

# **Abu Madi Opportunity**

27<sup>th</sup> September 2023

# Agenda

# ✓ Context

- ✓ Prospect
- ✓ Abu Madi Key Challenge
- ✓ Lithology description
- ✓ Detailed Geophysical Analysis
- ✓ Conclusion

### Context

#### Analogue Wells



- ✓ AM Opportunities is surrounded by many Abu Madi technical success , some of them are already producers ✓ Abu Madi commercial discoveries / producers analogues are:
  - ➢ Abu Qir wells : ~ 30 km
  - > N. AQ wells : ~ 30 km
  - ➤ Well-2

✓ Abu Madi technical / geological success analogues are:

➢ Well-1 : ~ 5 km
➢ Well-3 : ~15 km
➢ Well-4 : ~25 km
✓ Abu Madi offset wells are:
➢ Well-5 : ~ 3 km

A new target in Abu Madi allocated just

: ~ 40 km

bellow a discovered target in KESH level.



Prospect

#### AM Seismic Amplitude



- Only the full stack amplitude allocated in the up-dip structure remain in the far offset amplitude.
  - The min. area allocated in the Abu Madi structure, Most likely area allocated in far offset amplitude and the Max. area allocated in full stack amplitude. Seismic Far Offset

#### Seismic Near Offset



#### Seismic Full Offset



AM Key Challenge Seismic Amplitude Vs Offset Interpretation The key challenge is dependencies on one source of information (seismic data) where seismic response shows reverse polarity from KES to Abu Madi level. Trough over peak decrease of amplitude with offset (Wet Sand) Trough over peak Increase of amplitude with offset (Clean Gas Sand) Peak over Trough Increase of amplitude with offset (Calcareous Gas Sand) **Seismic Near Stack** Seismic Mid Stack Seismic Far Stack The discovered reservoir is Peak over Trough, but the target reservoir is Trough over Peak.

# AM Key Challenge Anhydrite Thickness Map

- The anhydrite thickness map is created based on actual well results
- Well prognosis driven by a geophysical analysis peered reviewed work
- $\checkmark$  Expected to have the following :
  - $\checkmark$  Anhydrite thickness of 10 m ( causing the polarity reverse)
  - ✓ Gross thickness of 25 m
  - ✓ NTG of ~40%
  - ✓ Net sand of ~ 10 m sand



# Lithology description Well-2 Log



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#### Well-1 Study: 1- Wet Sand Case



#### Well-1 Study: 2- Gas Sand Case

Logs after fluid Substitution.

Logs Before fluid Substitution.



Well-2 Study: 1- Wet Sand Case & 2- Gas Sand Case



Well-2 Study: 3- Gas Sand with change anhydrite thickness





1- With using gas clean sand and changing anhydrite thickness to check to what limit anhydrite thickness will not affect the gas sand reflection.

2- The result wedge model show Peak over trough performance started by 10meter anhydrite.

3- At 10-meter anhydrite very low increase of amplitude with increasing offsets (almost flat change up to 35 degree) 10 meter can be assumed the upper limit to have gas indication from increasing of amplitude with offset.

Well-2 Study: 4- Change Gas Sand thickness under 10-m of anhydrite



At 25 m of gross clean sand show peak over trough with no increase of amplitude with increase offset Noted that the gross thickness from seismic interpretation of the reservoir in target AM is 25m.



Well-2 Study: 5a- Wet Calcareous Sand under 10 m anhydrite



1- Change calcareous sand thickness under 10 meter of anhydrite with remove all the thickness of clean sand 2- The result wedge model show Peak over trough performance with clear base of channel trough amplitude, while the offset data show increase of amplitude with offset.

3- With comparing the result with existing seismic at target AM all the character are applicable except bright amplitude at the base of the channel.



#### Well-2 Study: 5b- Gas Calcareous Sand under 10 m anhydrite



#### Conclusion

**Reverse Polarity Scenarios** 

- ✓ Using existing data of 2 analogue wells and running wedge modeling integrated with fluid substitution analysis on Well-1 and Well -2
- ✓ Criteria to match Target AM Seismic reflectivity are:
  - $\checkmark\,$  peak over trough on the full stack
  - $\checkmark$  Increase of amplitude with increase offset & no clear base of the channel.

- $\checkmark$  The matched possible sceneries are:
- 1. Gas Sand with changing anhydrite

thickness >10 m

 Gas Calcareous Sand with anhydrite of 10 m thickness



- Understanding surrounding depositional environment can identify a depositional scenarios models at the proposed location.
- Using shear sonic can gave the performance of the seismic wave to compare deferent model with actual data.
- The most likely scenario should have match with surrounding environment and match with pre-stack and post stack seismic performance.
- Seismic 1D modeling can use for reduce the risk of exploratory wells.