Datashare 135

The offshore Mancos play in the San Juan Basin as a component of the Mancos total petroleum system

Ronald F. Broadhead

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Broadhead carrier bed paper

Cores letter to number conversion

Core letter	Core number
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8

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Cross section A-A'

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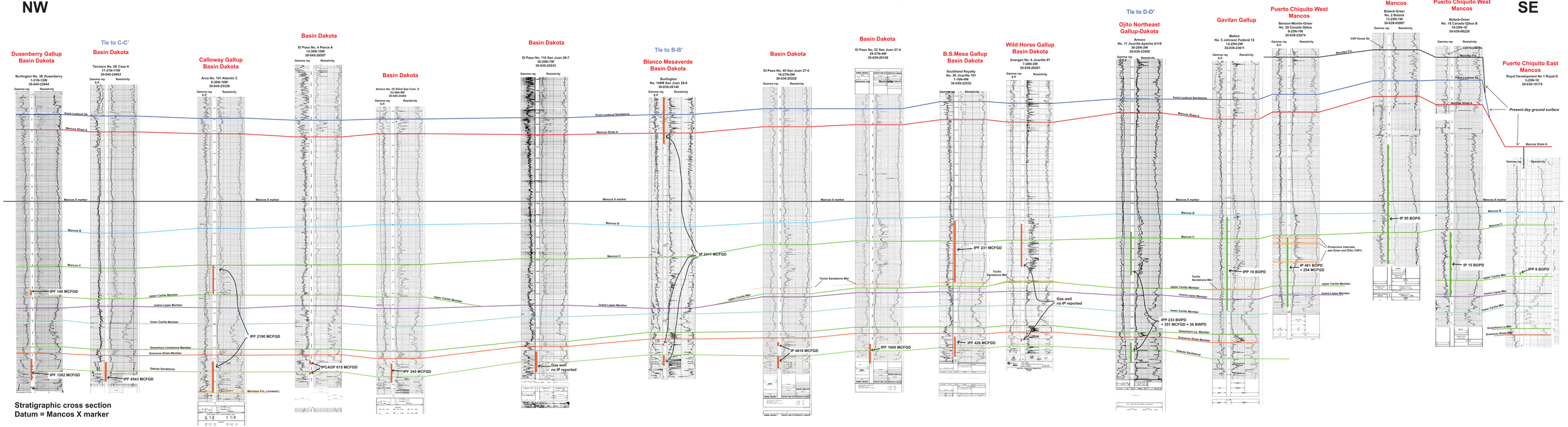
Mancos Shale Project

A
NW

A'
SE



Stratigraphic cross section
Datum = Mancos X marker

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Cross section B-B'

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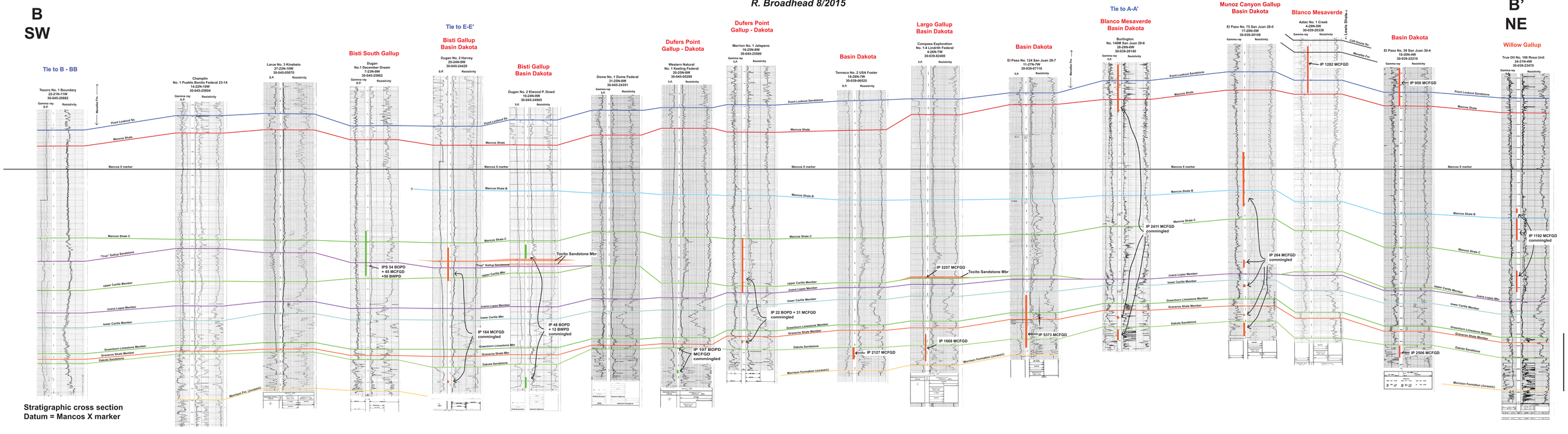

Stratigraphic cross section
Datum = Mancos X marker

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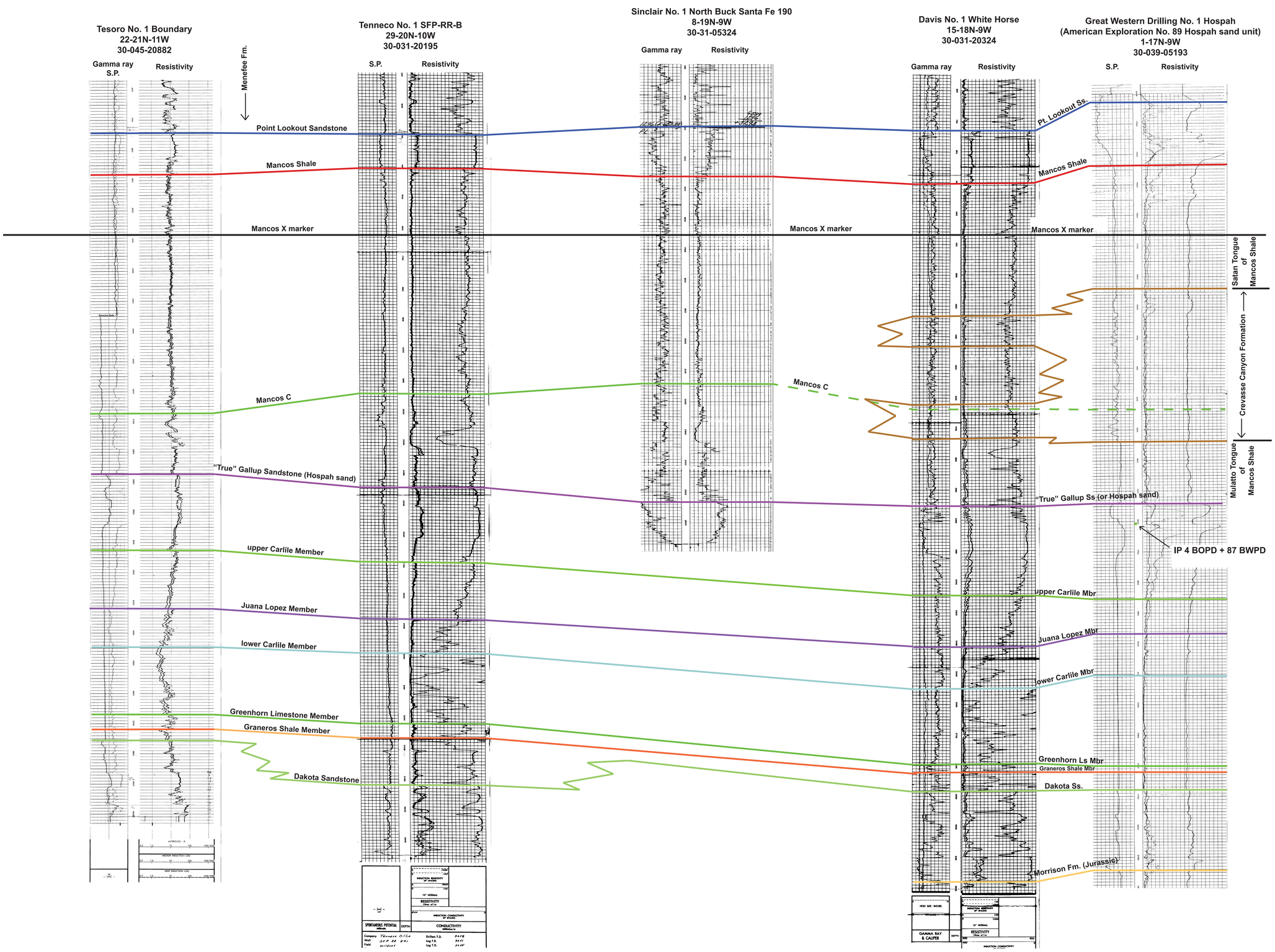
B — Cross section B - BB — BB

NW — *R. Broadhead 9/2014* — SE

Tie to B - B'

Hospah Lower sand
("True" Gallup)



Stratigraphic cross section
Datum = Mancos X marker

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Cross section C-C'

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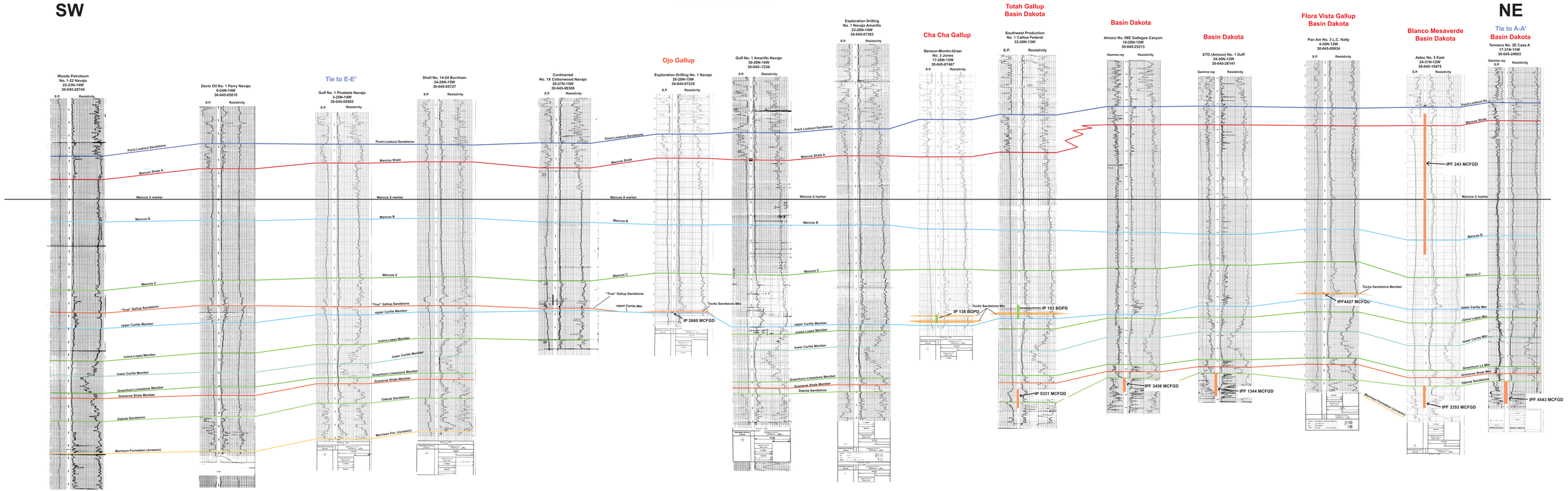
Mancos Shale Project



Stratigraphic cross section
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Cross section D-D'

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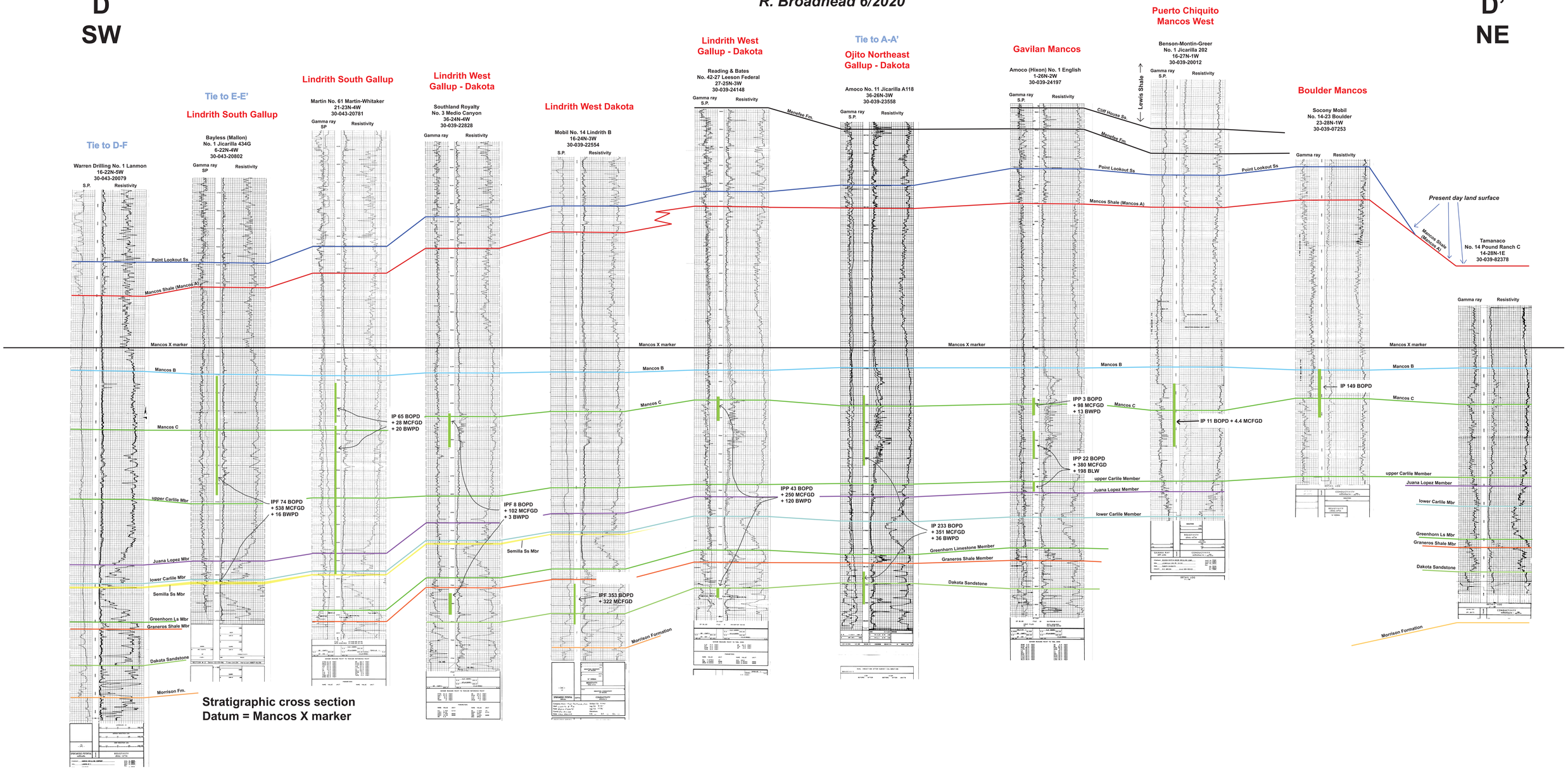
Mancos Shale Project



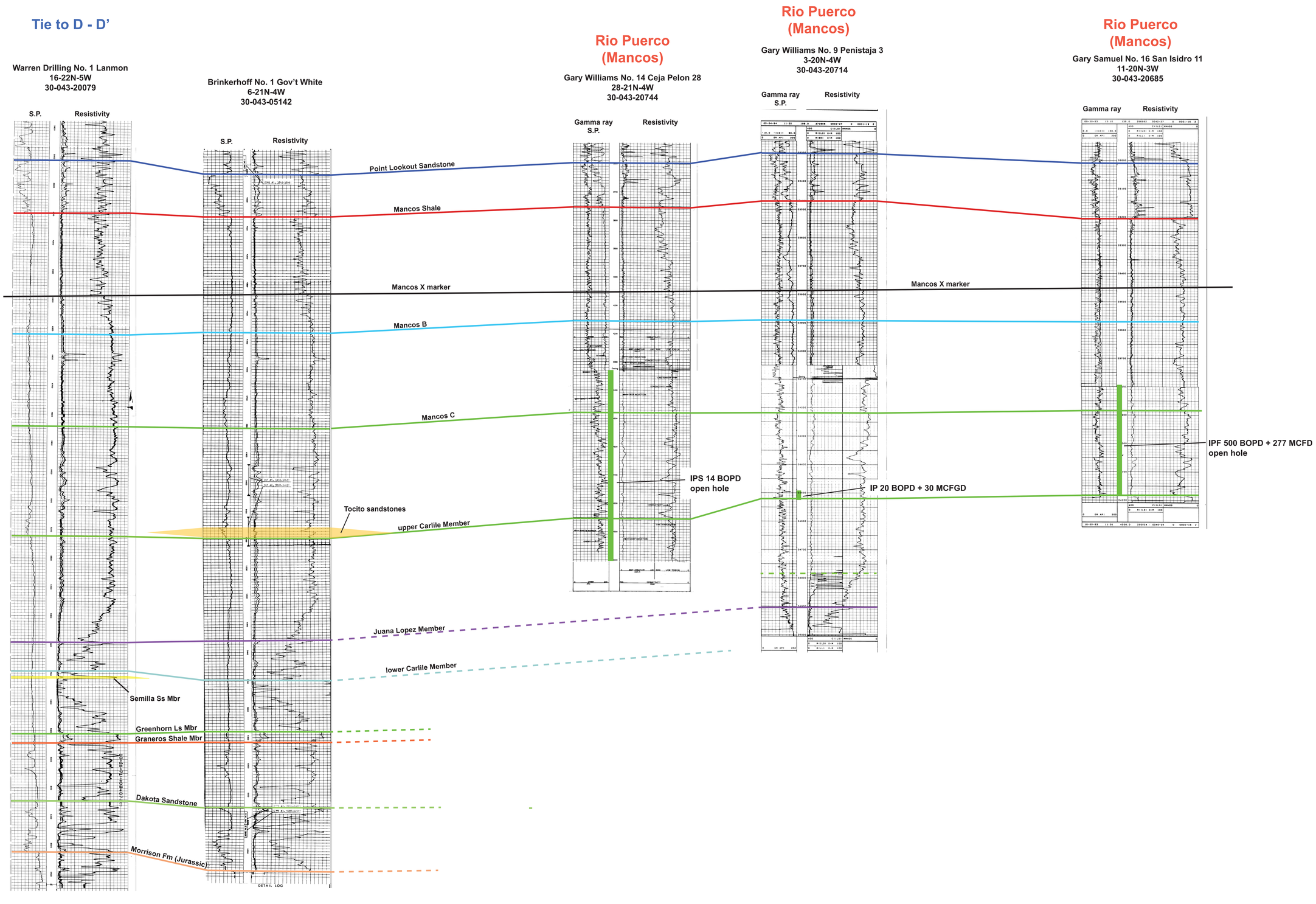
Stratigraphic cross section
Datum = Mancos X marker

Cross section D - F

R. Broadhead 8/2020

D
NW

F
SE



Stratigraphic cross section
Datum = Mancos X marker

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Cross section E-E'

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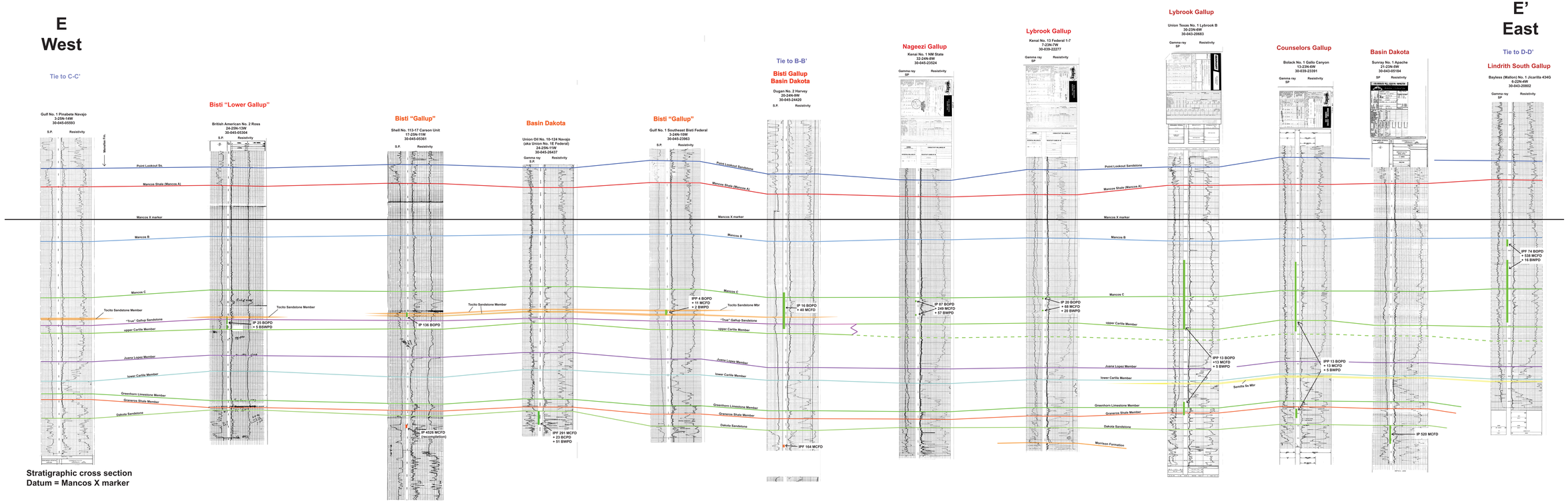
Mancos Shale Project



Stratigraphic cross section
Datum = Mancos X marker

Stratigraphic cross sections through the Mancos Shale (Upper Cretaceous) in the San Juan Basin of New Mexico

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This AAPG Datashare document presents a network of stratigraphic cross sections through the Mancos Shale (Upper Cretaceous) in the San Juan Basin (Fig.1). Development of these cross sections began in response to a request to deliver a presentation on the horizontal Mancos oil play in the San Juan Basin at the San Juan Basin Energy Conference, which was held in Farmington New Mexico during March 2013. The primary reason for development of the cross sections was to provide a stratigraphic framework based on established nomenclature in the published literature in order to analyze the Mancos petroleum system.

The stratigraphic nomenclature typically used in well completion records is misleading and often leads to misidentification of productive units in wells (see Molenaar, 1974 and Broadhead, 2015). Therefore a network of cross sections was developed that attempts to subdivide the Mancos into its internal stratigraphic units as published in the literature. In addition the author established three new subdivisions of the upper Mancos Shale (Mancos A, Mancos B, Mancos C; Fig. 2). The upper contacts of the Mancos B and Mancos C are laterally continuous electric log markers that relate to the silt content of the shales. Although the lower Mancos Shale had been subdivided into several formal and informal members in the literature, the upper Mancos Shale, which is approximately twice as thick as the lower Mancos and which is responsible for most oil production in the basin, had not been subdivided in the literature.

Completion forms and regulatory terminology in most cases refer to the top of the productive intervals in the Upper Mancos Shale as “Gallup” or the “Gallup producing interval”. However, Dane (1960) recognized the presence of a regional unconformity (basal Niobrara unconformity) at the base of the upper Mancos Shale. The true Gallup Sandstone Member underlies the basal Niobrara unconformity in the southernmost part of the basin and is therefore older than the Upper Mancos Shale. Therefore most of oil production in the basin is from reservoirs that are younger than the Gallup Sandstone Member. Molenaar (1973, 1974, 1977) has discussed this problem.

There is, however, production from members of the lower Mancos Shale. Analysis of petroleum systems in the Mancos Shale benefits from distinction of production from the various subdivisions of the Mancos as well as by analysis of source rocks and carrier beds in each of the Mancos subdivisions. Furthermore the stratigraphic extents of the "Gallup" are not used consistently in completion records. While the most common pick for the top of the "Gallup" is the top of the Mancos C, substantial numbers of well records place the top of the "Gallup" within the Mancos B and others place it within the Mancos C. To complicate analysis, the basal Niobrara unconformity is recognized in only a few well records, leaving the term "Gallup" variously applied to the upper Carlile Member, the Juana Lopez Member and even in some cases to the lower Carlile Member. The cross sections presented in this Datashare document are the author's attempt to assign stratigraphic nomenclature to productive intervals, source units and carrier beds.

Development of the cross sections was dependent upon previously published work by other authors, perhaps most importantly the work of Molenaar (1973, 1974, 1977), Pentilla (1964), McPeek (1965), O'Sullivan and others (1972), Molenaar and Baird (1992), and Ridgley and others (2013). The publications of Molenaar and Baird (1992), Ridgely and others (2013), McPeek (1965), and Pentilla (1964) contain cross sections with well logs that allowed full application of their ideas by the author. The cross sections of this report also place productive intervals in wells within the stratigraphic framework.

The cross sections were not based solely on well logs but included information derived from examination of cores that penetrated the upper and lower Mancos shales (Table 1). These cores reside in the Core Library of the New Mexico Bureau of Geology and Mineral Resources and may be accessed by the geologic community at large.

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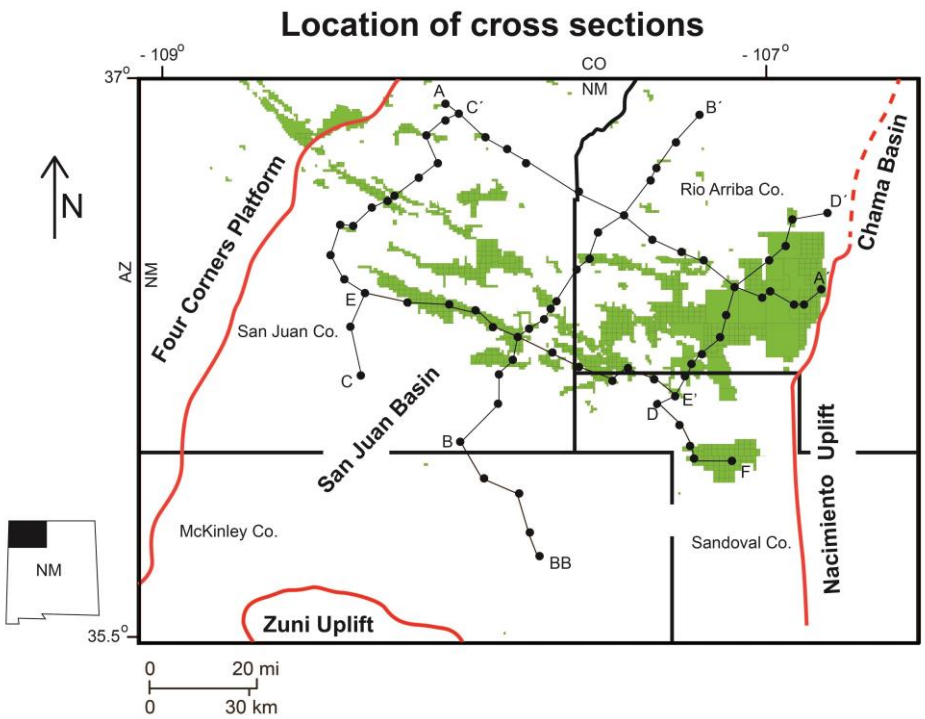

Figure 1. Location of cross sections within San Juan Basin. Reservoirs that have produced from the Mancos Shale are shown in green.

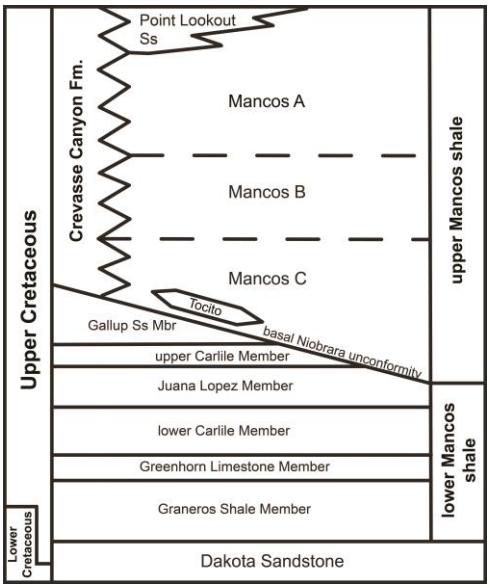

Figure 2. Internal stratigraphy of the Mancos Shale in the San Juan Basin. Modified from Broadhead (2018).

Table 1. Cores of Mancos C utilized in this project.

Operator, well name, well number	API number	Location (section- township-range, county)	Thickness of cored Mancos section ft (m)
Mesa Petroleum South Blanco 25 Federal No. 5	30-045-25043	25-T24N-R8W	180 ft (55 m)
Samuel Gary San Isidro 11 No. 16	30-043-20685	11-T20N-R3W	59 ft (18 m)
Getty Oil Jicarilla B No. 20	30-039-22513	31-T25N-R5W	312 ft (95 m)
Union Texas Newsom A No. 20	30-045-25753	4-T26N-R8W	151 ft (46 m)
Amoco Jicarilla A118 No. 14	30-039-23708	36-T26N-R3W	525 ft (160 m)
Burlington San Juan 28-6 No. 148M	30-039-26140	28-T28N-R6W	1434 ft (437 m)
Union Texas Angel Peak B No. 37	30-045-25654	24-T28N-R11W	156 ft (48 m)
Amoco Romero A No. 1	30-045-25509	27-T29N-R10W	380 ft (116 m)