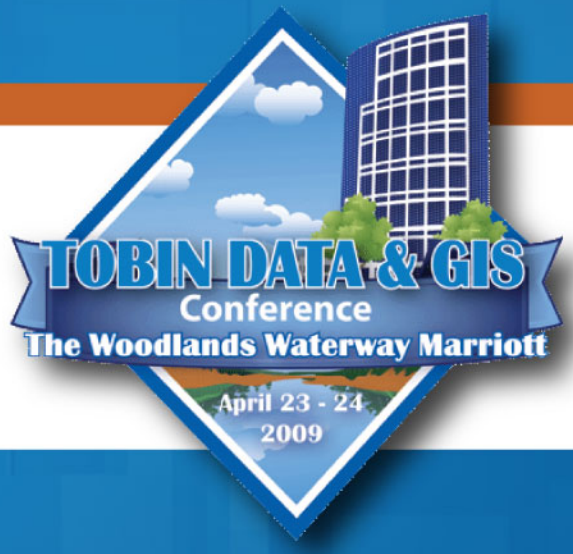
The API Number and its use 2009 and beyond

Concepts, pitfalls and solutions



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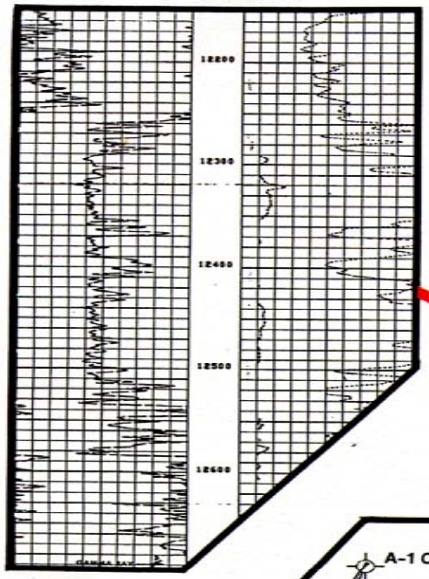
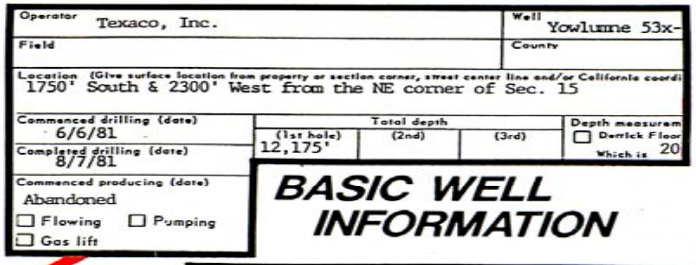
Where are we now? :Current industry state of well data integration in the U.S.

All operators experience negative impact, whether they recognize it or not, with the current industry state of our available well headers.

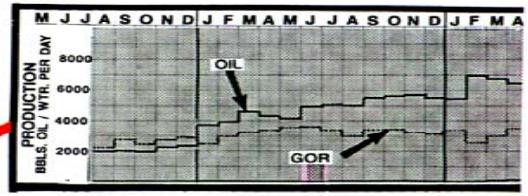
- The majority of companies use and rely in the API number as the prime integration vehicle
- Data integration is far from perfect
  - what each operator would like, or need
- It is not completely broken or unusable

WHAT IS THE RELEVANCE OF THE API NUMBER?





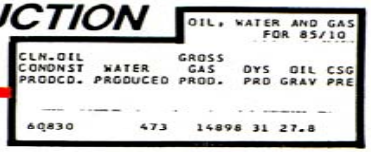
BASIC WELL INFORMATION



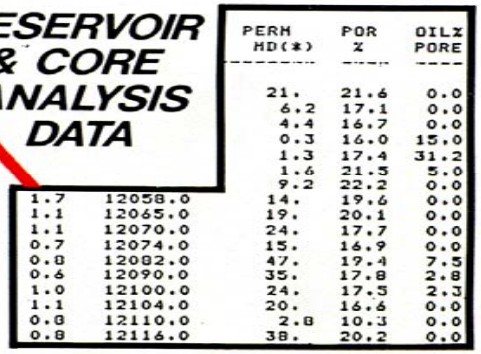
In the U.S., the API Number is a (the) unique reference number (UWI) for identifying wells.

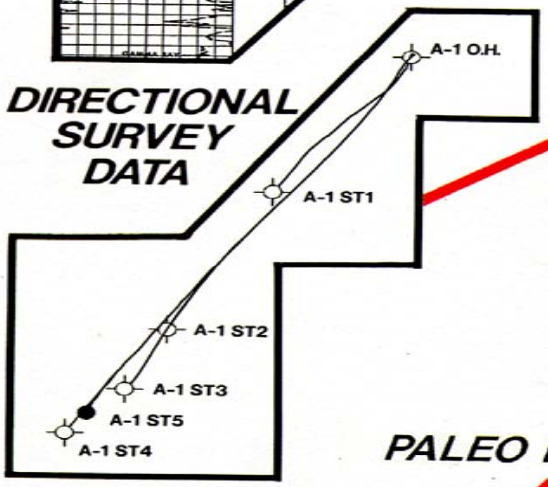
It is used to link /integrate all forms of well data from vendors, government agencies and other operators

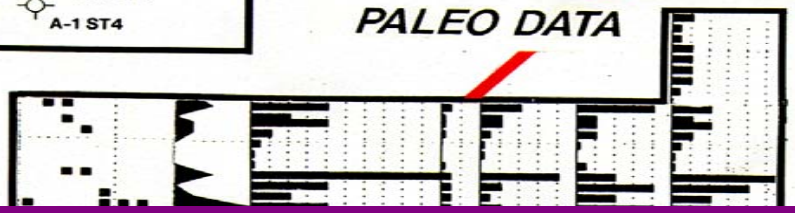
PRODUCTION DATA



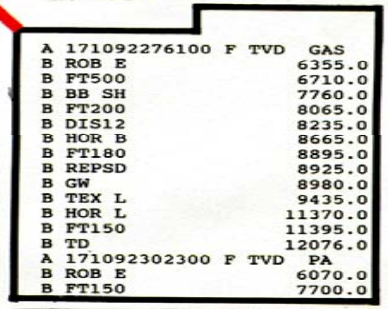
RESERVOIR & CORE ANALYSIS DATA







TOPS & FAULT CUT DATA



Inconsistent usage of the API number between different sources will cause data integration errors

The API Number as a link to other data

Two examples of other reference numbers and (how easy it is) to attach incorrect attributes to the reference number

Social Security numbers
Bank Account numbers

The API Number-A bit of history

1) Originally conceived in 1962(API Comm. Well Data Retrieval)
2) About 7 years after Petroleum Information started collecting
   Well information.
3) API standard first published 1966
4) Publication called the D12A in 1968 (added state/cty codes)
5) Revised in 1970, 1974 (added offshore st/co codes)
   and most recently in 1979 (more offshore areas)
6) 29 years and no further published updates. An unpublished update exists from about 1995. Nothing in the current edition covers horizontal drilling concepts.

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The API Number- Rest of the story

1) Originally conceived in 1962(API Comm. Well Data Retrieval)
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5) Revised in 1970, 1974 (added offshore st/co codes) and most recently in 1979 (more offshore areas)
6) 29 years and no further published updates. An unpublished update exists from about 1995. Nothing in the current edition covers horizontal drilling concepts.
7) API does not want to continue support of API standard and it looking for suggestions as to a subsequent sponsor

The API Number continues to be a vital number to the O&G industry – currently in need of a champion for support.

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Discussion Subjects

Part 1) API Basic Concepts (then and now)

Part 2) Differences in API number assignments (between different sources) and the Data Integration Problems that result

Part 3) Improving Data Integration Success – Solutions, Ideas and Suggestions.

The API Number

- Part 1) API Basic Concepts, and Practices

The API Number-Fundamental Concepts

Its Purpose

"A need common of these organizations is a simple, consistent methods for identifying all wells – an identity that will not change through time and an identity that will not change with various well operations"
(Page 5)

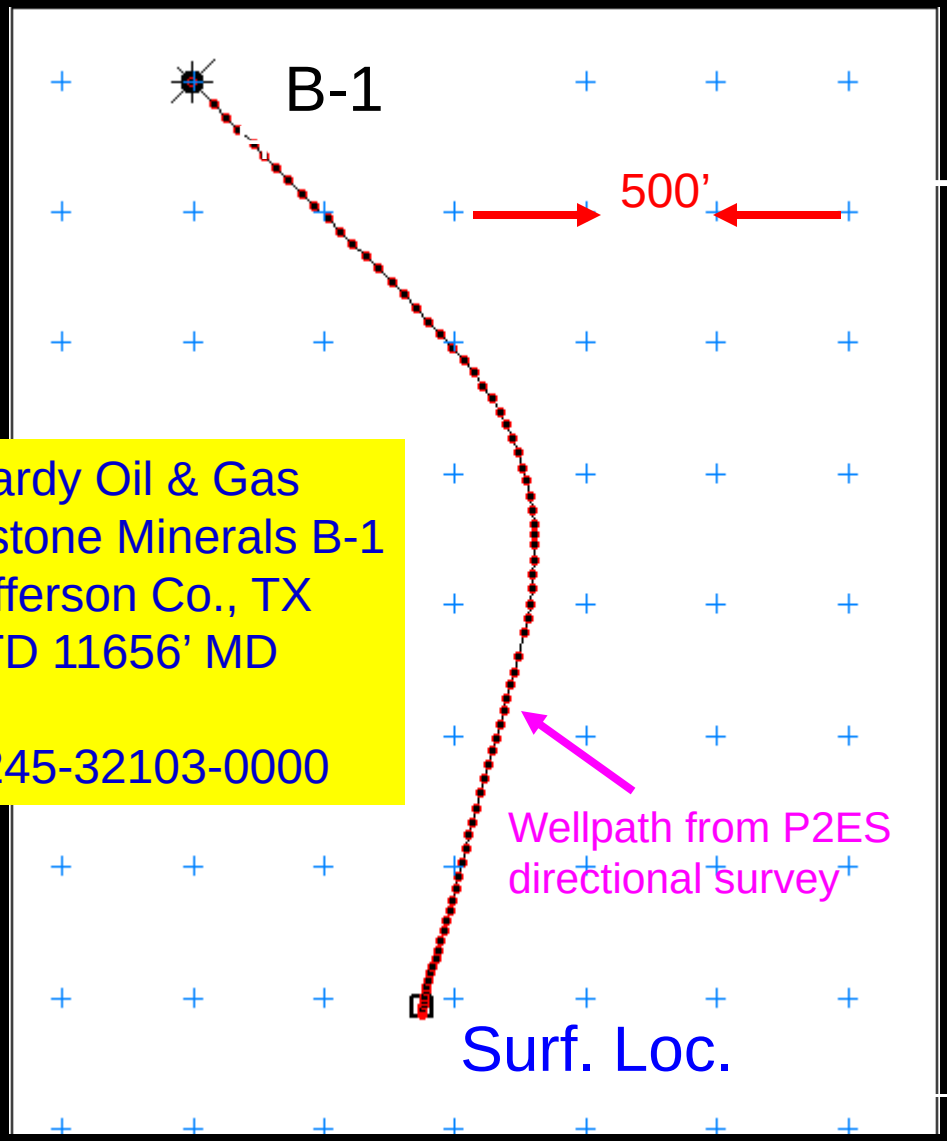
The API Number-Fundamental Concepts

Its Purpose

"It is imperative that *each* well (i.e. hole-in-the-ground) be uniquely identified in order for computer oriented data to be most useful to industry, government and educational institutions" (Page 6, PP1)

Had the first underlined word (each well, i.e. hole-in-the-ground) been implemented, a significant part of our API problems would have been overcome

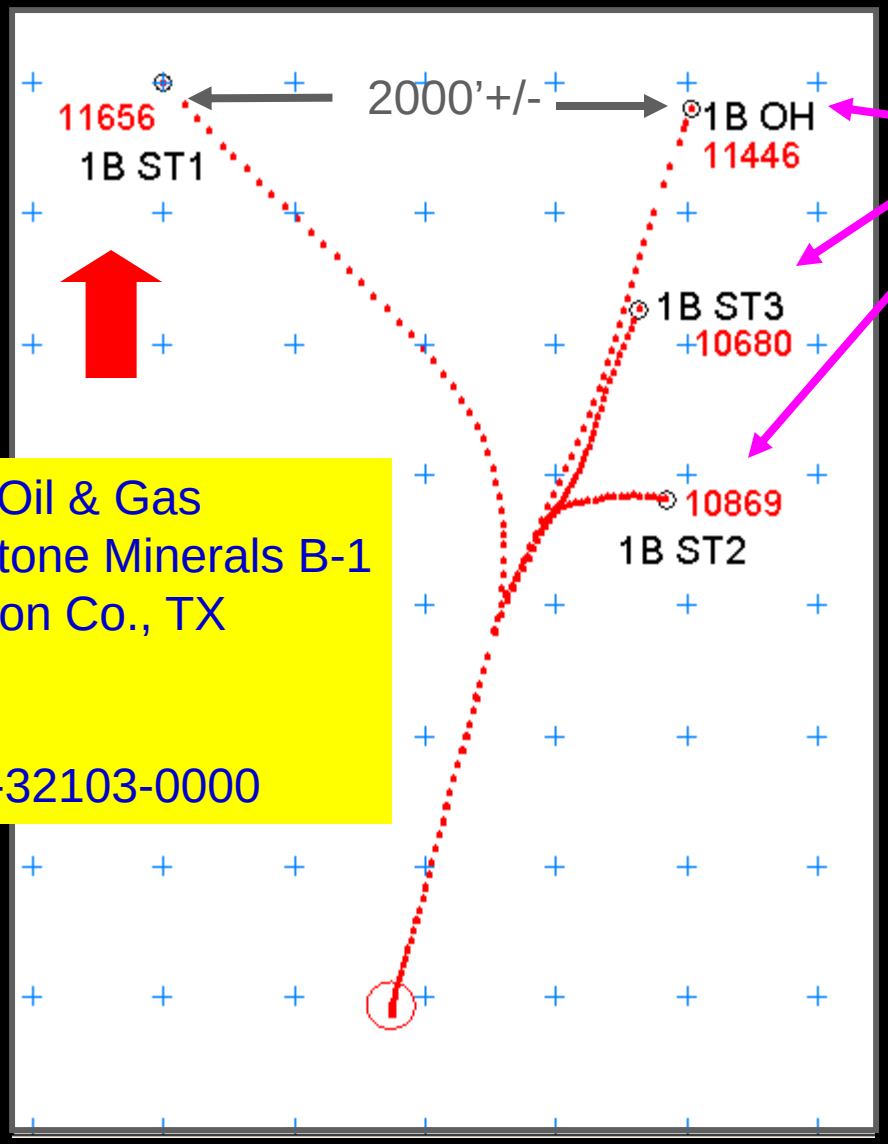
Let's diverge for a moment to consider 'What is a well?' and what " each well (hole-in-the-ground)" should mean



If a well is a defined as 'hole-in-the-ground' (and that implies we need to know the well's total depth),

This should qualify as a well.

“D12A---It is imperative that *each* well (i.e. hole-in-the-ground) be uniquely identified… this well is actually composed of 4 ‘H-I-T-G’



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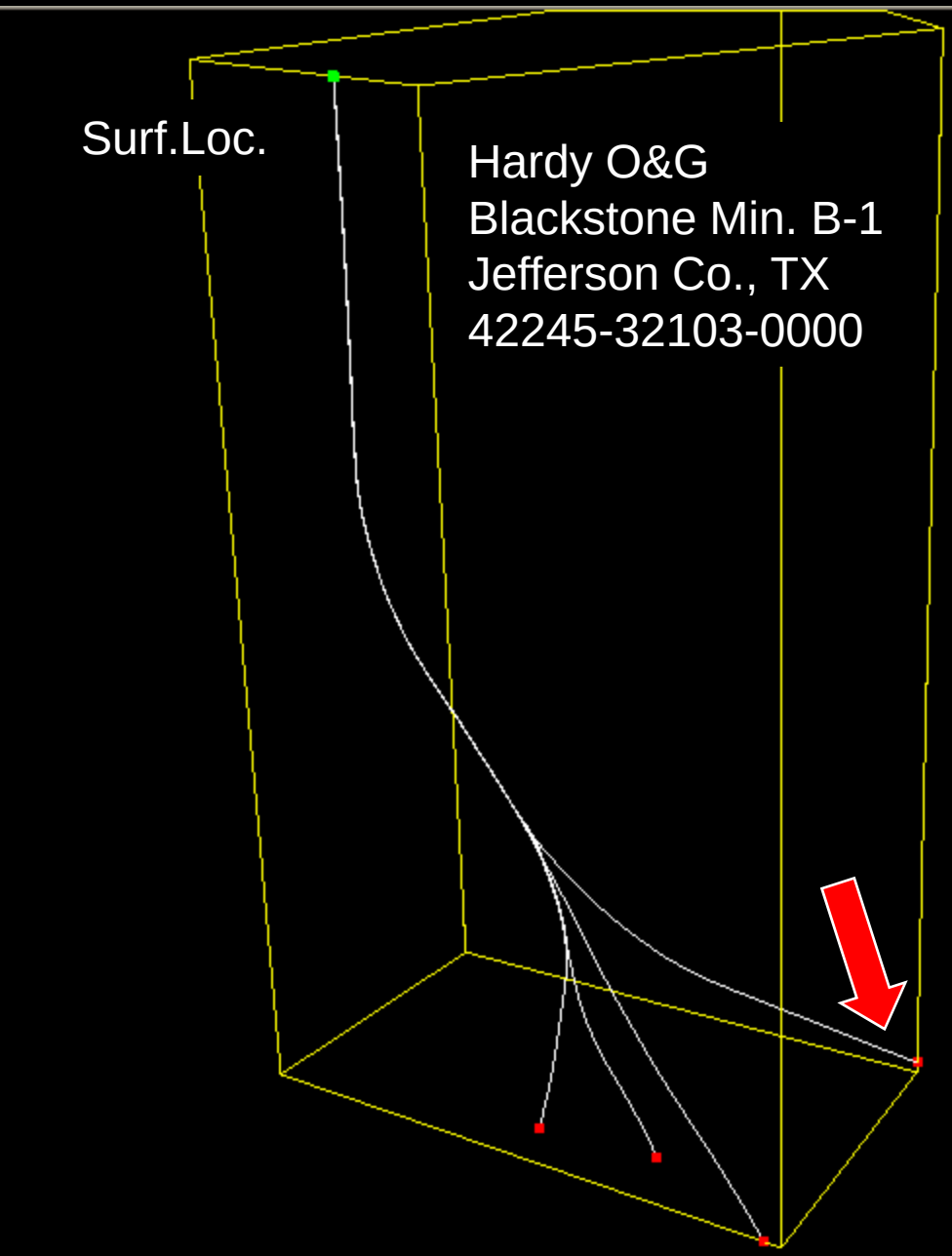
Blackstone Minerals B-1
Jefferson Co., TX

42245-32103-0000

Why then were the right 3 wellpaths representing ‘holes-in-the-ground’ ignored as wells/wellbores? (only the left wellpath received a unique API number)

(Part of this answer has to do with historic collection practices)

Are there any valid reasons not to capture ‘each’ and all these wellbores? Can anyone imagine an interpreter saying they don’t want to see info on these wells/wellbores



Today's various G&G applications work better when all wellbores are recognized.

Fundamental to maximizing the use of their various applications is the ease & ability to associate just the data that applies to each, individual wellbore.

The API Number-Fundamental Concepts

Its Purpose

"… each well (i.e. hole-in-the-ground) be uniquely identified …

…its sole purpose is to uniquely identify the

In every area we work we observe that 15-20% of the drilled wellbores were never uniquely recognized with API_12 numbers.

This is one of the significant problems to successful data integration with the API number –missing wellbores make it very difficult.(there are solutions)

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API Number Structure

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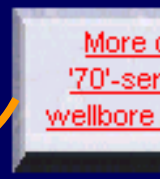
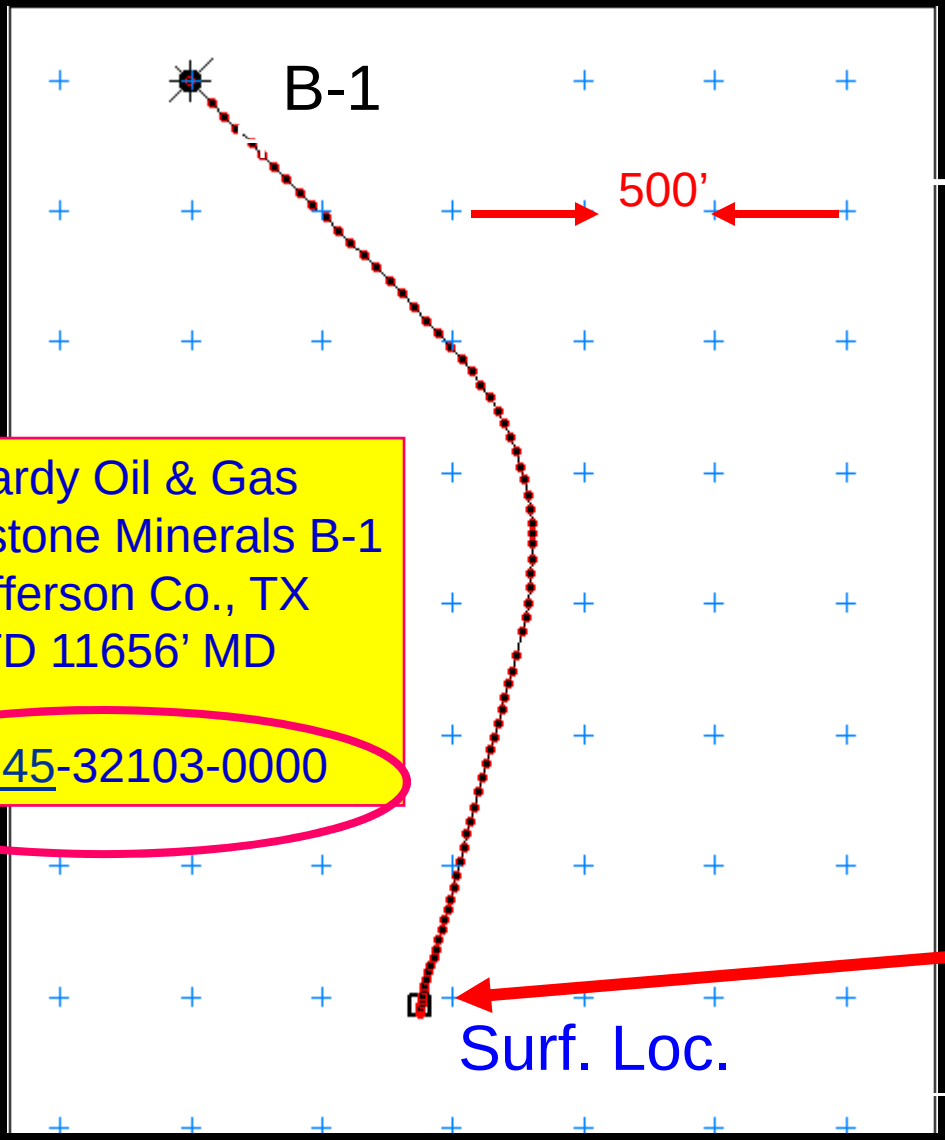
The API Number Structure

The API Number is a unique control number that represents each well /wellbore from the surface to total depth

API Well Number guide				
Original or 'Parent' well			Wellbore	Opr Seq
State Code	County Code	Unique Well Code	Wellbore Code	Seq. Code
42	245	32103	00	00
Recommended 12 character usage				Optional
2 Char.	3 Char.	5 Characters	2 Char.	2 Char.



How does the API number uniquely identify
" each well (hole-in-the-ground") API Parts 1 and 2



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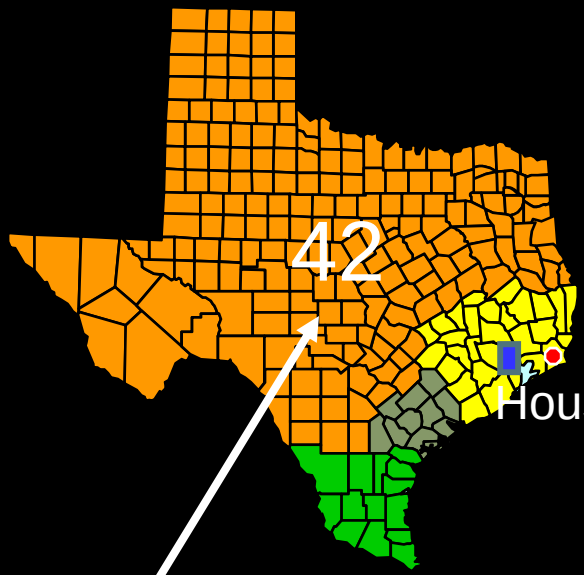
TD 11656' MD

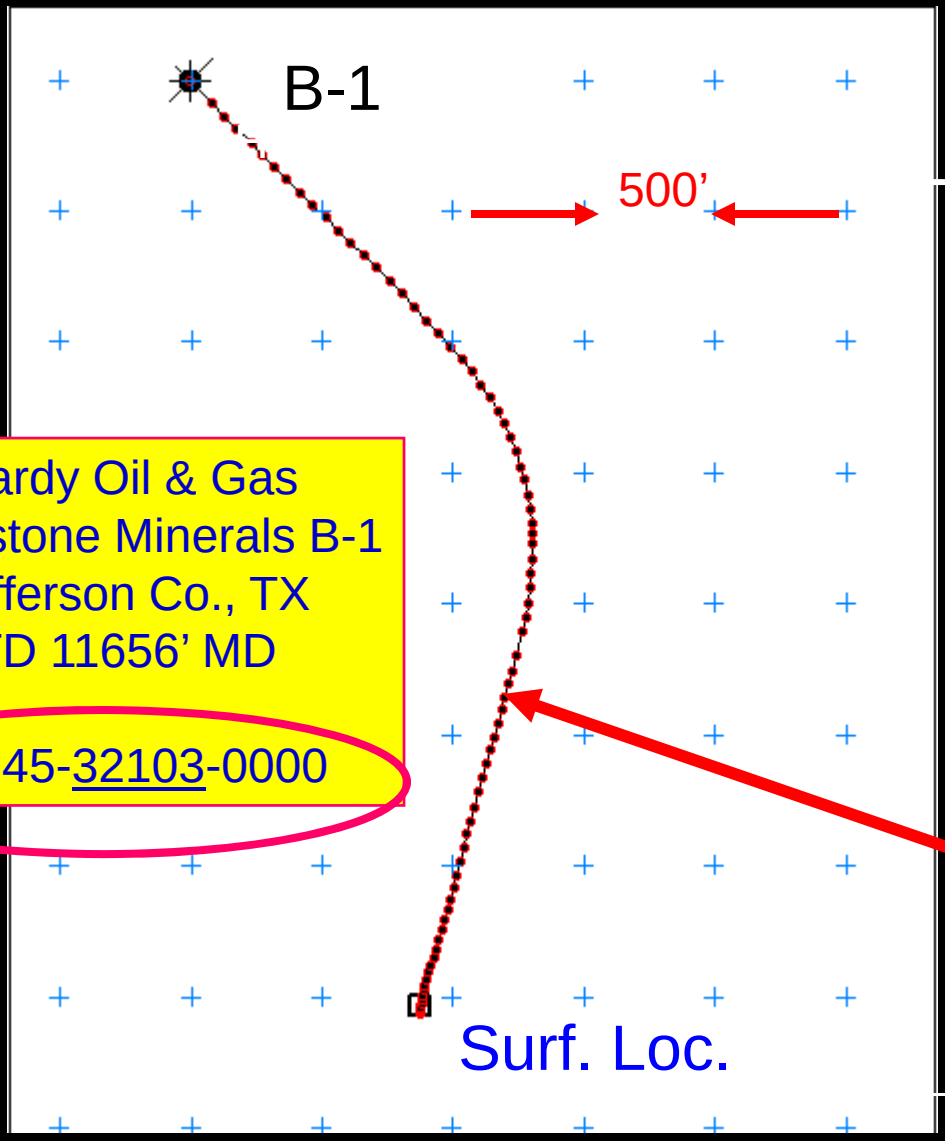
42245-32103-0000



1) State Code = 42
2) County Code=245

The state/county code is for the surface location

How does the API number uniquely identify " ' each' well (hole-in-the-ground") -- API Part 3



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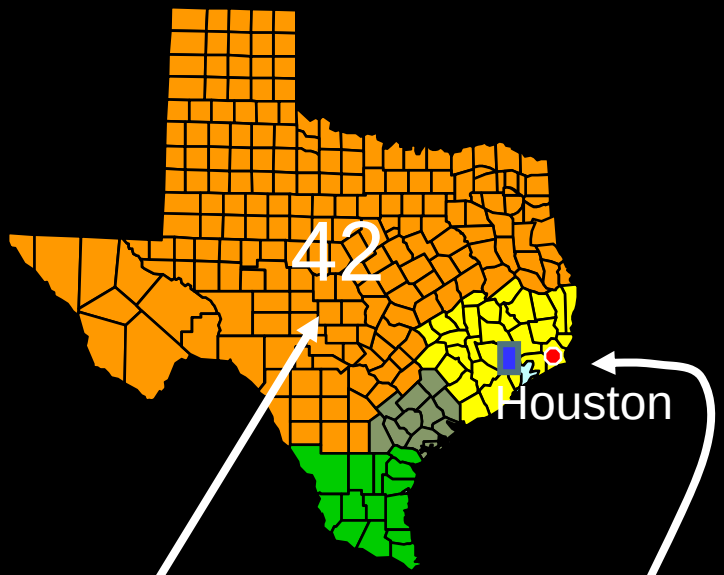
Jefferson Co., TX
TD 11656' MD

42245-32103-0000



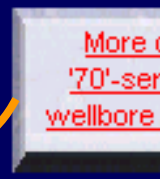
1) State Code = 42
2) County Code=245
3) Unique code=32103

The unique code is a unique reference code within the respective county

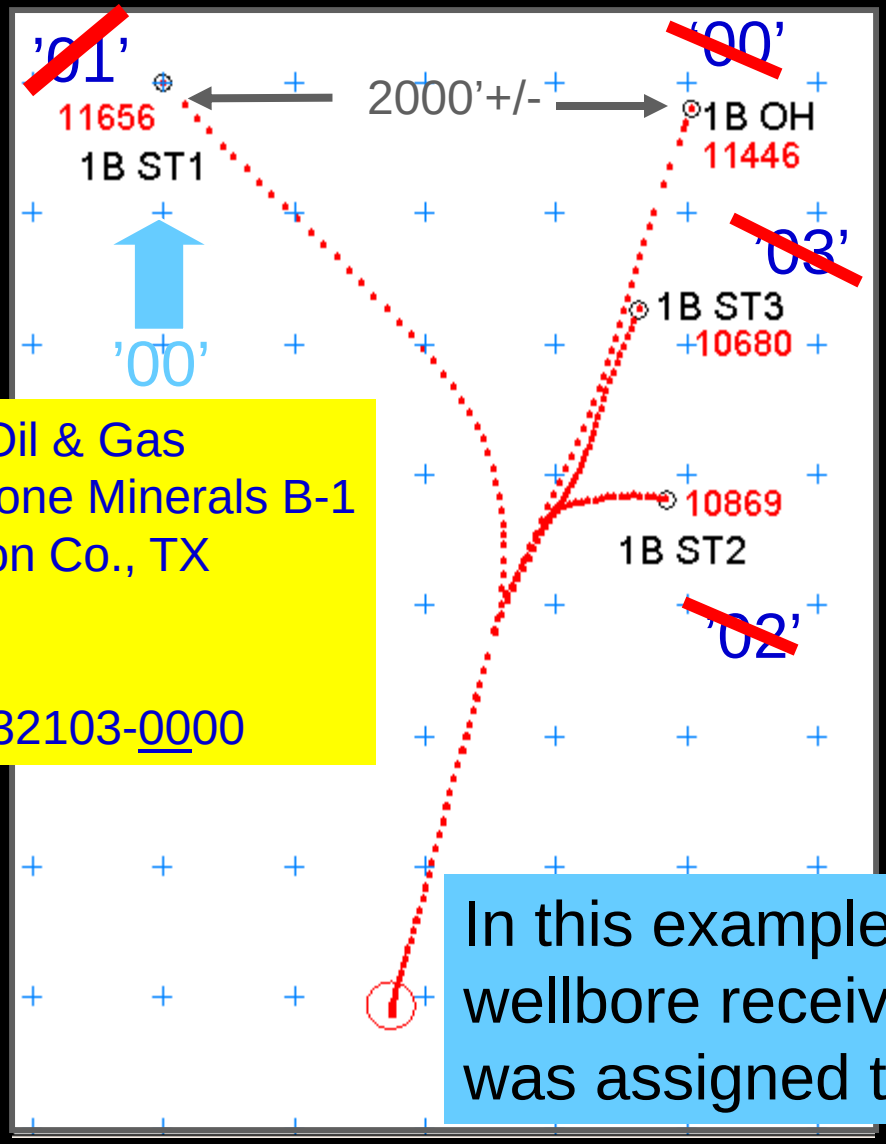
The API Number Structure

The Wellbore or Sidetrack code uniquely identifies the 'children' wellbore of the API_10

API Well Number guide				
Original or 'Parent' well			Wellbore	Opr Seq
State Code	County Code	Unique Well Code	Wellbore Code	Seq. Code
42	245	32103	00	00
Recommended 12 character usage				Optional
2 Char.	3 Char.	5 Characters	2 Char.	2 Char.



How does the API number uniquely identify " ‘ each’ well (hole-in-the-ground”) -- API Part 4-ST/WB Code



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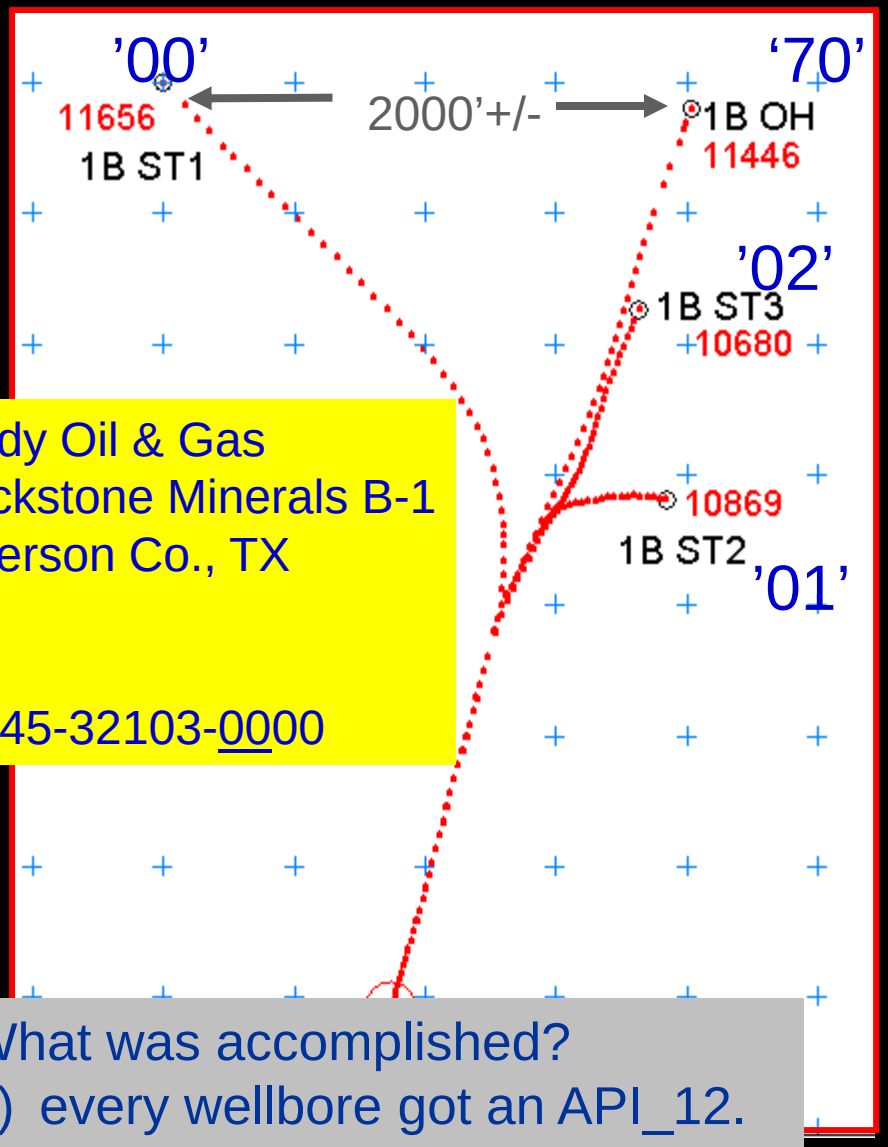
42245-32103-0000

In a perfect world,
API part 4 (char 11-12)
would/could have been
numbered like this:

OH 00
ST1 01
ST2 02
ST3 03

In this example only the deepest wellbore received an API_12 - the ’00’ was assigned to the 11656’ TD wellbore

How does the API number uniquely identify
" ' each' well (hole-in-the-ground") -- API Part 4-ST/WB Code



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Jefferson Co., TX

42245-32103-0000

What was accomplished?
1) every wellbore got an API_12.
2) The initial '00' was not changed

This wasn't a perfect world, and only 1 wellbore received an API_12 with char 11-12 assigned the '00'

Using some numbering options, we (later) filled out the ST/WB codes for each wellbore as:

OH 70
ST1 00 WB init. assigned
ST2 01 Could have been 71
ST3 02 Could have been 72

Key API concepts to wellbore uniqueness

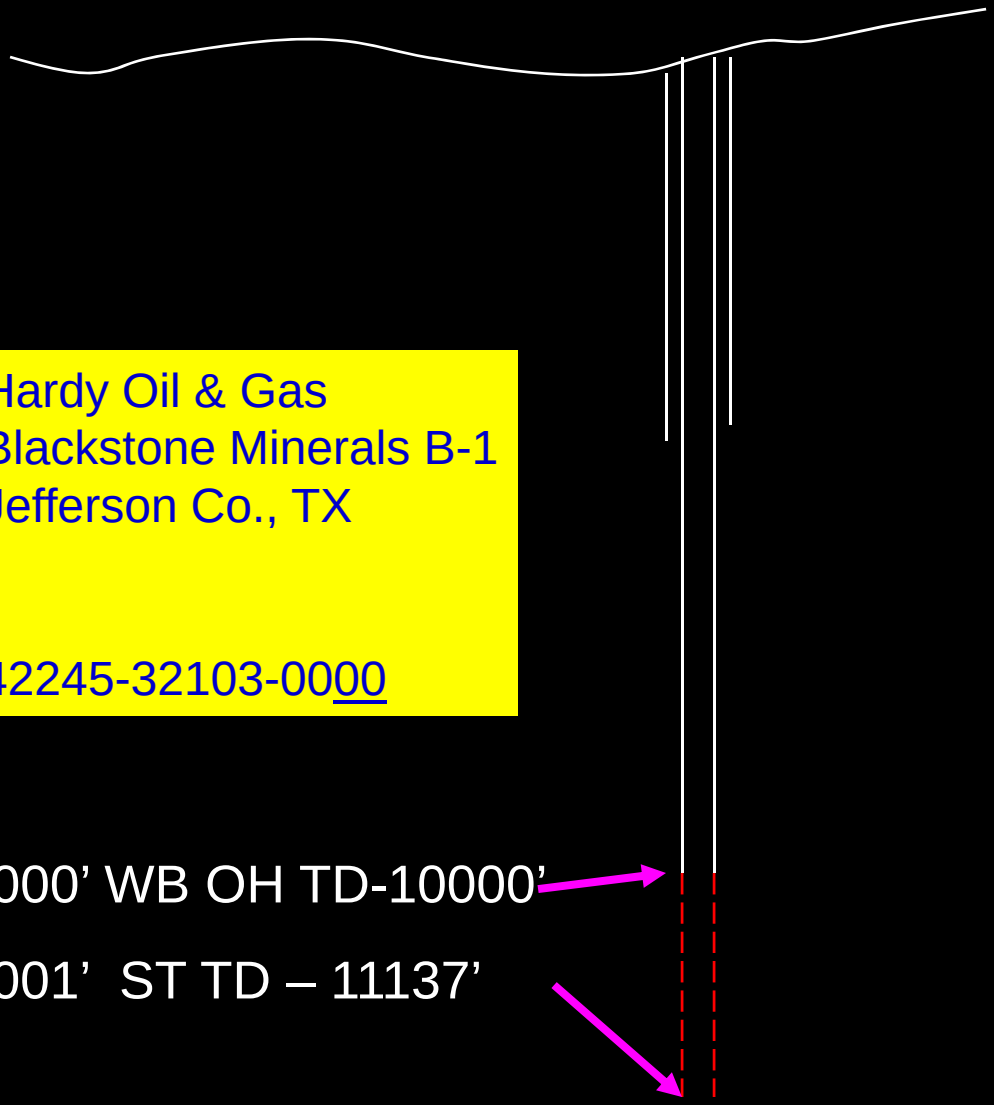
- 10 character API # - Provides uniqueness to the 'Parent' - well level if only 1 wellbore exists

- 12 character API # - Can uniquely describe each and all wellbores of a well.

- 14 character API # - Discriminates well activities within a specific wellbore

An API number of a minimum 12 characters should always be used to provide wellbore uniqueness

A word on API_14 usage – Not a formal part of the API Number, but used by part of the industry with characters 13-14 to uniquely describe operational sequences within a specific wellbore

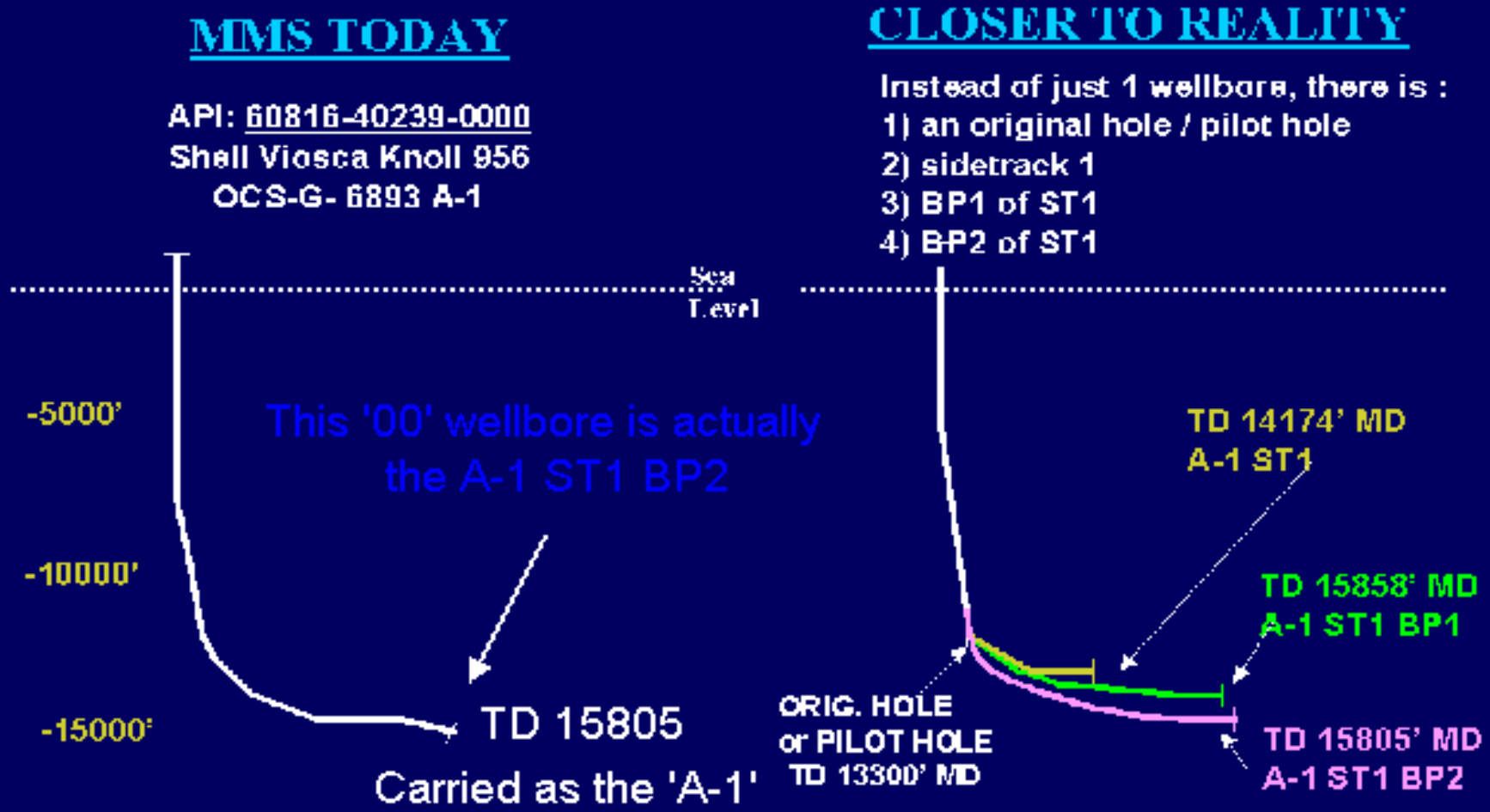


Characters 13-14 should not be used to uniquely identify a wellbore.

Where characters 13-14 are used to reference well deepenings, problems are created in the collapsing of API_14 to API_12 format – i.e. 2 well TDs exist requiring a slightly different enhanced data model to accommodate both, or just a loss of data.

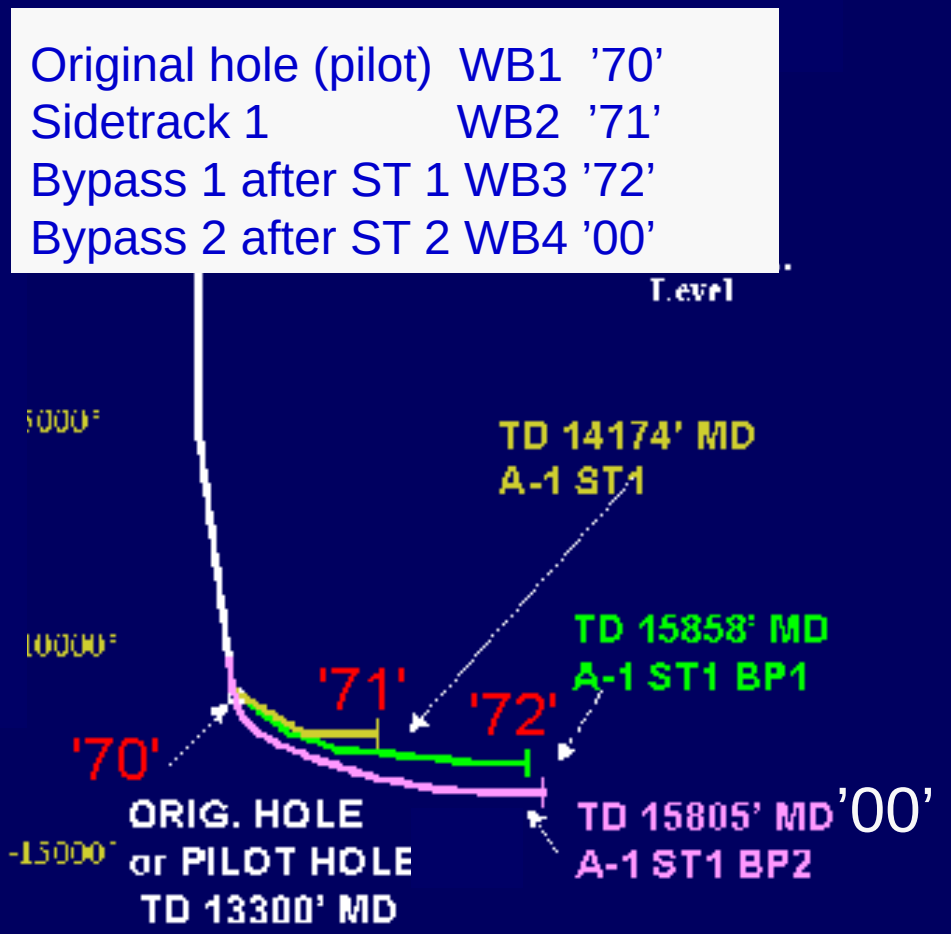
Using the 70-series in the wellbore code

Accounting for every wellbore is a necessity for complete and accurate data integration



why not just re-number all the wellbores?

1) Clients already using the ’00’ – it has been loaded to all sorts of interpretation projects
2) Other forms of data has already been stored and/or linked to this ’00’ in client DBs.
3) Changing all of client DBs not a simple trickle down UWI change for most.
4) If the ’00’ had production associated with it – that API number is generally ‘sacred’ – can’t change.



The best rule seems to be live with the existing assigned ST/WB codes (char 11-12) and number around them

Finally --The API Number-an initial plan

Its Planned Purpose and where the plan headed South

"The cooperative well data systems have agreed to make the numbers on historical wells available to state and federal regulatory agencies and to the industry."
(Page 6, PP3)

Had this truly happened, we would not have the data integration problems that we see today. There is a solution we will review later…

Geoscientists & engineers unknowingly gamble on a routine basis

Everytime:

1) they assume the datasets being used, like velocity, paleo, logs, reservoir /core analyses, production and test information, etc. have been digitally integrated to the correct well / wellbore

Pt 2) Differences in API number Assignments (between different sources) and the Data Integration problems that result

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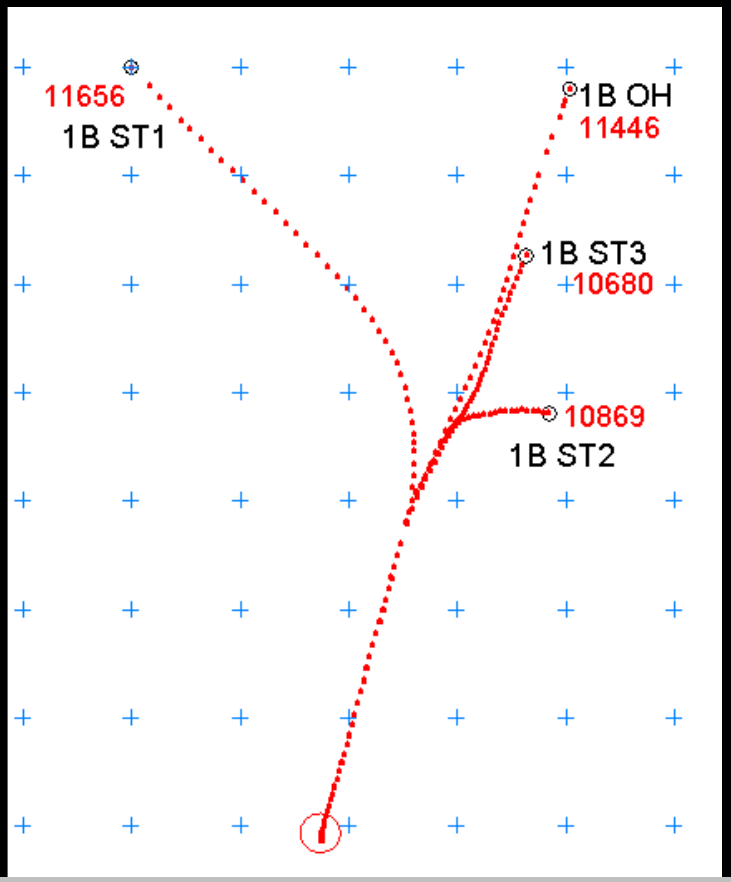
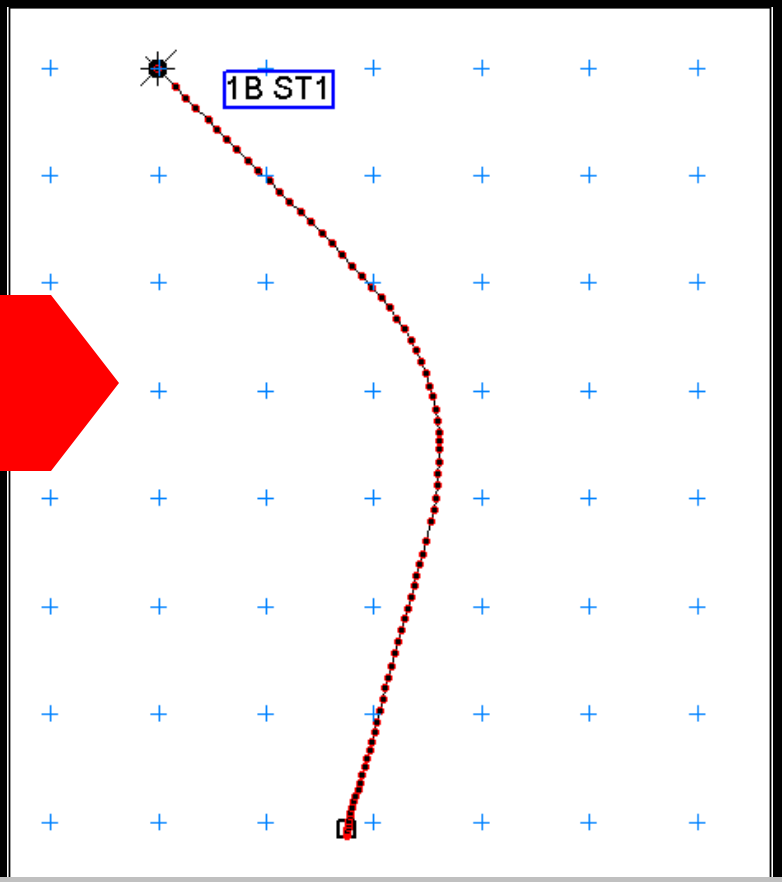
What happens when we integrate data from 4 different wellbores to a DB with only 1 ?





Data either gets 'lumped' or 'lost (rejected). Where lumped, think of the interpretation confusion but we can now do it at lightspeed with our applications

The basic data integrations problems using API numbers

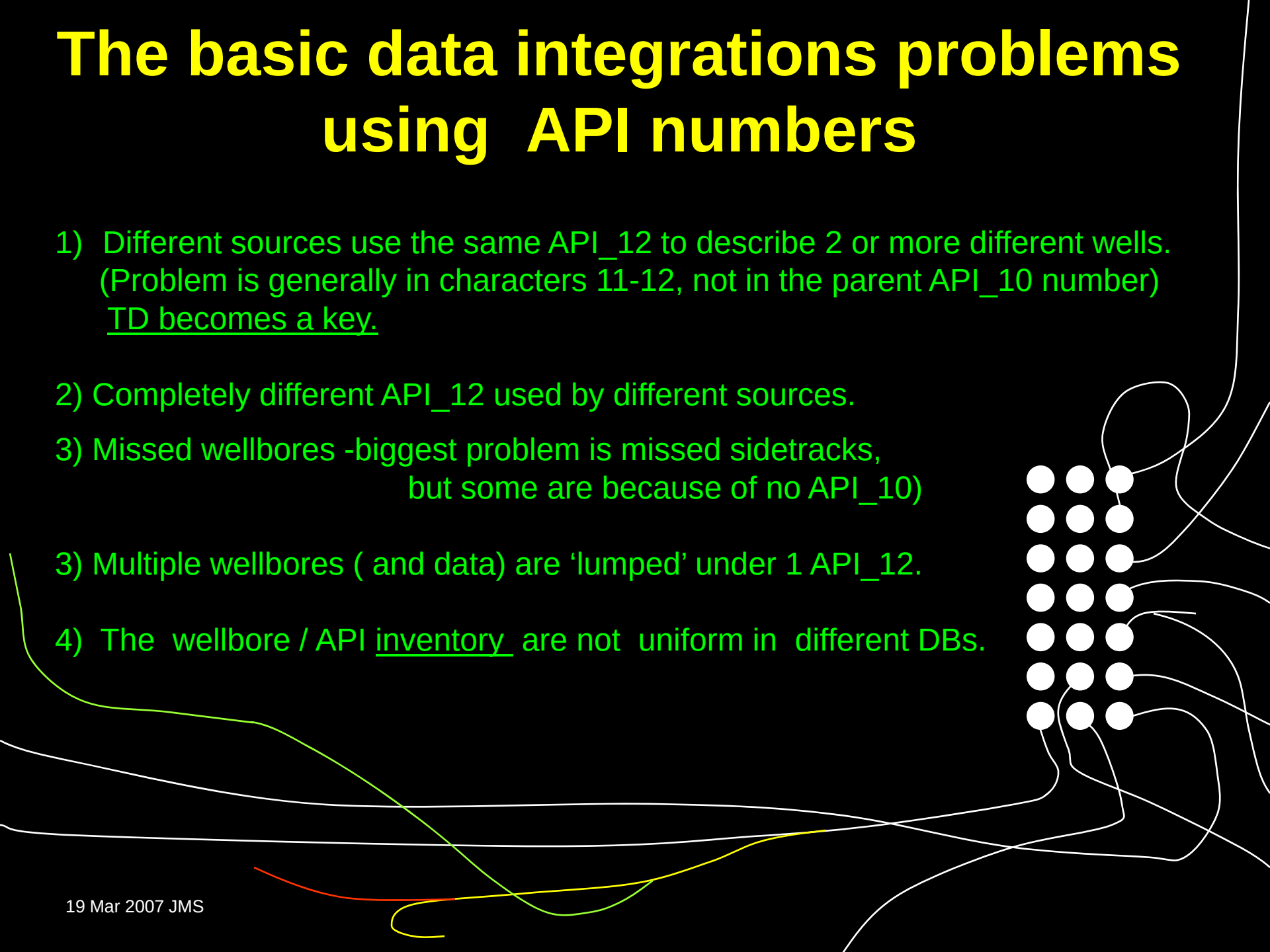
1) Different sources use the same API_12 to describe 2 or more different wells. (Problem is generally in characters 11-12, not in the parent API_10 number) TD becomes a key.

2) Completely different API_12 used by different sources.

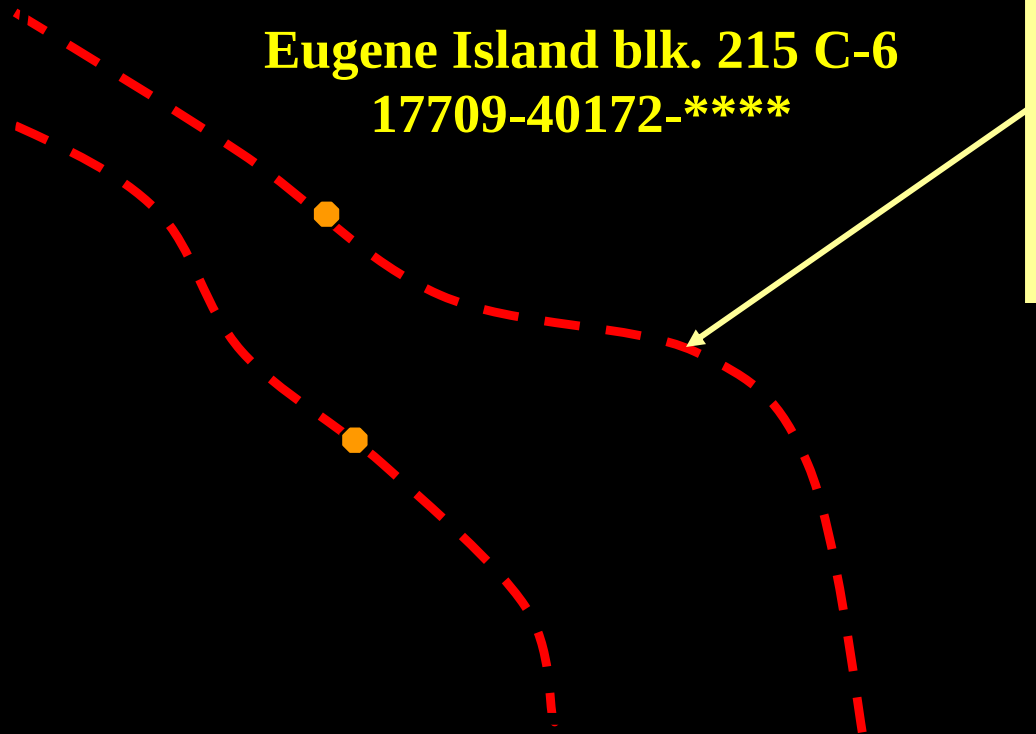
3) Missed wellbores -biggest problem is missed sidetracks, but some are because of no API_10)

3) Multiple wellbores (and data) are 'lumped' under 1 API_12.

4) The wellbore / API inventory are not uniform in different DBs.



All wellbores are not recognized with an API (‘Missed wellbores’)



The red dashed wellbores did not historically receive API number assignments

from the MMS.

’00’
OH
(WB1)
TD 12253

’01’

ST1
(WB2)
TD
10858

’02’

ST2
(WB3)
TD
11158

ST3
(WB4)
TD 9703

’73’
MMS

’03’

ST3BP1
(WB5)
TD 10824

’74’
MMS

ST4
(WB6)
TD
11976

’04’

ST4BP1
(WB7)
TD 11606

How can you integrate logs, paleo, etc. to a wellbore that doesn’t have a UWI or any header data?

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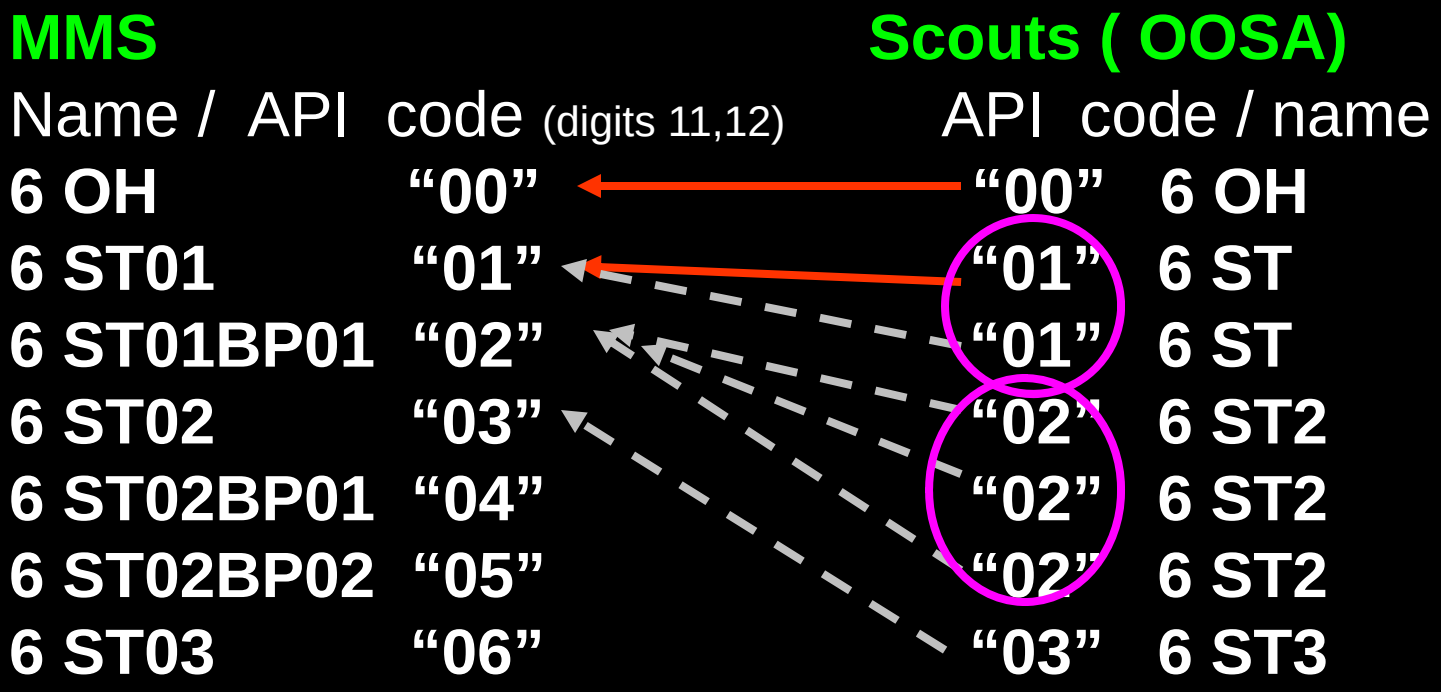
Data Integration By Pure API_12 Linking
(Any differences cause integration problems)

API 60817-40878- (Year 2000 example)



(equivalent wellbores are opposite each other)

Slide info provided by Faye Schubert / Shell orig. to MMS DMWG

Scouts and MMS each recognize 7 wellbores , but the API numbers assigned are quite different

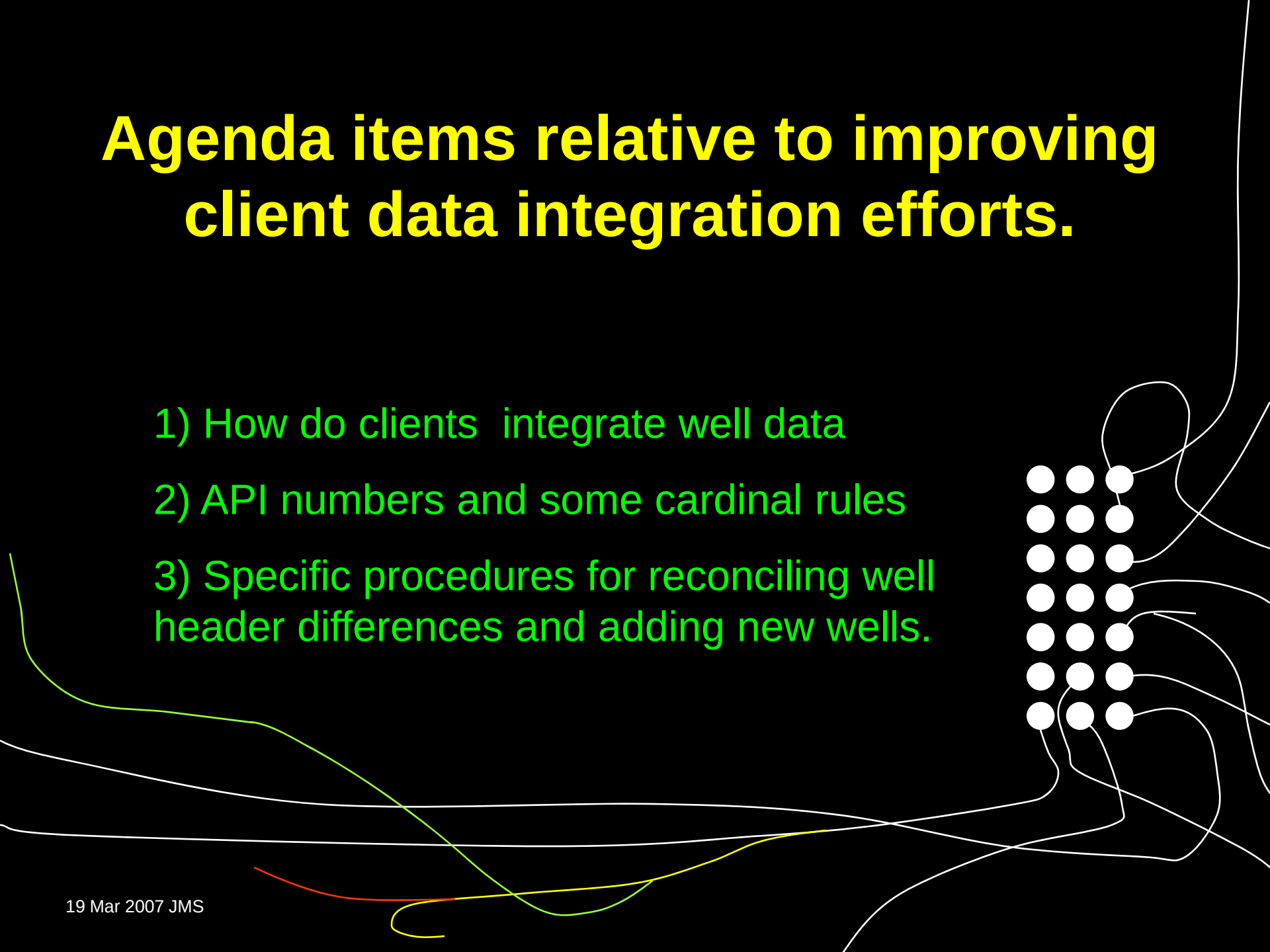
As a result 6 of the 7 wellbores would integrate incorrectly to the Shell / MMS headers

Agenda items relative to improving client data integration efforts.

1) How do clients integrate well data

2) API numbers and some cardinal rules

3) Specific procedures for reconciling well header differences and adding new wells.



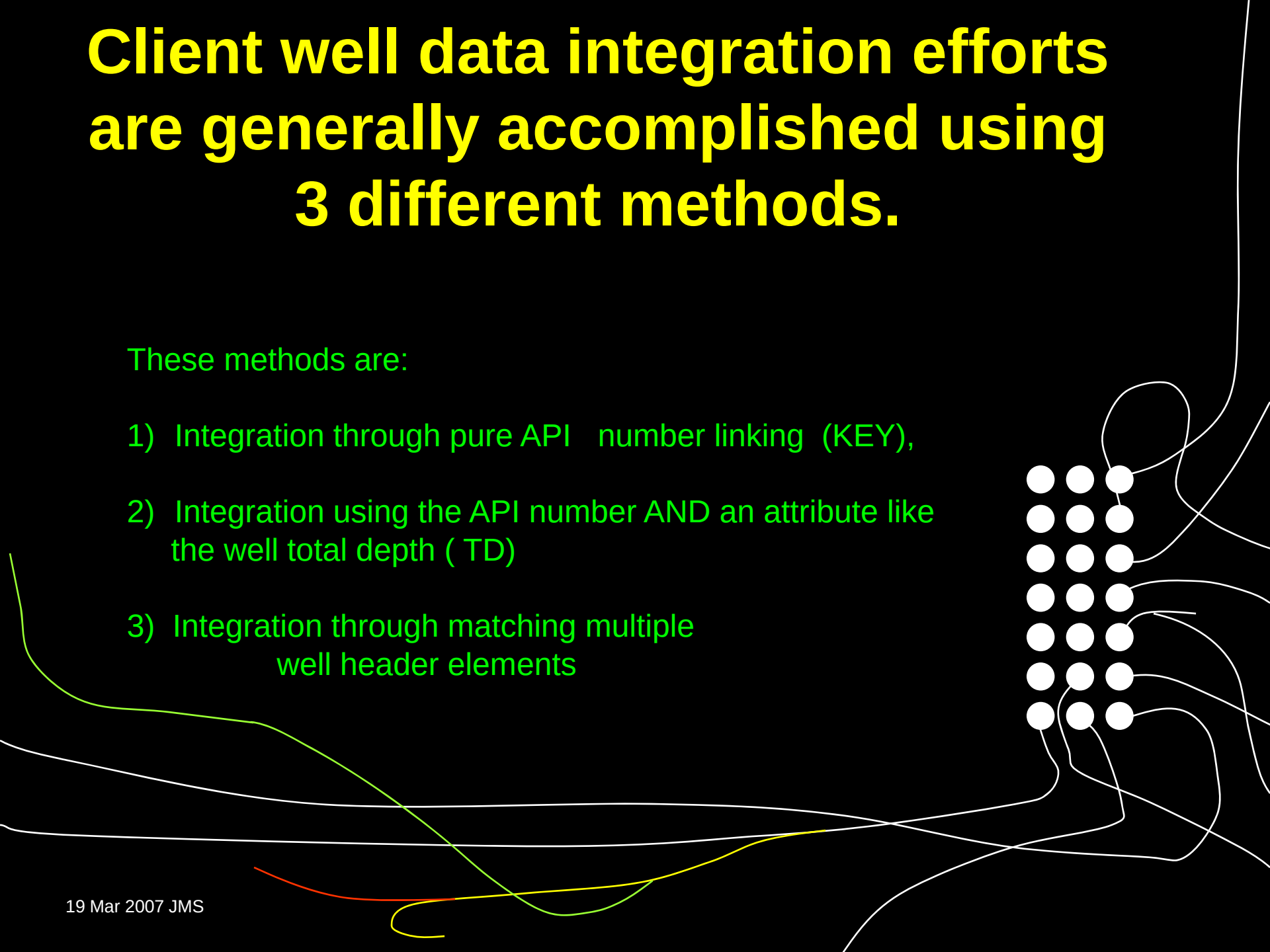
Client well data integration efforts are generally accomplished using 3 different methods.

These methods are:

1) Integration through pure API number linking (KEY),

2) Integration using the API number AND an attribute like the well total depth (TD)

3) Integration through matching multiple well header elements



Integration through header data

Integration pitfalls through matching well header elements

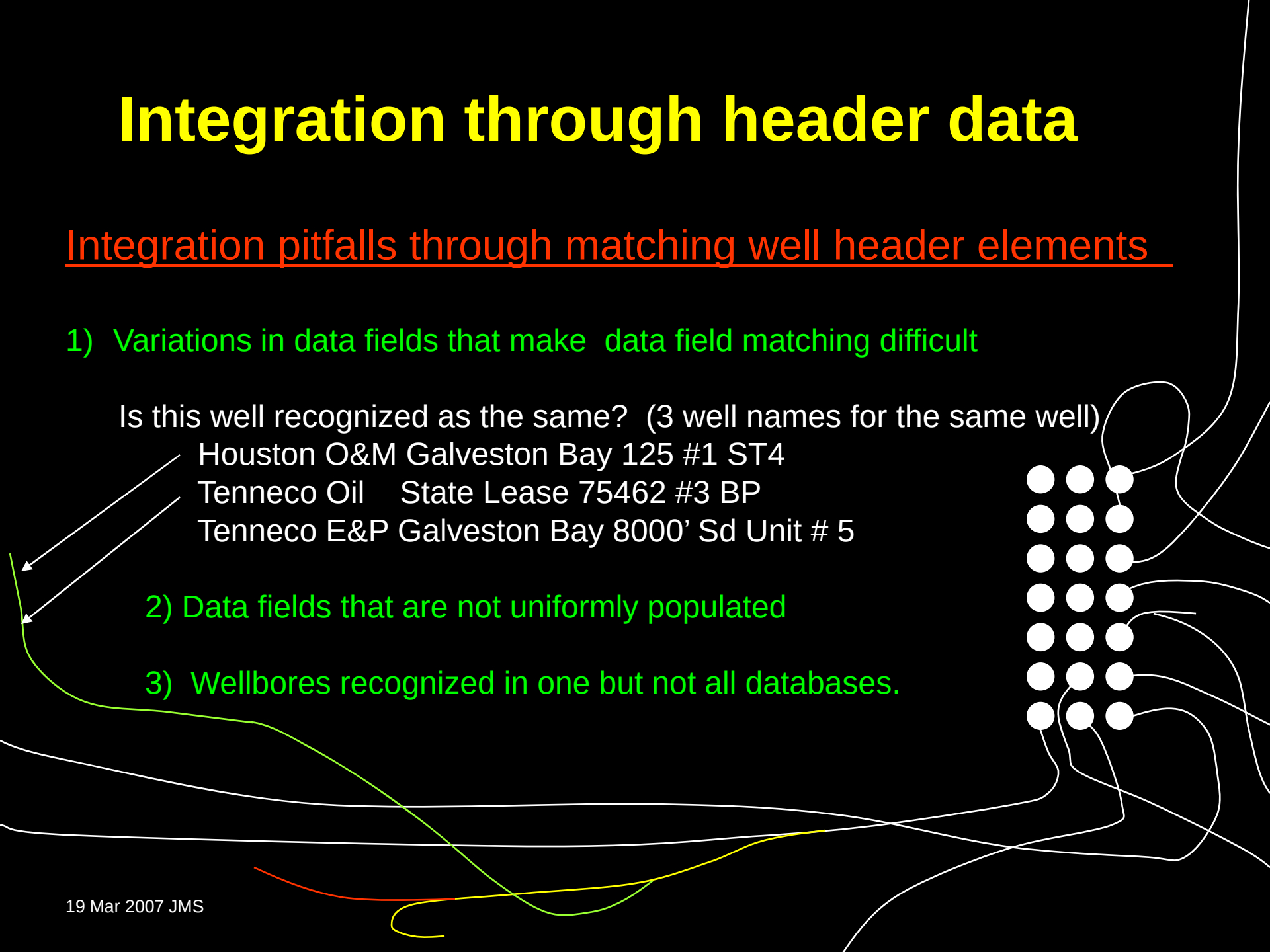
1) Variations in data fields that make data field matching difficult

Is this well recognized as the same? (3 well names for the same well)

Houston O&M Galveston Bay 125 #1 ST4
Tenneco Oil State Lease 75462 #3 BP
Tenneco E&P Galveston Bay 8000' Sd Unit # 5

2) Data fields that are not uniformly populated

3) Wellbores recognized in one but not all databases.



Data integration via the API is the most commonly used method

Data integration via API numbers
is easiest IF the industry well headers
are in ‘sync’ on API_12s.

Statement of current API consistency between all industry vendors

1) No definitive, easily accessible source is available

2) Clients/operators may chose to use a ‘free’ API source even though data vendor sources are out of sync.

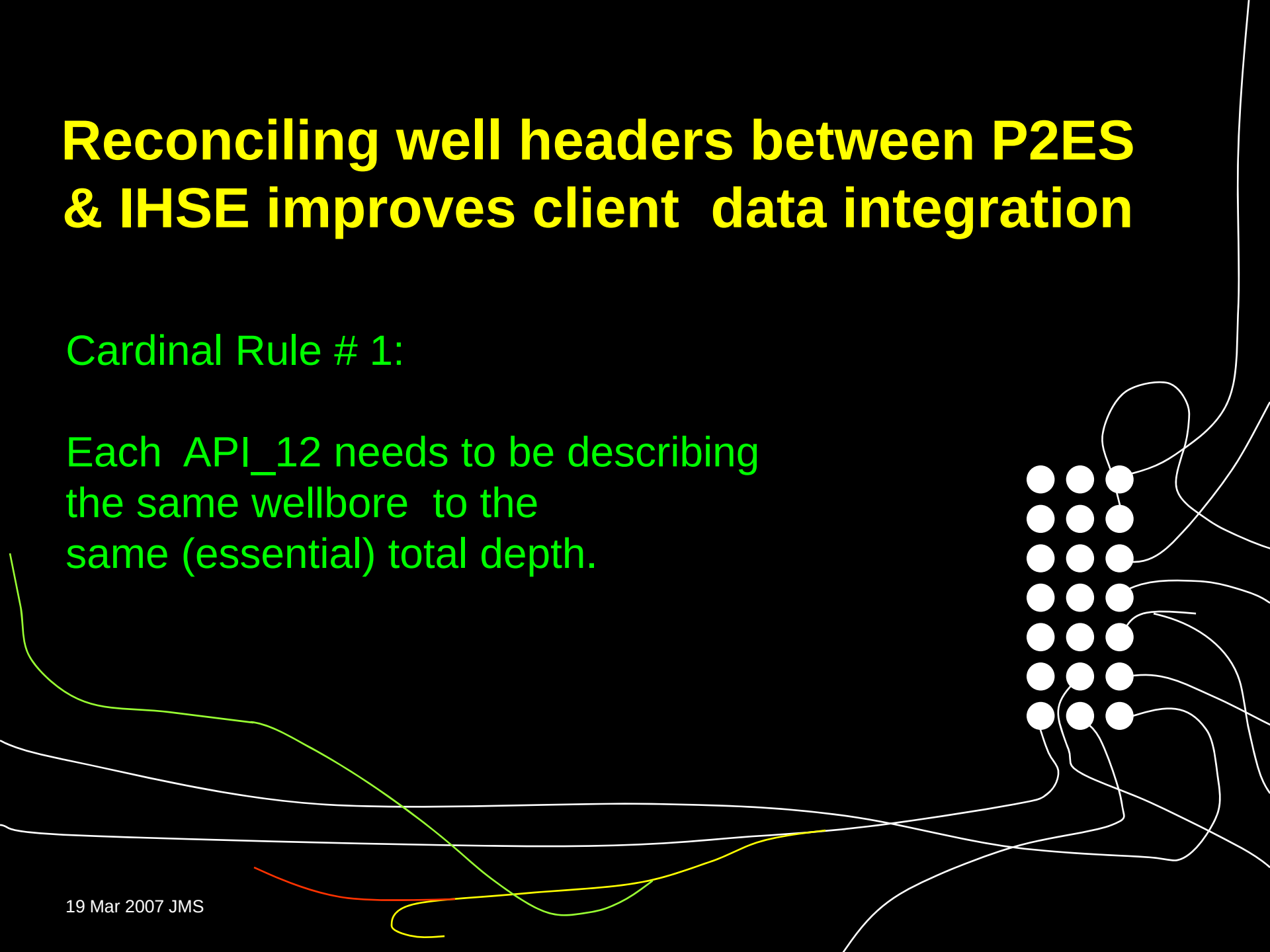
3) For given API_12 #s, the same wellbore is not being described.

3) Many API_12s on important wellbores are missing – both API inventories are incomplete. Secondary vendors may have well data on a well with no industry header.

Reconciling well headers between P2ES & IHSE improves client data integration

Cardinal Rule # 1:

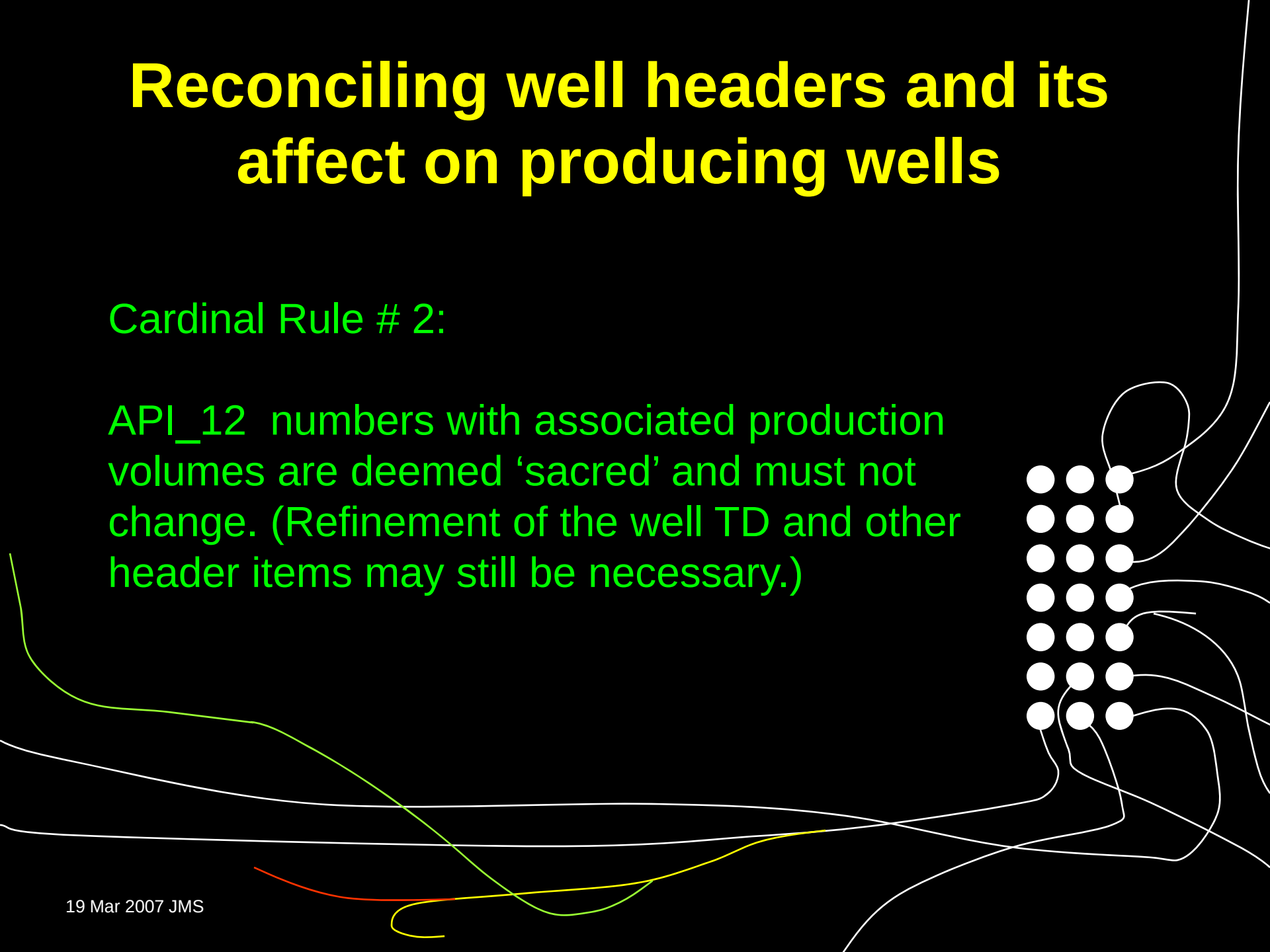
Each API_12 needs to be describing the same wellbore to the same (essential) total depth.



Reconciling well headers and its affect on producing wells

Cardinal Rule # 2:

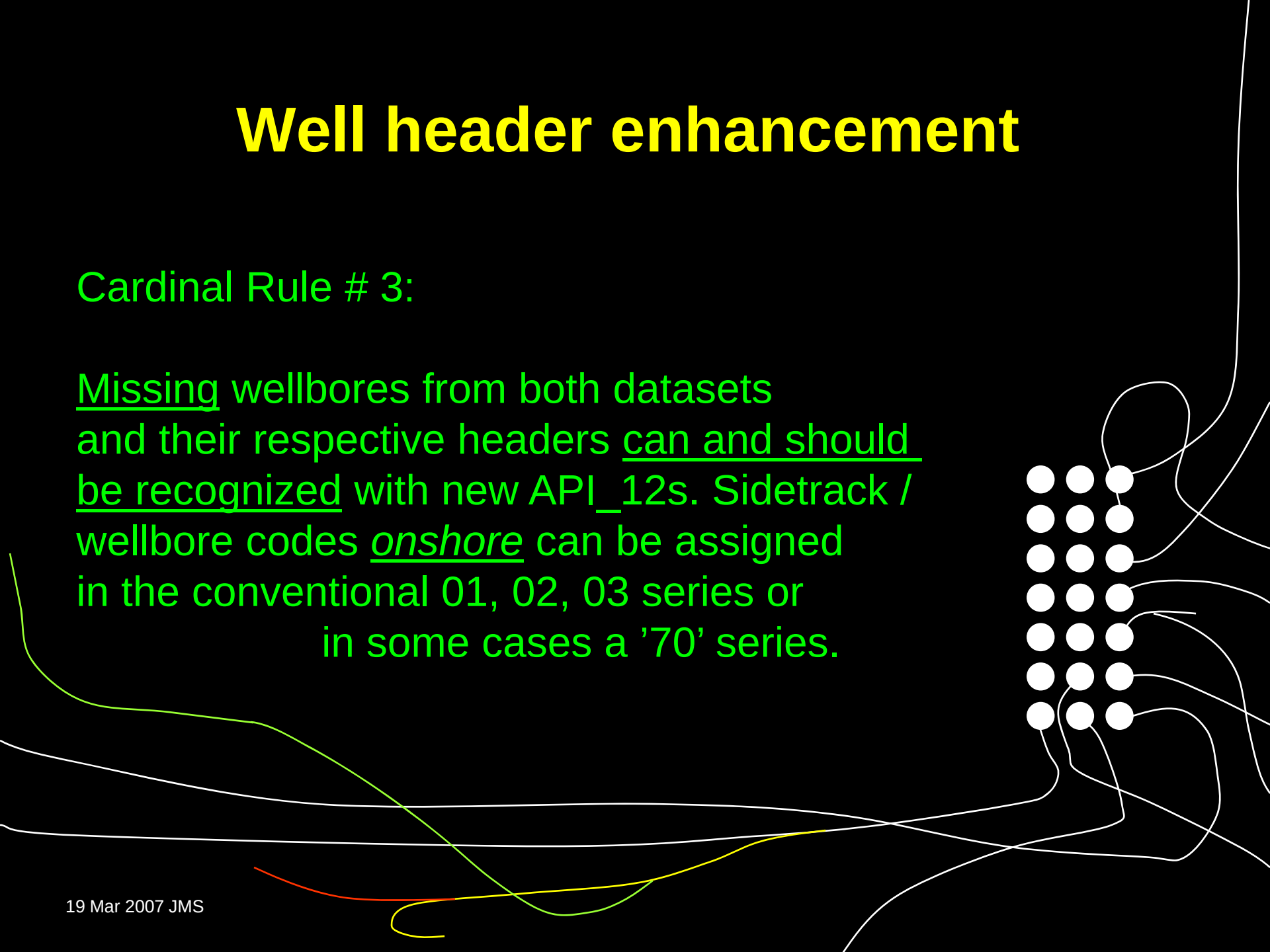
API_12 numbers with associated production volumes are deemed ‘sacred’ and must not change. (Refinement of the well TD and other header items may still be necessary.)



Well header enhancement

Cardinal Rule # 3:

Missing wellbores from both datasets
and their respective headers can and should
be recognized with new API_12s. Sidetrack /
wellbore codes *onshore* can be assigned
in the conventional 01, 02, 03 series or
in some cases a ’70’ series.

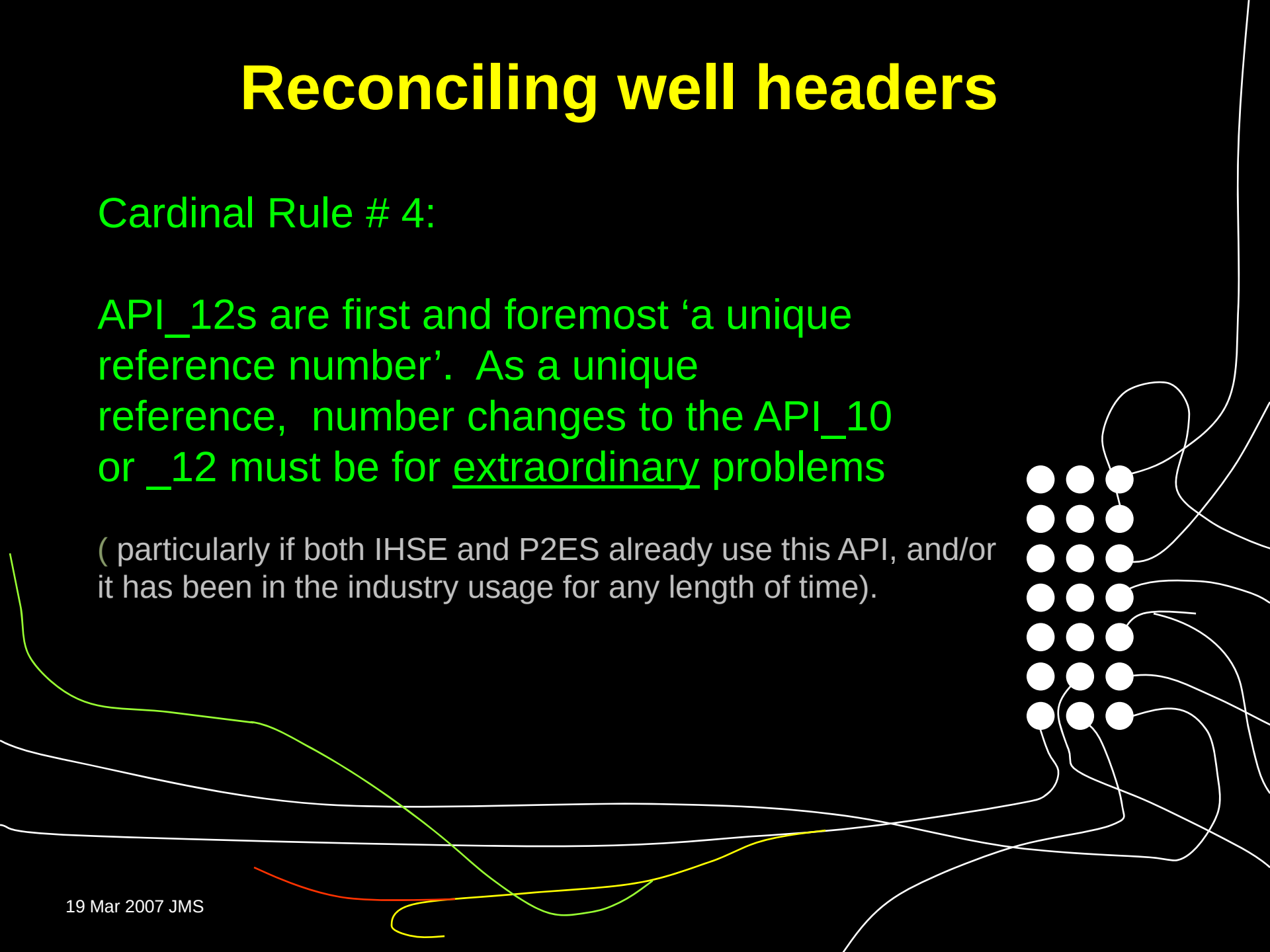


Reconciling well headers

Cardinal Rule # 4:

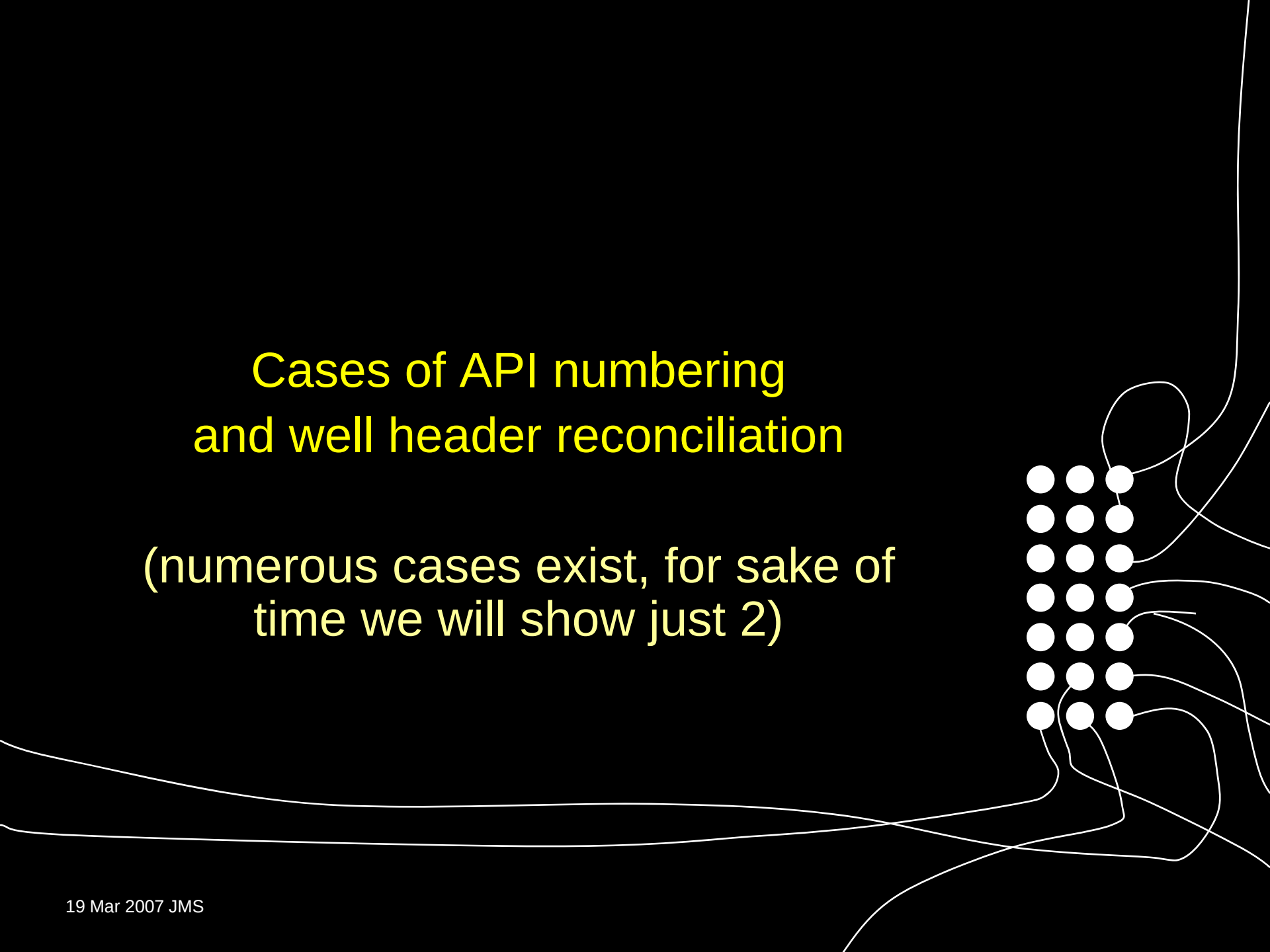
API_12s are first and foremost ‘a unique reference number’. As a unique reference, number changes to the API_10 or _12 must be for extraordinary problems

(particularly if both IHSE and P2ES already use this API, and/or it has been in the industry usage for any length of time).



Cases of API numbering
and well header reconciliation

(numerous cases exist, for sake of time we will show just 2)



Well header reconciliation and addition of new wellbore examples

- Case 1- Only 1 API_12 exists, and both IHSE and P2ES are describing the same wellbore. Minor header field differences.

- Case 2- Only 1 API_12 exists, both IHSE and P2ES agree on TD and use the ‘00’ as the sidetrack code. An additional, unrecognized OH is found to exist – use a ’70’ series ST/WB code.

Newfield Miami Corp #3
17023-22726-00

Reconciling Case # 2

Missing wells / wellbores
A simple example

TD 5900’ MD

At this depth the well is 36.08’ S and 84.77’ W

UID:	17023227260000	Well Bore Seq:	2	State:	LA	Permit Number:	221004
Current Oper:	NEWFIELD EXPLORATION	Code:		Source:	P2ES	Copy to Orig	
Original Oper:	NEWFIELD EXPLORATION	Code:		Source:	P2ES		
Well Name:	MIAMI FEE CORP.	Well Num:	3	Well Suffix:	ST1		
Lease Name:	MIAMI FEE CORP.	Field:	SECOND BAYOU				
Spud Date:	8/31/1997	TD Date:	12/6/1997	Final Status:	OIL		
Total Depth:	5,900.00	OUOM:	US_FT				
Ref Elev:	21.00	REF:	KB	KB-GL:			
Ground Elev:				KB-CHF:			
Csg Head Flange:				RT-KB:			
Rotary Table:				CHF-GL:			
Surface Lat:	29.850030	Surface Long:	-93.520590	Datum:	NAD27	Source:	P2ES TS
Header Date:	2/15/2006	Update Date:					
Version:		Project:					

Done | Well Comments | Srun | Survey | Survey Quad

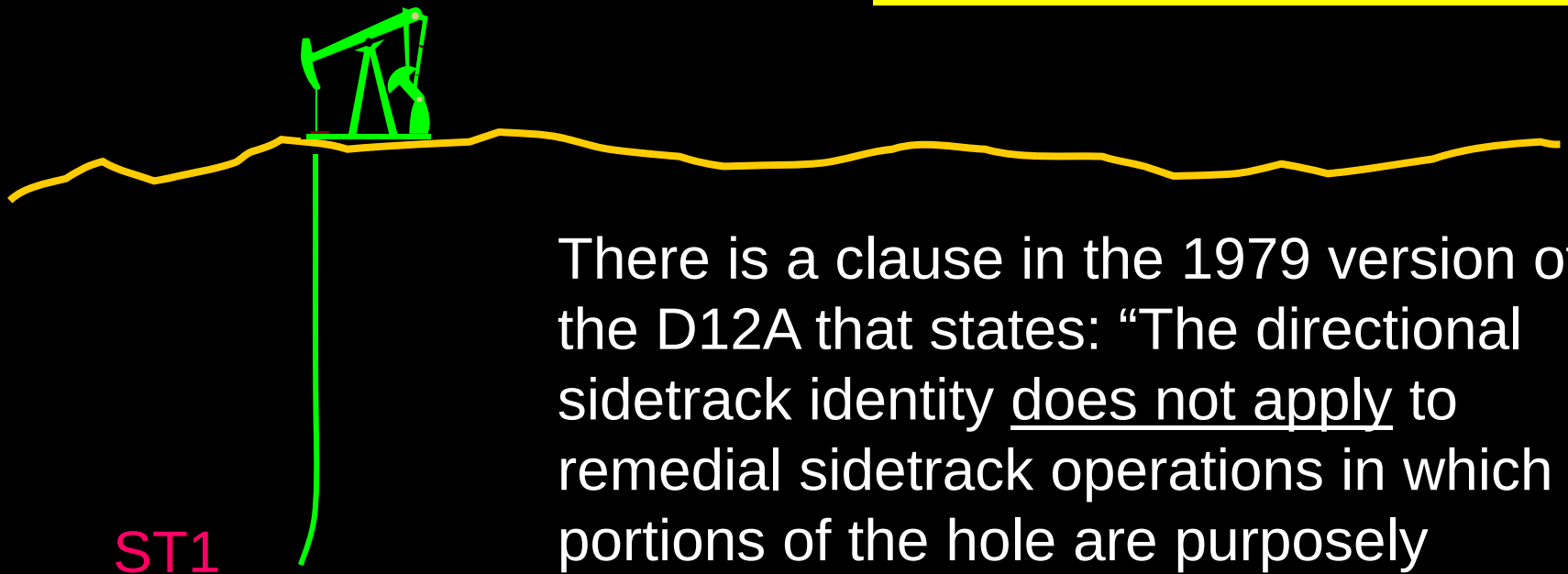
Update Date 3/7/2006

Both IHSE and P2ES use the ‘0000’ but no other API_12 or 14 exist

Newfield Miami Corp #3
17023-22726-00

Reconciling Case # 2

Missing wells / wellbores
A simple example



ST1

TD 5900’ MD

At this depth the well is 36.08’ S and 84.77’ W

There is a clause in the 1979 version of the D12A that states: “The directional sidetrack identity does not apply to remedial sidetrack operations in which portions of the hole are purposely detoured around junk, redrill of ‘lost hole’, or straightening ‘key seats’ and ‘crooked holes’.(Pg. 9 - 2nd to last paragraph)

This statement has been misinterpreted to mean “only the final wellbore fulfilling a permit’ gets assigned a sidetrack code.

Case # 2 continued

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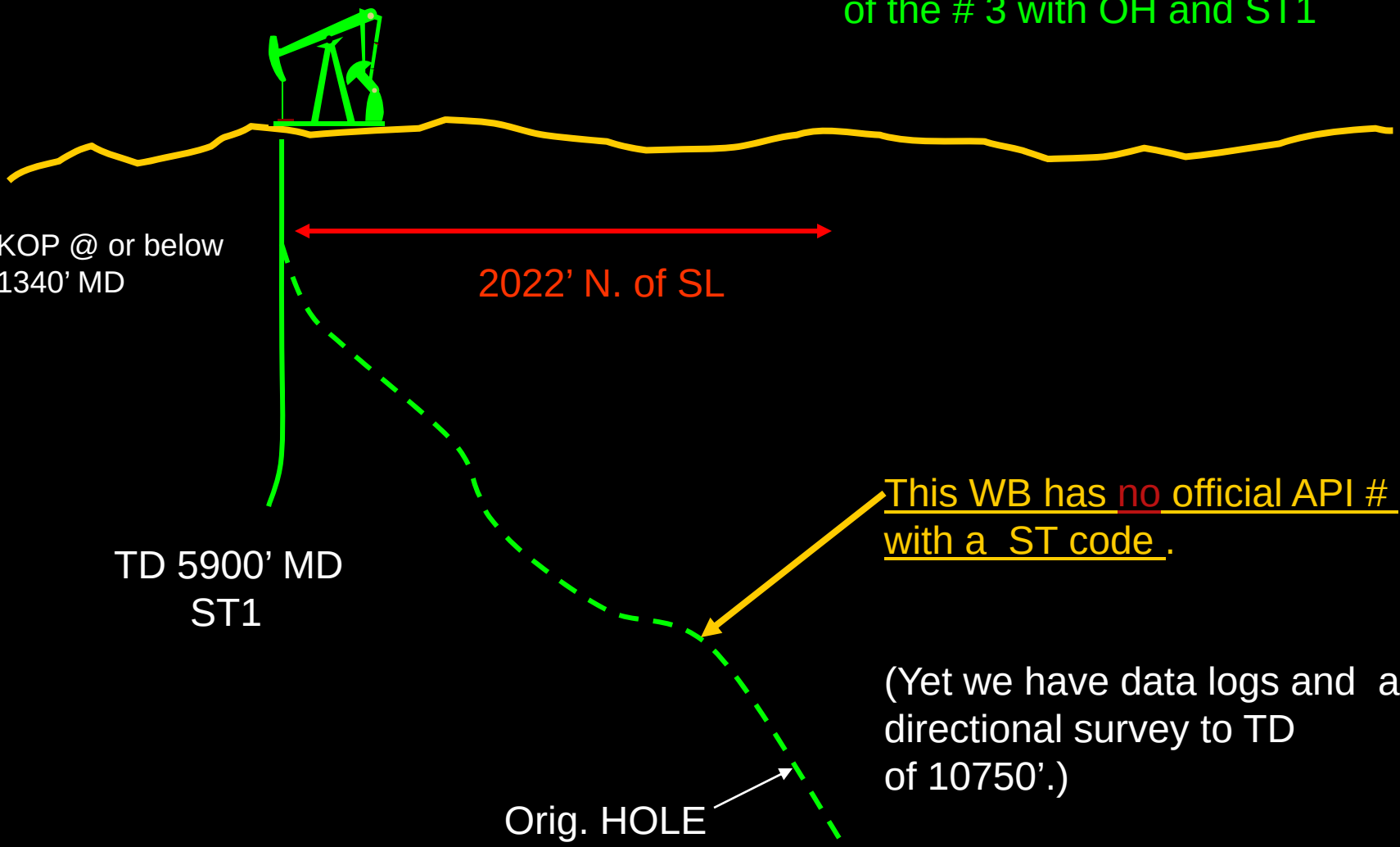
17023-22726-00

Correct wellpath schematic
of the # 3 with OH and ST1

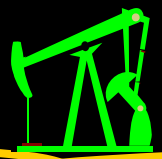


Back

Case # 2 continued

Newfield Miami Corp #3
17023-22726-00

Rules and API handling where a wellbore is missing



KOP @ or below
1340’ MD

Cardinal Rules

OH 17023-22726-7000

3 (Important new wellbore addition)

1.

2

TD 5900’ MD

Existing ‘0000’
ST 17023-22726-0000
1(both IHSE & P2 use it)
2 (API w / production)
4 (API since 1997)

Back

Orig. HOLE
WB 1

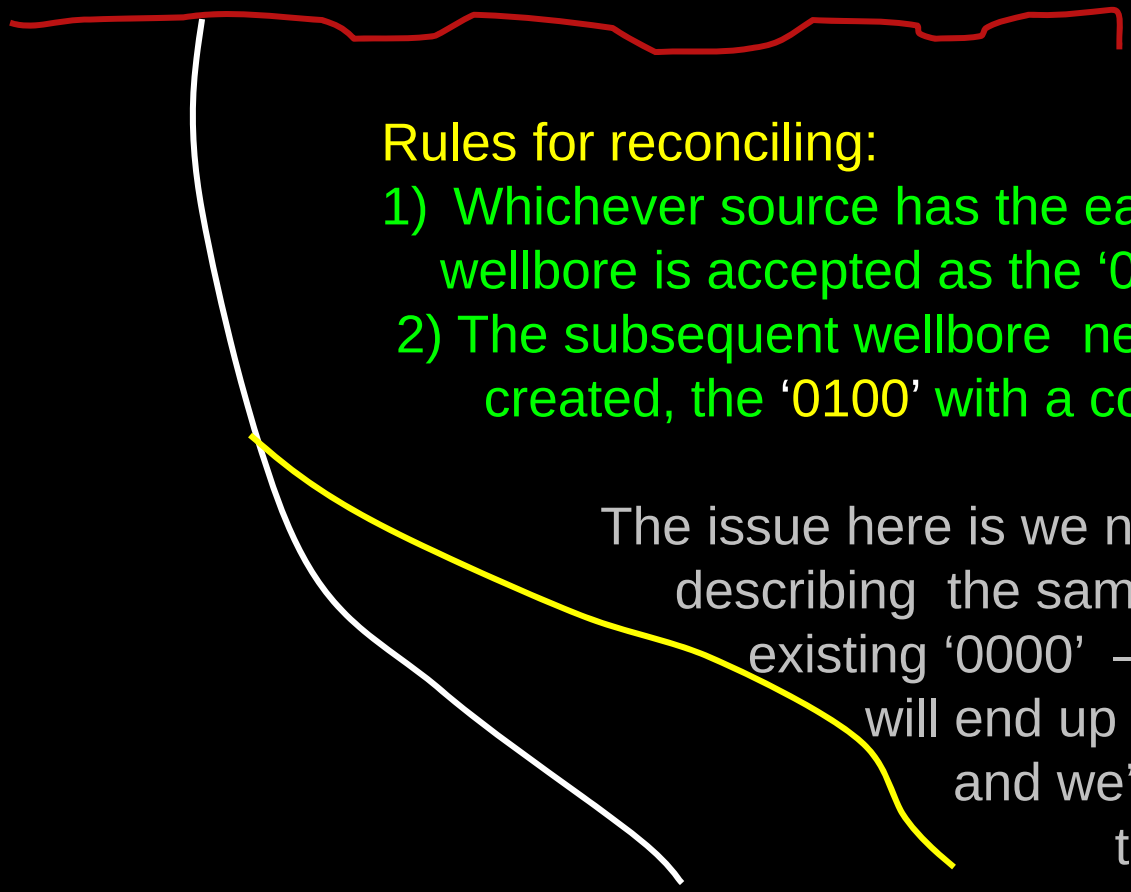
TD 10750

Well Header cases.

- Case 1- Only 1 API_12 exists, and both IHSE and P2ES are describing the same wellbore. Minor header field differences.
- Case 2 - Only 1 API_12 exists, both IHSE and P2ES agree on TD but an unrecognized OH exists – use a ’70’ series ST/WB code.
- Case 3 - Only 1 API_12 exists (a ‘0000’) between IHSE and P2ES but we are describing different wellbores – determine who has the earlier wellbore, accept it, and create a new API for subsequent WB.

Case 3 – 1 API_12 between IHSE & P2ES, but 2 different wellbores described.

A hypothetical example – similar to many in our DBs.



Rules for reconciling:

1) Whichever source has the earliest wellbore is accepted as the '0000' (char 11-14)
2) The subsequent wellbore needs a new API_12 or 14 created, the '0100' with a complete new header file.

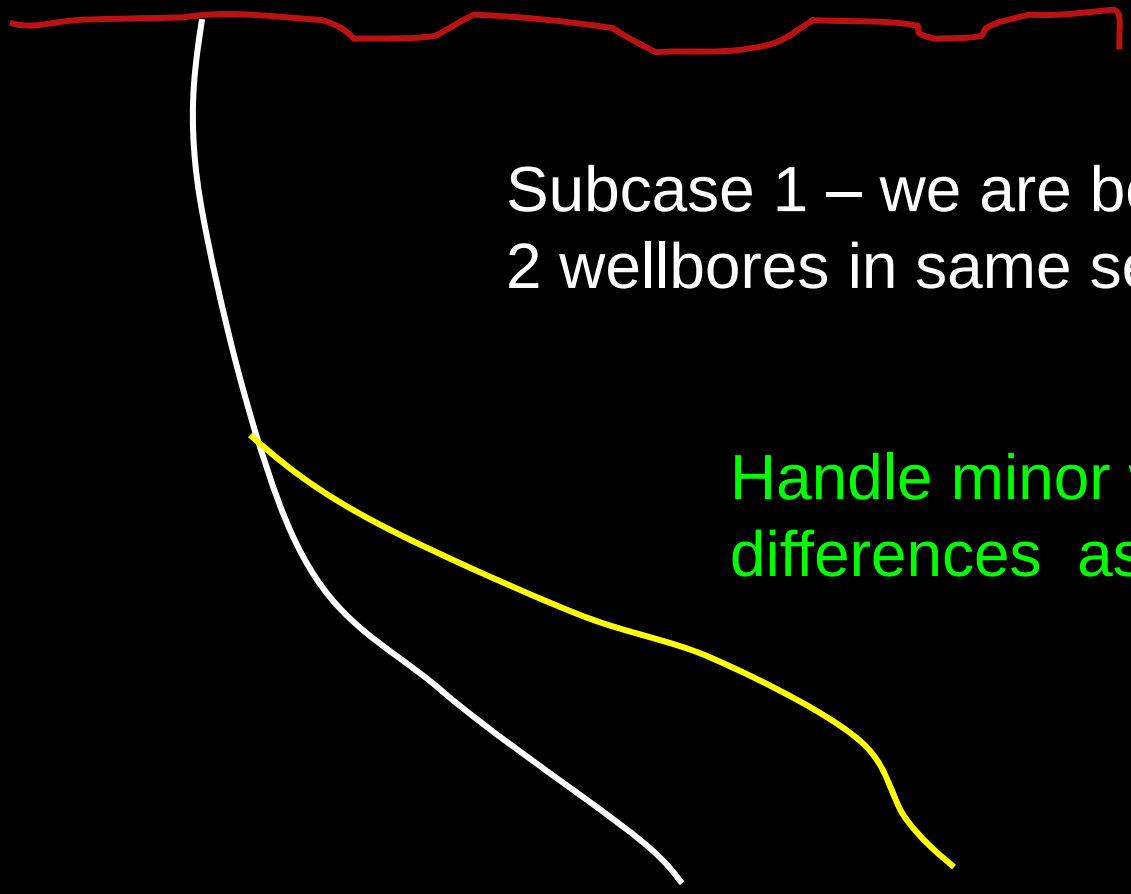
The issue here is we need to get in 'sync' describing the same wellbore with the existing '0000' – one of the companies will end up changing to be in sync, and we'll both end up adding in the new '0100'

IHSE '0000'
OH – 11,150

P2ES ~~'0000'~~ '0100'
ST1 – 11333'

Case 4 – 2 API_12 between IHSE & P2ES

A hypothetical example – similar to many in our DBs.



Subcase 1 – we are both describing same 2 wellbores in same sequence.

Handle minor well header differences as in Case 1

‘0000’
OH – 11,150

‘0100’
ST1 – 11333’

Reconciled headers are important to clients

Key issues are:

1) Working together to have a common well header.
2) Timely passing through corrections and additions.
3) Searching, recognizing, and making changes to keep headers in ‘sync’.

This effort is moving forward because of our directional survey effort in select project areas and the research effort required. No reconciling effort is happening outside of our directional survey project areas – it needs to.

Discussion Subjects

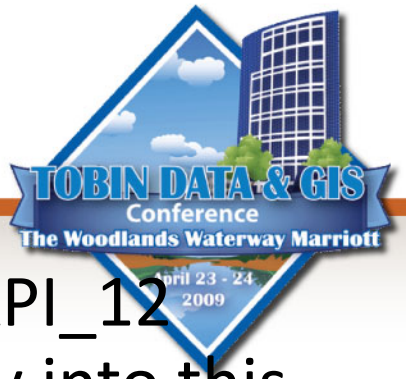
Part 3) Improving the API/Data Integration Problems

– Solutions, Ideas and Suggestions.

Discussion Subjects

- Update current D12A for new technology – drilling and data management
  - Standard is way out of date, needs to be updated.
  - Needs to be looked at with current data models in mind-API situations that relate to multiple data occurrences.

2) Build State agency support



- States Need to capture API numbers to an API_12 not just an API_10. Need to get states to buy into this important concept.
- States need to identify every wellbore (threat of extra paperwork)
- States may have other areas where they need to consistently use or administer API assignments (see B. Smith talk)
- Intelligent permitting-access to API verification by service companies

3) Handling the API Problems

- What is your level of data management pain tolerance. Options:

1) As a company, ignore the API/Data Integration issue
(interpreters are not complaining enough)
2) Try and manage integration issues on your various well datasets by yourself, by your own company
-with each data load correct all the problem API #'s
3) As an industry, develop an standard header through an API' clearinghouse' that all vendors can link to.

An industry cooperative effort and why it should work.

Thesis: The API number is but a vehicle to link each company's real data assets.

The real data assets for vendors are:

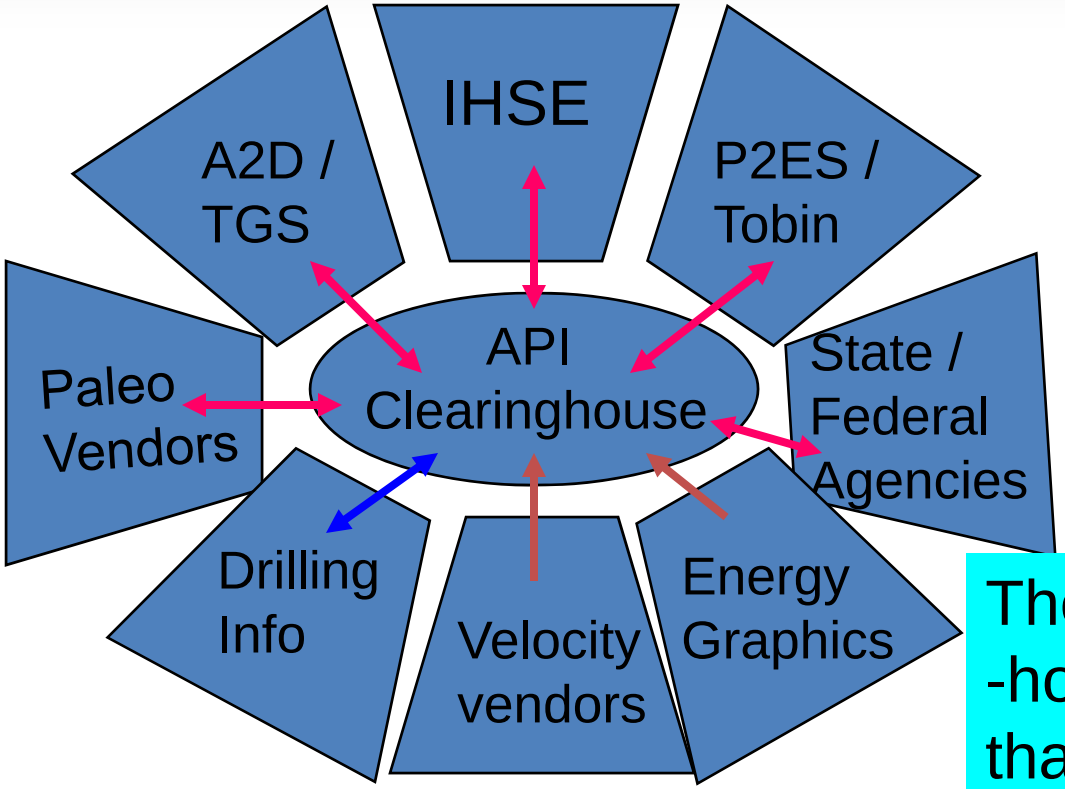
Basic well header data including perforation and test data,
Log data, Location data, Core data, Production data, Velocity data, Paleo data, narrative daily drilling data, Pressure data, etc.

The API number in and of itself is not the data asset.

What data elements are needed for an industry common well header?

- Reconciled UWI / API – API_12s
- Possible alias / aka UWIs
- State and county (actual, not from API #)
- Operator – original
- Lease name / number
- Well Name
- Well Number
- Well suffix
- Well TD
- Spud date

Fixing the API Problems



The best well inventories and improved well attributes are obtained when multiple sources are utilized.

The point of clearing -house is a source that all vendors / agencies can draw from to maintain some commonality in header data.

Comfort and ease in the data management storm.

Immediately after the recent Hurricane Ike when all power was down (think here no ATMs working, no gas stations working, stores closed, and heaven forbid – no fast food, no cell and telephone coverage, no TV, and worse- no AC (important to think here -- hot, humid, lots of grumbling…) for virtually every house in Houston…

I checked on a family that while their electrical lines were out, and trees down all over their property, including one on the house they still had full AC, lights, and power to their house, and comfort and convenience.

<u>They had planned for that occasion</u>

Likewise, the API issues we face are manageable with effort & planning. These problems will not solve themselves…ever.

How much pain, loss of preformance, and mistakes is your company and our industry willing to endure?

P2 Energy Solutions