## MOVEOUT'S TOP TIPS FOR SEISMIC DATA STORAGE AND ORGANISATION

### PART1: SEISMIC DATA STORAGE AND MANAGEMENT ON PHYSICAL MEDIA (TAPE & DISK)


Remastered seismic data representing 39 surveys acquired over 30 years, transcribed to 40 x 4TB 3590JC magnetic tapes for archiving and 5 x USB HDD's for ready access

### Data Organisation

In our experience, energy exploration companies are likely to have a variety of seismic and associated metadata acquired over time stored on various generations of media. Over the years, archive back-ups and data management inefficiencies will have inevitably resulted in duplication, which means incurring unnecessary storage costs for data which isn't needed. But sorting all this out, rather like tidying your garage, takes up valuable time.

The optimal solution for data organisation will depend on what seismic data you have available, what it is to be used for, how and where it is archived and if it meets the criteria for processing and analysis.

| Media | Data type | Access |
|---|---|---|
| Documents | Acquisition reports, plots, maps | Occasional |
| Network Attached Storage (NAS) | Data in use (live) | Frequent |
| Magnetic tapes | Raw data, not in current use | Infrequent |
| | Backups | Occasional |
| high density USB disk | Shared internally / 3rd parties | Frequent |

## Physical Seismic Data Management

Live (usually post-stack) seismic data takes up relatively little capacity and is normally stored on network-attached disk devices, or high-density portable disk drives if convenience is important. Whilst these offer benefits in terms of practicality and are both options which are acceptable for day-to-day usage on workstations, we would not recommend either method for long term data storage, due to the inherent instability of such media devices.

By contrast, raw field data due to its pre-stacked high trace count requires significant high-capacity storage. It is rarely accessed after processing and is usually archived off-site, often incurring long-term storage costs.

The volume of live data immediately available for use depends on the capacity and limitations of your IT system's specification, and in particular its disk capacity and processing speed. Even with careful data management, loading data for use and its subsequent removal for archiving will incur latency and system downtime.

A physical IT system handles key factors of data security, disaster recovery and varying usage demand in the following ways:

**Data security** is simply managed behind firewall and access protocols; however, sharing data with third parties can present challenges.

**Disaster Recovery** is achieved by routinely backing-up and archiving data. However, loss of IT capability through a security breach or physical event such as fire or flood is harder to mitigate against without duplicating the entire IT system.

**Flexibility to cope with varying usage demands** depends again on the capacity of the IT system. Scaling down in periods of low data usage creates inefficient use of expensive IT hardware. Scaling up introduces significant cost and time overhead to overcome IT system resource limitations.

## Physical seismic data storage

Seismic data archived on magnetic tape media is typically stored in secure warehouse facilities, controlled for temperature and humidity to ensure long-term data preservation with provision to mitigate risk from fire and rodent damage. Data security is ensured by implementation of auditable processes limiting access to only authorised personnel.

Correct selection of archive media is critical to ensure that the physical volume of data is minimized for cost efficiency, whilst ensuring that data can be read and uploaded, should it be required. The impact of this is well illustrated below: even a tape from the '90s wilts when compared to modern media – 1 modern tape can replace 12,500 tapes from 1991 and note the huge increase in data read speeds.

| Tape type | Introduced | Capacity | Ratio | Drive to Read | Max Read Speed | Read 1 tape | Read 10 TB |
|---|---|---|---|---|---|---|---|
| 3592 JD | 2014 | 10 TB | 1 | TS1150 | 360 MB/sec | 7.5 hrs | 7.5 hrs |
| 3592 JC | 2011 | 4 TB | 2.5 | TS1140/50 | 250 MB/sec | 4.4 hrs | 11 hrs |
| 3592 JB | 2008 | 1 TB | 10 | TS1120/30/40 | 160 MB/sec | 1.7 hrs | 17 hrs |
| 3592 JA | 2003 | 500 GB | 20 | TS1120 | 100 MB/sec | 1.4 hrs | 28 hrs |
| 3592 JA | 2003 | 300 GB | 33 | 3592 J1A | 40 MB/sec | 2.1 hrs | 3 days |
| 3590 H | 2002 | 30 GB | 333 | 3590 H11 | 14 MB/sec | 36 min | 9 days |
| 3590 E | 1999 | 20 GB | 500 | 3590 E11/H11 | 14 MB/sec | 24 min | 9 days |
| 3590 B | 1995 | 10 GB | 1000 | 3590 B11/E11/H11 | 09 MB/sec | 18 min | 13 days |
| 3490 E | 1991 | 800 MB | 12500 | 3490E | 03 MB/sec | 4 min | 35 days |
| 3480 | 1984 | 200 MB | 50000 | 3480/3490E | 03 MB/sec | 1 min | 35 days |
| 9 Track | 1964 | 120 MB | 83333 | 9 Track | 1.25 MB/sec | 1.5 min | 87 days |

## Summary

| The pros and cons of storing data on physical media | | |
|---|---|---|
| | **Advantage** | **Disadvantage** |
| Physical storage | You keep a physical asset | Data access / sharing can be limited |
| | You have direct control of your data | Data can be slow to access (high latency) |
| | You are fully responsible for your data security | You require a disaster recovery provision |
| | Operational data management is simple | Periodic archive transcription is advisable |
| | Costs are easy to predict and manage | You will require a data centre hardware |
| | | Unit storage costs are likely to increase with time |
| | | There's a technological risk of being left behind |
| | | Data must be copied to share with customers |
| | | Tape media will degrade / become obsolete |

## Conclusion

Choosing to store seismic data on magnetic tape media offers several benefits: most significantly that of maintaining a physical asset, simply and reliably with good visibility on cost, while retaining control of data security. But magnetic tape media does have drawbacks, particularly with the physical risks of storage, IT system limitations and around data access and sharing.
It is important to stress that the choice to retain seismic data on magnetic tape media should be an active decision, rather than a default choice. Good data management is required to ensure that the seismic data are systematically transcribed periodically to prevent media degradation and to maintain storage cost control. It is recommended that vintage seismic data undergo thorough QC and verification ahead of transcription onto modern media, so that the data is compliant, ready for use, and duplications are removed.

In the end, storage choices hinge so much on what the data is going to be used for. With so much accumulated experience in the data sector over the last 30 years, Moveout Data can offer you a consultation and data audit service, after which our specialists can advise upon the best course of action to manage your data and guarantee its security and usability most effectively. Ultimately, a service like ours can put you back in charge of your survey data and make it work better for you.

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## About Moveout Data

**Moveout is a specialist in the management of geoscience data, with a mission to enable our customers to fully realise the value of their information asset by delivering optimised, application-ready data, whenever and wherever they need it. Moveout was appointed by the Oil & Gas Authority in 2020 to support the development of the new National Data Repository.**

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