GIS FOR PIPELINE ASSETS MANAGEMENT

SPEAKER: BANU PRAKASH CHITRALA
HUSAM EDDEAN JAMIL

ADNOC GAS PROCESSING
HSE MOMENT
AGENDA

- INTRODUCTION
- PIPELIEN LIFE CYCLE – GIS ROLE
- GEOSPATIAL DATA MATURITY; SURVEY, GDB MODEL, RESULTS
- LESSONS LEARNT (SURVEY)
- GIS PORTAL
INTRODUCTION

OVERVIEW

- GIS at ADNOC Gas
  - Triggers; business needs (Operations & Maintenance), eNOC, CRS, Geomaturity
- Enterprise GIS Implementation Roadmap development
  - As Is Study, Gap Analysis, enterprise GIS Implementation Plan
- Enterprise GIS Implementation Phases
  - Phase 1; Enterprise GIS Foundation – Infrastructure & (Geospatial) Data
  - Phase 2; Business Applications
  - Phase 3; Business Integrations
PIPEDLINE LIFE CYCLE – GIS ROLE

1. Planning Pre-Feed/Feed
2. EPC Contracts
3. Commissioning
4. Decommission

GIS

Maintain All Historical/Old Data

- Engineering & Design Data
- Operation Data
- Integrity Data
- Inspection Data
- Analysis data HCA/ HSE/…
- Other data: Railway, Roads, OH, Base map
GEOSPATIAL DATA MATURITY

As-built drawings / Pipe books

Inspection Data – ILI Survey

Satellite Imagery

Survey

Need for Survey – Geospatial data of pipelines was:

- Incomplete
- Inconsistent
- Outdated
- Multiple sources
- Unreliable / Inaccurate
GEOSPATIAL DATA MATURITY

SURVEY METHODOLOGY

- **Topo survey**
  - Corridor features like fences, fence gates, KM markers, Other markers, crossings, stations, etc.

- **Pipeline Survey (AG/UG)**
  - UG pipelines – Ground Penetrating Radar (GPR) techniques.
  - AG pipelines – Traditional Topo survey techniques

- **Specifications**
  - Connect to AD GRS network
  - Survey in UTM WGS 84 (Zone 39 & 40) projection
  - Accuracy tolerance (+/- 15cm)
Pipelines Features/On-line
- Centerlines
- Depth Of Cover
- Appurtenance/Supports
- CP Features: TP/JB/FB/BB
- Scraper structure
- KM/KP
- Valve
- Insulation Flange
- Instrument Device
- Weld
- Tee

Corridor/Off-Line
- Fence
- Markers
- Culverts
- GCP
- Fence gate
- Crossings
- Sites

Geometries

Attributes
- Pipeline Name,
- Pipeline Tag, Product Type,
- Pipeline Length,
- Above/Under Ground segments,
- Valve Tag & Type,
- Support Tag & Type,
- Crossing Type & name,
- Scraper Tag & Type,
- CP feature Tag & Types,
- Fence owner, Gate Width,
- Site Name and type
- Depth Of Cover, Ground Level and ROW level
- Wall thickness
- Material Type
GEOSPATIAL DATA MATURITY

GEO DATABASE MODEL - MIGRATION; APDM TO PODS
GEOSPATIAL DATA MATURITY

DELIVERABLES

- Raw Data
  - Downloaded from survey equipment for all corridors

- Geodatabase
  - Pipeline online / offline features delivered as GDB;
    - Individually in both UTM Zone 39 & 40
    - Mosaic in UTM Zone 39

- Detailed Project Report (DPR)
  - Documentation on project approach, method statement, GDB model, teams, equipment used, certification, project lessons, etc.
The survey data is verified against existing historical excavations/trail pits done by AGP NOC teams.

- 95% of data falls in sub-meter positional accuracy
- 97% of data falls in sub-meter accuracy for depth of cover
## LESSONS LEARNT

<table>
<thead>
<tr>
<th>CONSTRAINTS / STOPPERS</th>
<th>CONSTRAINT DESCRIPTION</th>
<th>SOLUTIONS / WORKAROUNDS</th>
</tr>
</thead>
</table>
| TECHNOLOGY LIMITATIONS | ▪ GPR can detect pipelines buried within 4-6mtrs  
▪ Positional accuracy declines with depth  
▪ Can’t detect non-metallic pipelines | As-built drawings / alignment sheets / pipe books / ILI Pipe-Tally/ trial pits / satellite images / aerial photos as reference |
| ACCESS TO FACILITIES | Access Permits to sensitive installations | As-built drawings / alignment sheets / pipe books / ILI Pipe-Tally/ trial pits / satellite images / aerial photos as reference |
| TERRAIN | Pipelines/facilities in Sand dunes/Sabkhas/HDD locations | As-built drawings / alignment sheets / pipe books / ILI Pipe-Tally/ trial pits / satellite images / aerial photos as reference |
| WEATHER | Hot & humid desert conditions | Start early and take mid-day breaks |
| NON - STANDARDIZATION | Potential results of non-standardization due to multiple survey teams;  
▪ Requirements understanding in multiple teams.  
▪ chances of multiple raw data formats. | ▪ Requirements briefing sessions  
▪ Standard template for raw data capture. |
THANK YOU