

**Noble Energy
Ferguson B23-02
Production and Bradenhead
Whole Oil GC Results Summary
January 16, 2015**



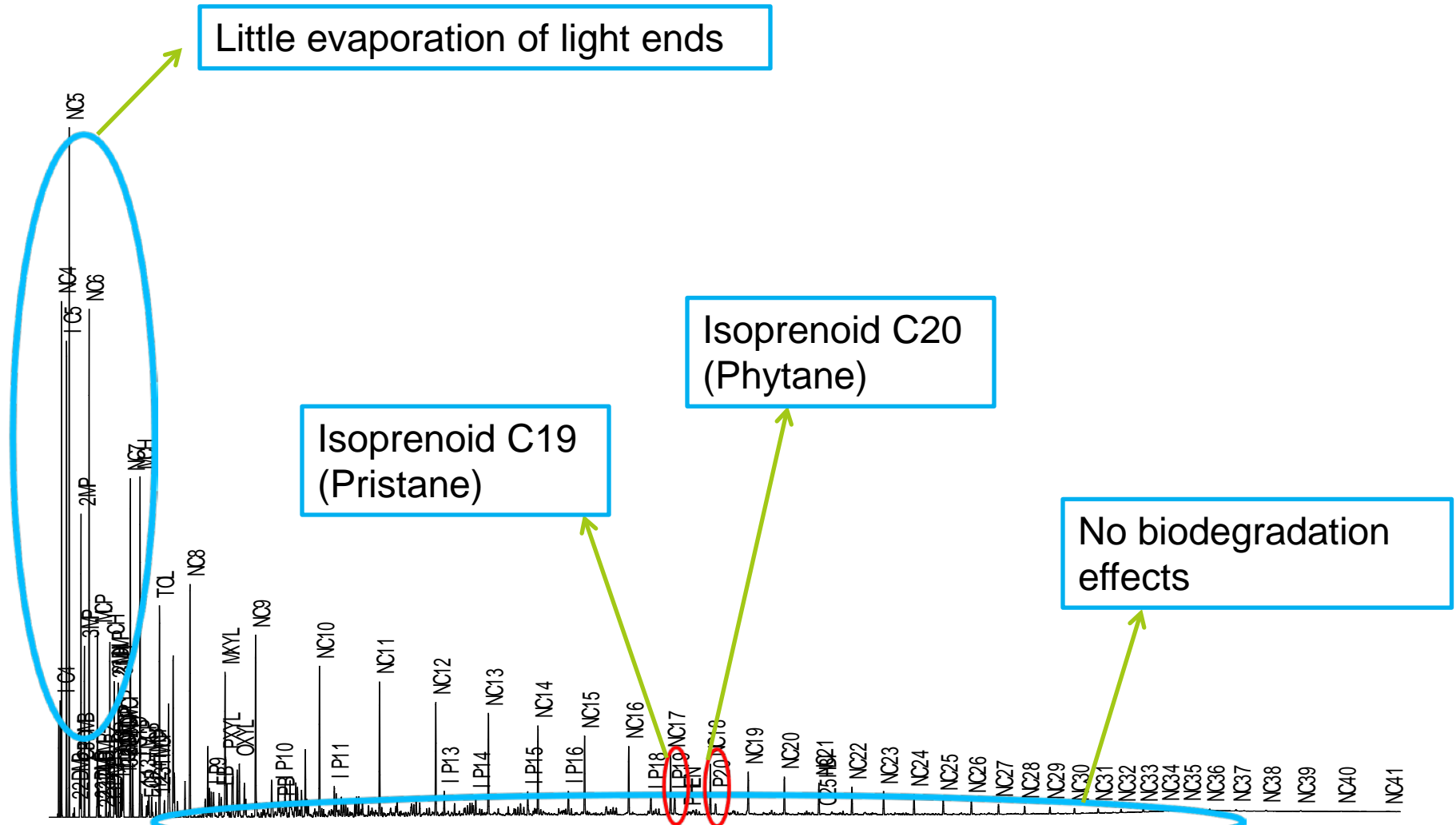
Outline



- Objectives:
 - Do the geochemical signatures of the oils from the bradenhead and production stream match?
 - Can we distinguish the source of the oils? (further work with existing Noble DJ oil data)
- Whole Oil GC Traces
- WGC Parameter Comparison
- Histograms based upon peak area
- Results Summary

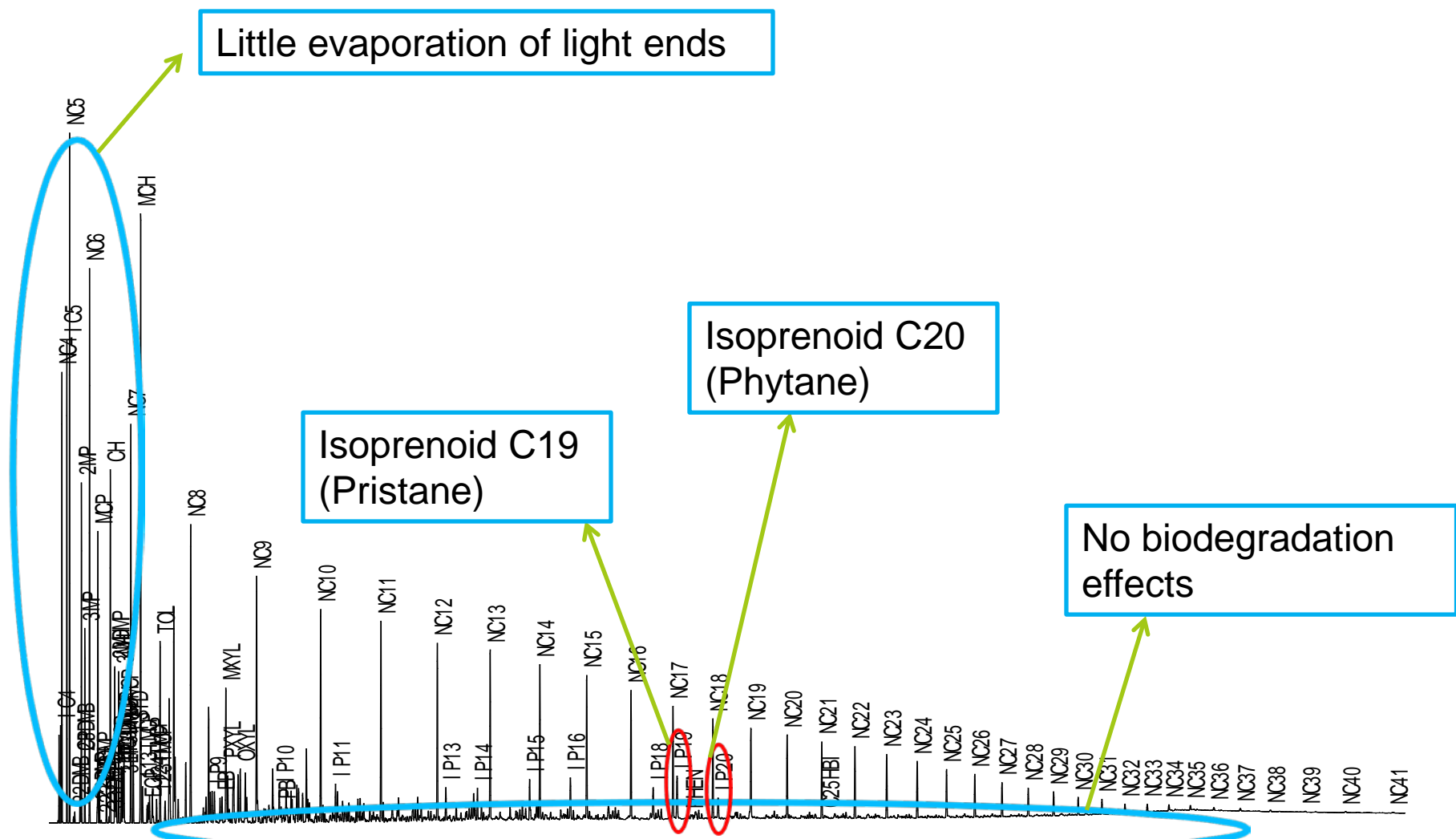
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Separator Sample – Whole Oil GC



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Bradenhead Sample – Whole Oil GC



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WGC Parameter Comparison

Separator

WGC parameters	
Pristane/Phytane	1.59
Pristane/ nC_{17}	0.46
Phytane/ nC_{18}	0.34
nC_{18}/nC_{19}	1.15
nC_{17}/nC_{29}	7.47
$nC_{18}/(nC_{18}+nC_{19})$	0.53
$nC_{17}/(nC_{17}+nC_{29})$	0.88
CPI Hunt ⁴	0.99
CPI Marzi ⁵	0.98
Normal Paraffins	32.3
Isoprenoids	3.4
Cycloparaffins	8.5
Branched (iso-) Paraffin	9.0
BTX aromatics	5.6
Resolved unknowns	40.6

Significantly
different
Pristane/
Phytane
ratios

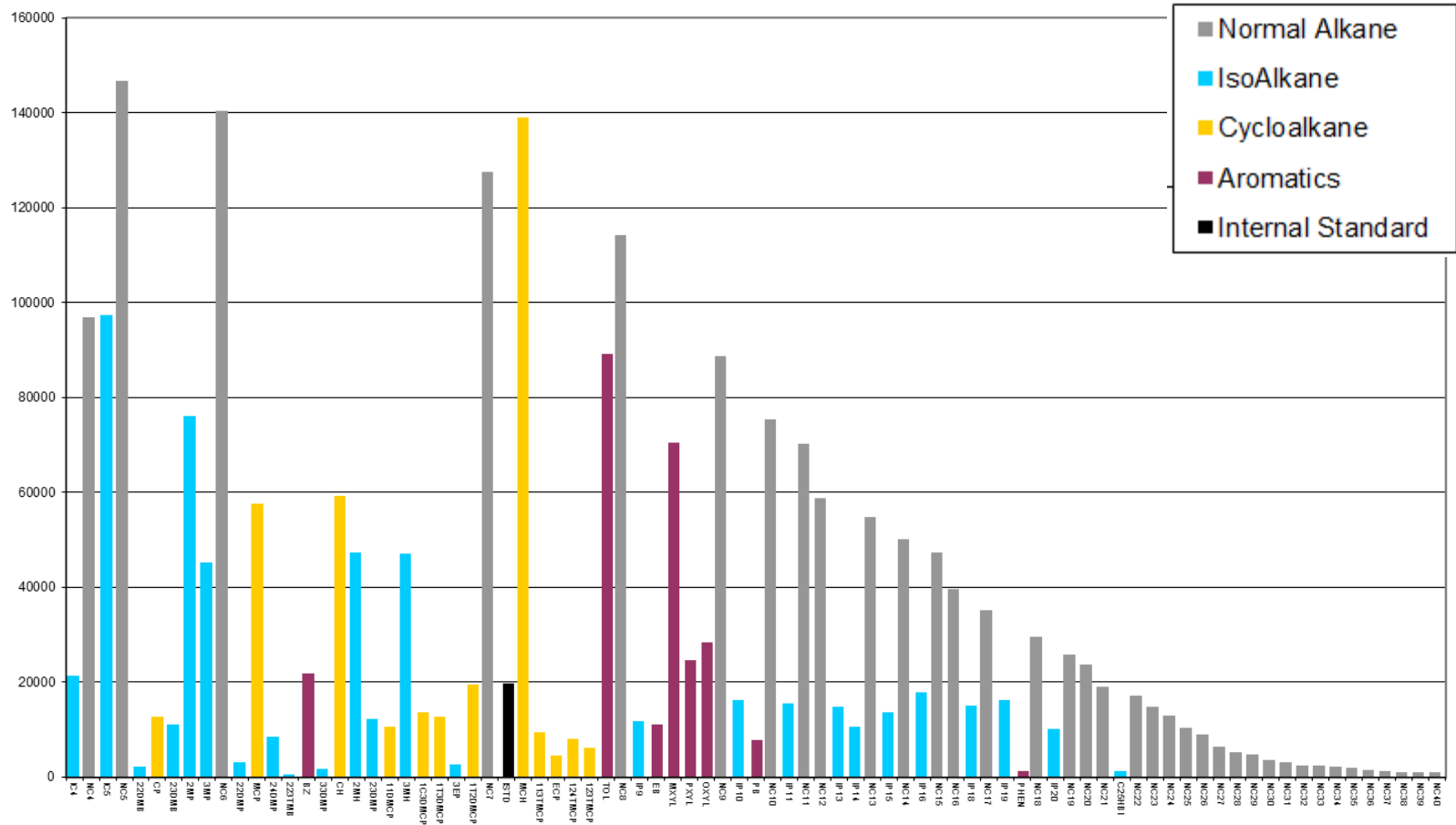
Bradenhead

WGC parameters	
Pristane/Phytane	1.98
Pristane/ nC_{17}	0.58
Phytane/ nC_{18}	0.33
nC_{18}/nC_{19}	1.07
nC_{17}/nC_{29}	3.96
$nC_{18}/(nC_{18}+nC_{19})$	0.52
$nC_{17}/(nC_{17}+nC_{29})$	0.80
CPI Hunt ⁴	1.03
CPI Marzi ⁵	1.00
Normal Paraffins	33.9
Isoprenoids	4.0
Cycloparaffins	10.2
Branched (iso-) Paraffin	7.0
BTX aromatics	3.5
Resolved unknowns	41.0

Ferguson B23-02 Separator Sample – Histogram



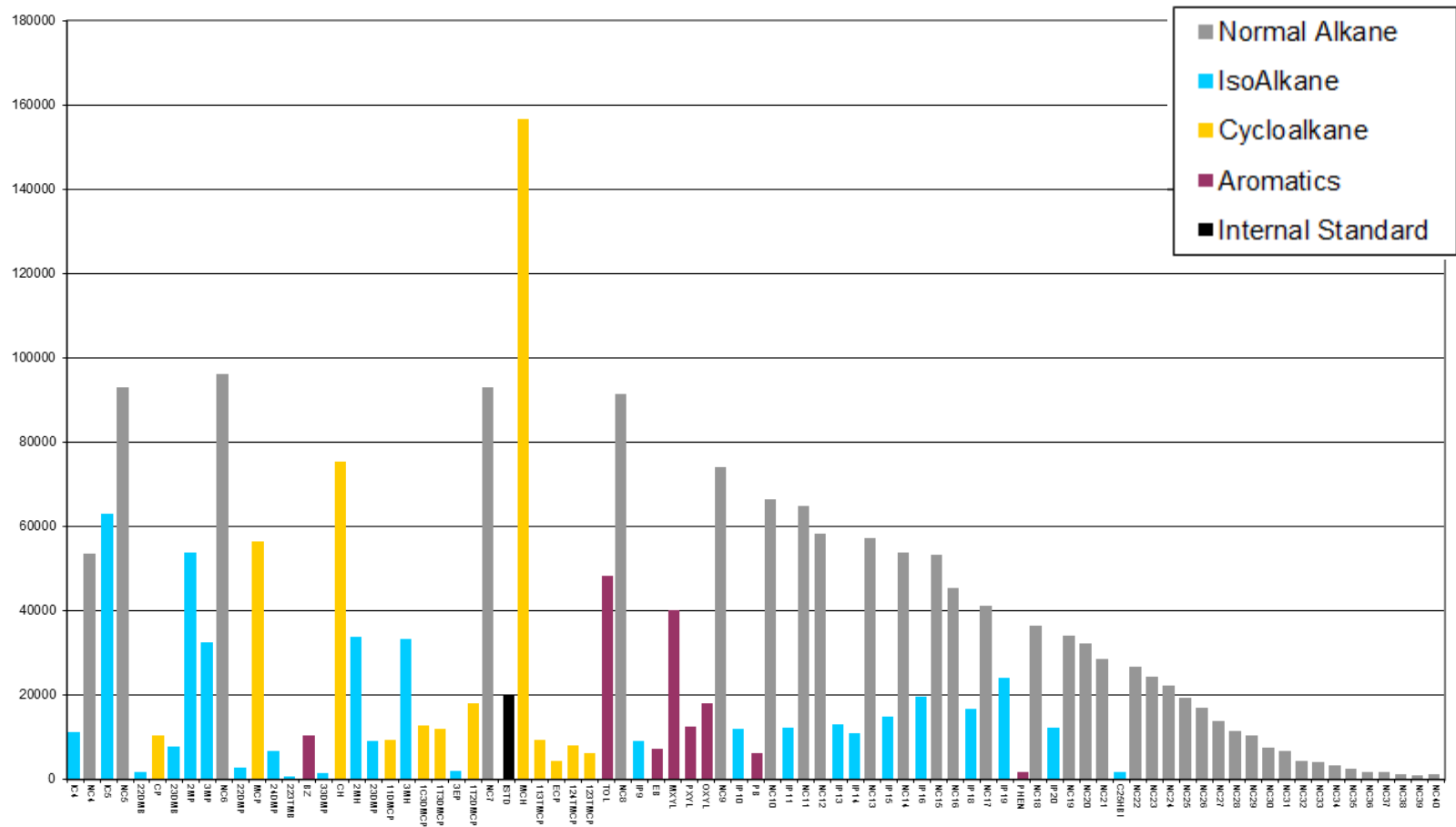
Histogram Based on Area



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Bradenhead Sample – Histogram

Histogram Based on Area



Results Summary



- Conclusions:
 - Bradenhead and separator samples exhibit distinct signatures suggesting differing source or source contributions of each oil
 - The bradenhead oil sample shows little evidence of biodegradation. The lack of biodegradation effects indicates that the bradenhead sample is not in contact with the near surface aquifer.
- Future Work:
 - DIG is contacting Noble personnel that may have access to DJ production oil datasets
 - Comparing the Ferguson oil samples with existing DJ oils should provide insight into potential sources of the fluids