the upstream, midstream, and downstream segments.

REGULATED GATHERING SYSTEM PROJECT

Located in Southeastern New Mexico

- 15.64 miles
- Two spreads
 - North trunkline – flows north to south
 - South trunkline – flows south to north
- Four lateral lines, comprising another 10 miles
- Transport crude
- Regulated – PHMSA and State of New Mexico
- 10" OD



SCOPE OF WORK

Audubon was requested to provide the following scope using best-in-class technologies.

- Data integration to provide traceable, verifiable, and complete data
 - Multiple third party contractors gathering data
 - Survey staking
 - Pipe stringing
 - Welding inspection – mobile data gathering tools
- As-built survey
 - Two survey teams
- Database management
- Deliverables production - alignment sheets
- Operations manual
- Oil Spill Response Plan
- Integrity Management Plan
- PHMSA compliance documentation

MOBILE GIS - DATA GATHERING

May 21, 2018 46 PM

AFE/WO/GL No. *
018534


Substrate Type *
Substrate/Surface to be coated
Weld

Substrate ID *
ID number related to the substrate being coating. Select 'other' to type

Data entry

Proceeds in same workflow as paper forms

29°44'N 95°33'W ± 65 m



Default Stationing Type
point

Change Stationing Type
Use only if Stationing Type is different

Gather location based data

Location + data

Temperature *
° F

Start Time *
2:46 PM

End Time *
Time

Weather Conditions
Comments

Programmable logic

Allows multiple branching questions

Standard *
SP3 Power Tool Cleaning

Weld Preparation *
NACE SP0178
None

Type of Grinding



Surface Perparation
Approved *
 Yes No

QC

Domain based data entry eliminates redundant or typing errors

images

Document Type *
 Image Document

Document / Image *
 

Description

Field Photos

Visual of work performed

1 of 1

Sign to complete report *

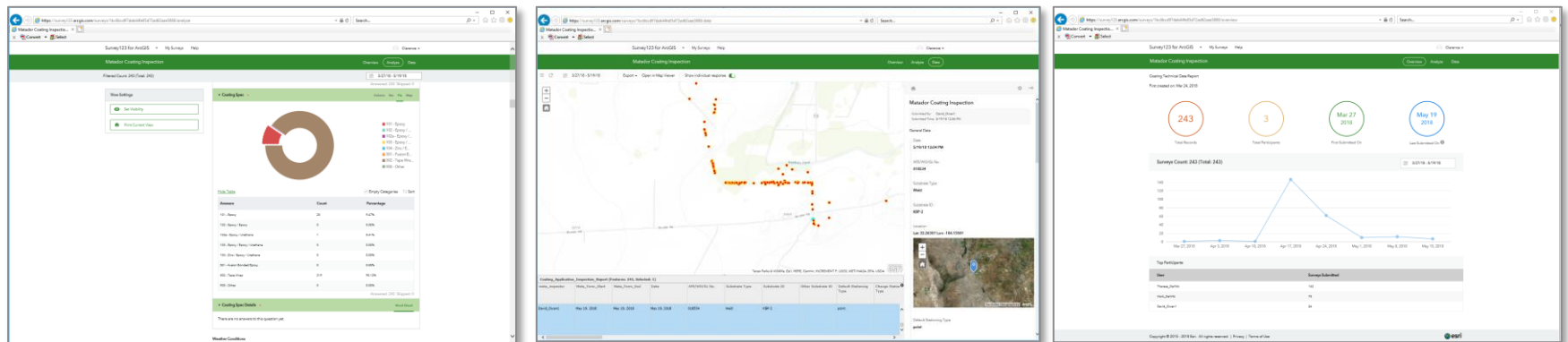
Signatures

Required from each inspector

MOBILE GIS - ANALYSIS

DATA ACQUISITION COMPLETE

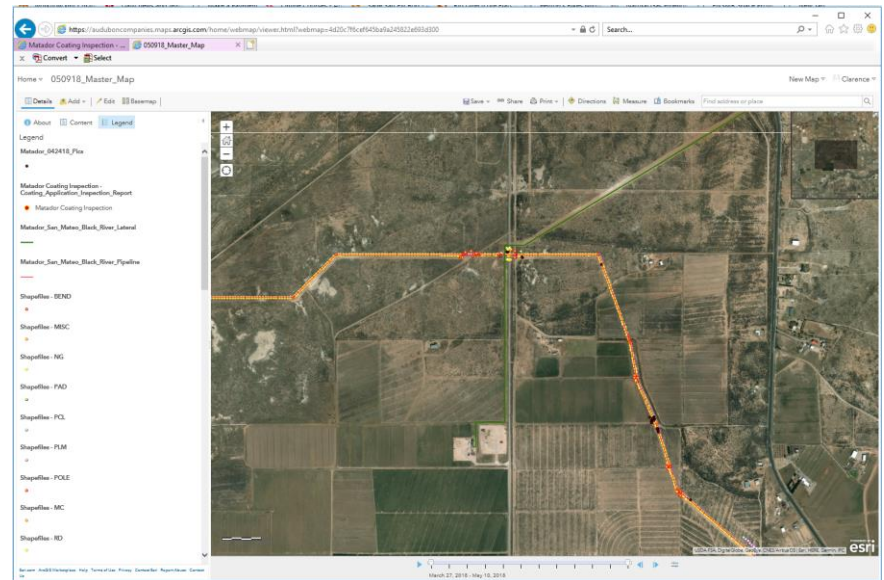
- Time saved in transposing data from tally books by directly integrating data in a real time setting
- Data transferred to staging database for quality control via business rules
 - i.e. must not overlap/must not intersect/must contain, etc.
 - Visual inspection
- Data analysis/dashboards
 - Inspections per day/hour
 - Rate
 - Status per segment
 - Clustering
 - Gaps
- Safety
 - Location of inspectors



WEB MAPPING

Web Mapping sites include many tools for visualizing, reporting, and analysis

- All standard out-of-the-box tools are available through ArcGIS Online
- Audubon integrated value-added tools to meet project & client needs specific to project requirements
 - Access help documents
 - Create and transfer sketches
 - Identify layers
 - Measure distances
 - Navigation
 - Open linked documents & media files
 - Search
 - Print preformatted maps
 - Upload user Shapefiles
 - View layer metadata



DATA INTEGRATION

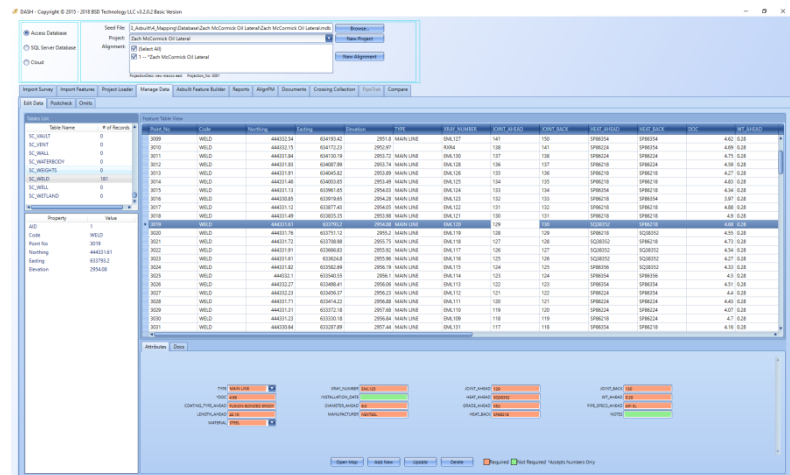
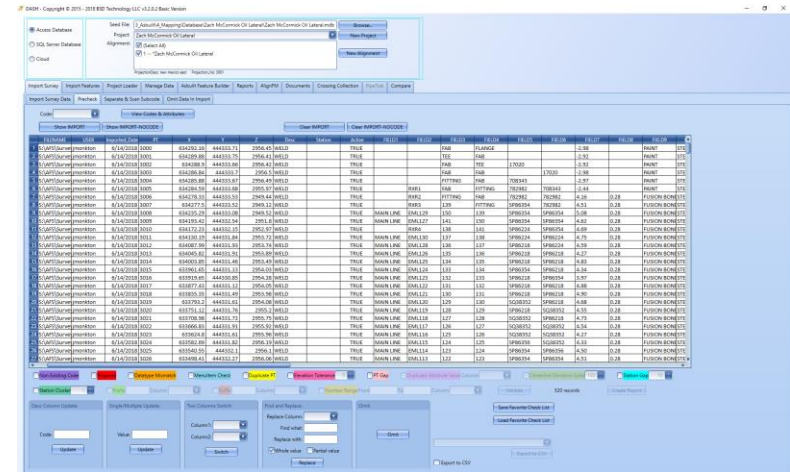
Audubon Field Solutions team members utilized Blue Sky Evolution's Dash product for:

- Data validation from both Audubon crews and third party vendors

- Preliminary/staking survey data
 - Centerline
- As-built survey data
- Field inspection
- MTR
- HEAT

- Document linking

- Tied documents of all types to centerlines and specific pipe features and maintain compliance for reliability, traceability, verification, and completeness
- Scanned documents to text



AS-BUILT SURVEY AND DATA PROCESSING

Field survey and data processing

- Two survey crews collected field data
 - Gathered all required features
- Data processed using Dash
- Dash provided an ideal platform to process all data in a single location and generate reports to validate and check data prior to document generation



BIMBA - Copyright © 2019 BIMBA Technology LLC v3.2.2.2 Back View

Select From:
Project: Dash McCormick CI Lateral
Alignment: OR 1 - Dash McCormick CI Lateral
New Alignment

Import Survey | Import Features | Project Leader | Manage Data | Add/Remove Features | Reports | Align/fit | Documents | Creating Collection | Print/Plot | Compare

Station	Code	Description	Station	Code	Description	Station	Code	Description	Station	Code	Description	Station	Code	Description	Station	Code	Description	Station	Code	Description
2008	WELD	444331.94	45491.91	2011.8	MAIN LINE	ENR 172	141	170	SPR214	SPR214	4.43	0.38								
2010	WELD	444332.15	45477.23	2025.07	ENR	138	141	170	SPR224	SPR224	4.49	0.38								
2011	WELD	444331.84	45470.76	2032.73	MAIN LINE	ENR 135	137	138	SPR224	SPR224	4.75	0.38								
2012	WELD	444331.81	45467.89	2051.74	MAIN LINE	ENR 138	138	137	SPR218	SPR224	4.39	0.38								
2013	WELD	444331.81	45464.52	2051.89	MAIN LINE	ENR 138	138	136	SPR218	SPR218	4.27	0.38								
2014	WELD	444331.81	45463.87	2051.89	MAIN LINE	ENR 135	134	135	SPR218	SPR218	4.03	0.38								
2015	WELD	444331.13	45399.81	2064.03	MAIN LINE	ENR 139	139	136	SPR214	SPR218	4.36	0.38								
2016	WELD	444332.81	45379.61	2064.03	MAIN LINE	ENR 132	132	133	SPR218	SPR214	3.97	0.38								
2017	WELD	444331.12	45387.43	2064.03	MAIN LINE	ENR 132	131	132	SPR218	SPR218	4.09	0.38								
2018	WELD	444331.48	45375.25	2064.03	MAIN LINE	ENR 132	130	131	SPR218	SPR218	4.18	0.38								
2019	WELD	444331.81	45370.2	2064.03	MAIN LINE	ENR 139	129	130	SC2012	SPR218	4.68	0.38								
2020	WELD	444331.76	45373.12	2091.1	MAIN LINE	ENR 138	139	139	SPR218	SC2012	4.05	0.38								
2021	WELD	444331.72	45370.86	2091.1	MAIN LINE	ENR 138	127	128	SC2012	SPR218	4.73	0.38								
2022	WELD	444331.81	45366.83	2091.02	MAIN LINE	ENR 117	126	127	SC2012	SC2012	4.54	0.38								
2023	WELD	444331.81	45354.4	2091.02	MAIN LINE	ENR 138	125	126	SC2012	SC2012	4.07	0.38								
2024	WELD	444331.82	45352.89	2096.18	MAIN LINE	ENR 115	124	125	SPR216	SC2012	4.33	0.38								
2025	WELD	444332.17	45348.33	2096.1	MAIN LINE	ENR 114	123	124	SPR214	SPR216	4.31	0.38								
2026	WELD	444332.27	45348.84	2096.08	MAIN LINE	ENR 115	122	123	SPR214	SPR214	4.51	0.38								
2027	WELD	444332.23	45345.27	2096.23	MAIN LINE	ENR 113	121	122	SPR214	SPR214	4.4	0.38								
2028	WELD	444331.71	45342.42	2096.08	MAIN LINE	ENR 113	120	121	SPR214	SPR214	4.48	0.38								
2029	WELD	444331.31	45337.14	2097.88	MAIN LINE	ENR 119	119	120	SPR224	SPR224	4.7	0.38								
2030	WELD	444331.23	45332.78	2096.08	MAIN LINE	ENR 109	118	119	SPR218	SPR224	4.7	0.38								
2031	WELD	444333.84	45327.89	2097.74	MAIN LINE	ENR 117	117	118	SPR214	SPR218	4.18	0.38								

Attributes: Desc

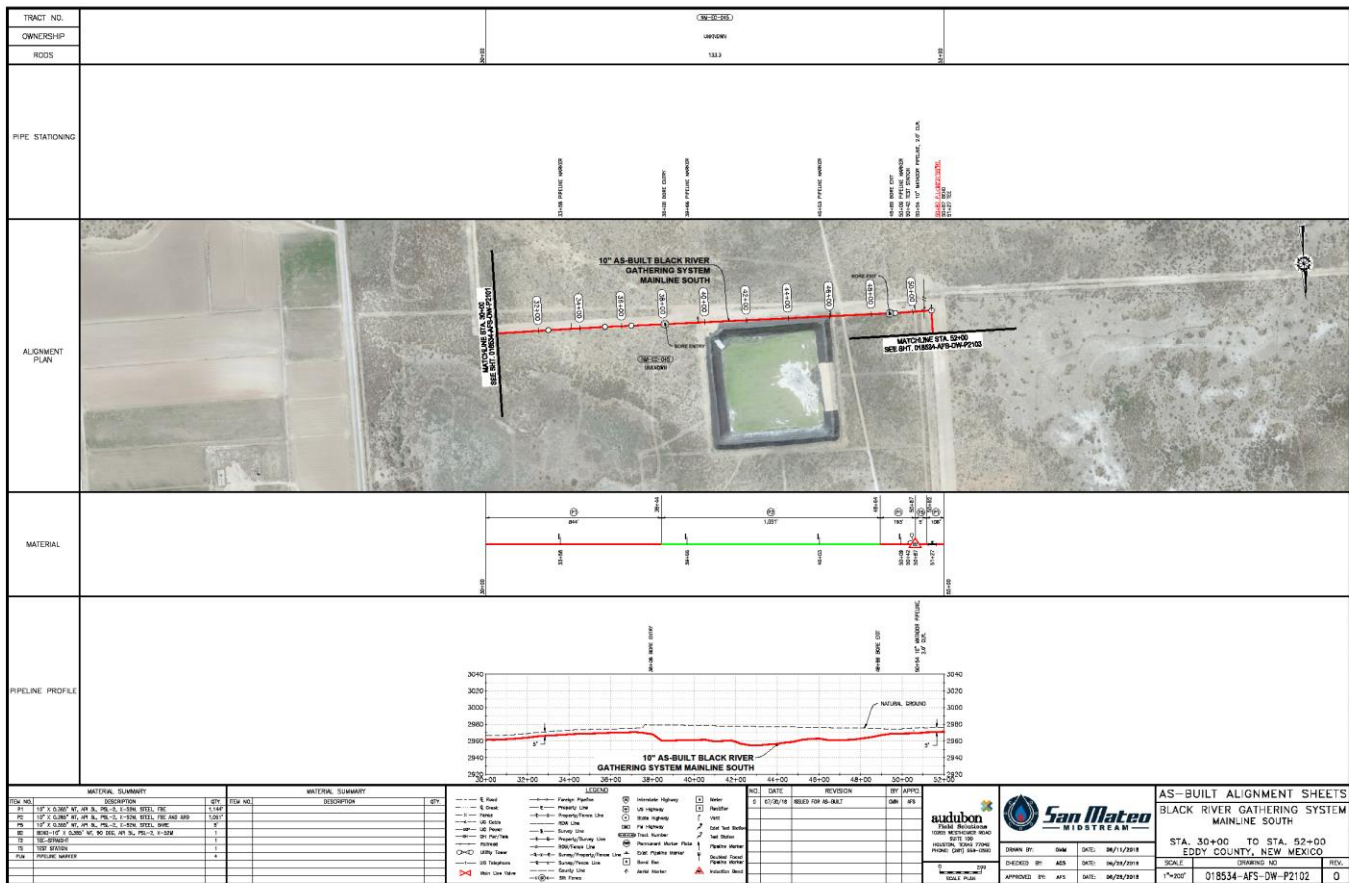
THIS ROW LINE | THIS ROW NUMBER | THIS ROW DATE | THIS ROW TIME
DATE/TIME | DATE/TIME | DATE/TIME | DATE/TIME
DATE/TIME | DATE/TIME | DATE/TIME | DATE/TIME
DATE/TIME | DATE/TIME | DATE/TIME | DATE/TIME

Clear Filter | Add New | Update | Delete | Required Not Required Needs Numbers Only

DELIVERABLES PRODUCTION

Data were processed for Blue Sky Evolution Skyline, leading to efficient alignment sheet production.

ALIGNMENT SHEET DOT-PHMSA

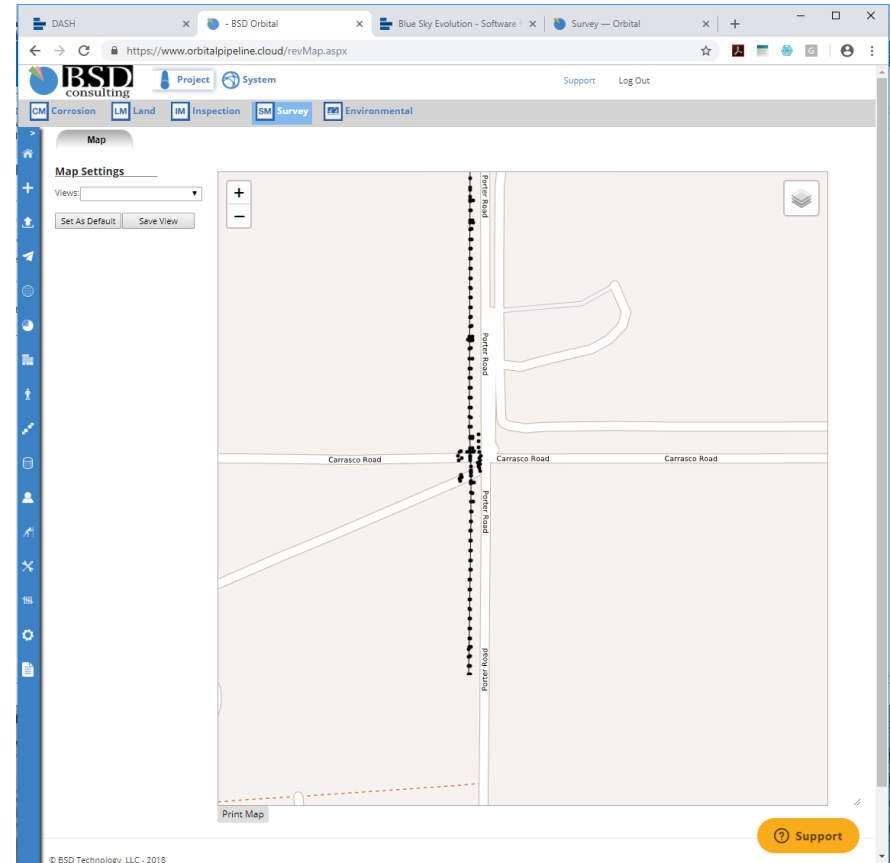


SURVEY DATA INTEGRATION

Using Blue Sky Evolution's Orbital Web Application provided a client-friendly platform to share data with the client and other non-GIS users.

SURVEY DATA LOADED & REPORTED

- Upload and link documents
 - Alignment sheets
 - Job books
 - Hydrotest
 - MTR
 - NDT
 - Survey data
 - Welder certifications



ASSET DATA INTEGRATION

Using Blue Sky Evolution's Orbital Web Application provided a client-friendly platform to share data with the client and other non-GIS users

ASSET REPORT GENERATION

- View objects and linked documents
 - Alignment sheets
 - Job books
 - Hydrotest
 - MTR
 - NDT
 - Survey data
 - Welder certifications
- All items clickable to access drill down data on a point-by-point basis

The screenshot displays the Blue Sky Evolution Orbital Web Application interface. The browser address bar shows the URL: <https://www.orbitalpipeline.cloud/AssetReports.aspx>. The application header includes the BSRD consulting logo and navigation tabs for AM Assets, DM Design, FM Facilities, and IM Corrosion. The main content area is divided into several panels:

- Selection:** System Name: BRGS, Line Name: ...Select Alignment.
- Report:** Report Name: ...Select Report.
- Table:** Table Name: SC_WELD.
- Additional Filter Selections:** Field Name: POINT_ID, Operand: >, Value: [empty].

A Properties window is open over a map, displaying a list of attributes and values for a selected asset:

Column	Value
Documents	NDT_Qualifications.pdf 279680.pdf Welder_Certifications.pdf 050418_T-AA9-E81-9774.pdf
AID	6
DOC	5.2
Code	WELD
TYPE	TIE IN
NOTES	0
Active	true
Point	7
Eastings	602224.4809
ImportID	7737
MATERIAL	STEEL
Northings	461435.2253
POINT_ID	3097
Point_No	20179
WT_AHEAD	0.365
Elevation	3115.124
HEAT_BACK	SB00028
HEAT_AHEAD	279680
JOINT_BACK	BRGS10-1959B
EntityAngle	-73.8461149027357
GRADE_AHEAD	X52M
JOINT_AHEAD	BRGS10-1766
XRAY_NUMBER	EPB-144
LENGTH_AHEAD	35.5
LAHIScanDate	null
MANUFACTURER	PYTCO
DIAMETER_AHEAD	10
PIPE_SPECS_AHEAD	API 5L PSL2
INSTALLATION_DATE	5/9/2018
COATING_TYPE_AHEAD	FBE

A data table is visible at the bottom of the screen:

POINT_ID	Import ID	Point_No	Code	Northings	Eastings	Elevation	TYPE	XRAY_NUMBER	JOINT_AHEAD	JG
1	26	26	WELD	444278.81	619512.6	3014.81			FAB	FLV
2	27	27	WELD	444279.84	619512.61	3014.79			TEE	FAI
3	28	28	WELD	444280.73	619512.56	3014.84			FAB	TEI
4	29	29	WELD	444282.72	619512.69	3014.86			FITTING	FAI
5	30	30	WELD	444283.92	619512.74	3014.43			TP131	FIT
6	31	31	WELD	444292.78	619512.27	3007.14	TIE IN	ET18		
7	32	32	WELD	444293.1	619512.24	3007.06	TIE IN	ET17		

SUPPORT FOR OTHER ASPECTS OF THE PROJECT

Audubon provided tools that assisted in the development and production of:

- Operations Manual
 - Collateral materials for inclusion in the document; data tables and reports
- Oil Spill Response Plan
 - HCA & other mapping products
- Integrity Management Plan
 - Mapping & storage of integrity data
- Compliance documentation
 - Planning for PHMSA audit
 - Reporting and submittal of data to PHMSA

CONCLUSION

Audubon provided an integrated platform to efficiently produce the client's deliverables and a system to manage any new lines going forward.

- Quick deployment
- Combining best-in-class technology for Audubon staff and client use
- Easy to use for the inspectors, survey staff and most importantly, the client
- Convenient – use anytime, anywhere
- Provides a one-stop solution to managing complex pipeline asset data
- GIS provides a platform for Audubon as a part of our overall project management and compliance solution

THANK YOU

**QUESTIONS OR
COMMENTS ?**



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PEOPLE | FLEXIBILITY | RELATIONSHIPS | EXPERIENCE