Two units comprise most of the Short Junction Field, which produces from the Hunton Group, located in northeast Cleveland County, Oklahoma. The units have produced approximately 22 million barrels of oil since 1948 of an estimated 250 million OOIP. The less than 9% recovery even after a secondary water flood leaves a sizable target for a revitalized field.

Trey Resources, Inc. took over operations in 2014 and drilled the WSJU 1101H. The entire Hunton (Bois d'Arc to Chimneyhill) was cored, as well as a full petrophysical suite including borehole imaging logs. In 2008, the WSJU 109H, was recompleted as a horizontal lateral and included borehole imaging logs. These data were used to model the Bois d'Arc.

The core was oriented to determine principle stress direction and structural position. Additional whole core samples were analyzed for directional permeability and plugs samples were measured permeability in the east-west direction. Three plugs were selected for conventional CT scan analysis to help determine electrical properties.

Advanced interpretation techniques were applied on the acquired borehole images and correlated with the core results. The objective was to characterize the heterogeneities present in the formation. With the creation of full borehole images covering the entire borehole surface, it was possible to better identify various heterogeneities (including vugs and fractures) and classify them as connected or isolated vugs, fractures connecting vugs, or heterogeneity developed along bed boundaries. Intervals where the matrix porosity was the predominant component to the overall porosity were highlighted, versus intervals where the vuggy porosity has an important contribution.
Abstract

The Short Junction Field, which produces from the Hunton Group, located in northwest Cleveland County, Oklahoma. The units have produced approximately 22 million barrels of oil since 1948 of an estimated 250 million OOIP. The field was revitalized in 2008, with the WSJU 109H recompleted as a horizontal lateral and included borehole plugs for directional permeability studies and core samples for petrophysical analysis.

Additional whole core samples were analyzed for directional permeability and plugs were removed for petrophysical analysis. The focus was on determining the heterogeneities and porosity of the Hunton Group. Correlations with the core results show that the objective was to characterize the heterogeneities and porosity of the Hunton Group.

West Short Junction Unit #1101H Core description

This core description includes detailed descriptions of the Hunton Group core samples, along with petrophysical analysis results. The core samples were analyzed for grain size distribution, porosity, and other petrophysical properties. The core description also includes cross-sections and images of the core samples, as well as location maps and stratigraphic columns.

Short Junction Location Map

The Short Junction Field core description and petrophysical analysis provide valuable insights into the reservoir characteristics and potential for further exploration and development in the Northwest Cleveland County, Oklahoma.
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**Image Porosity Analysis Workflow**

This state of the art workflow includes textural analysis, image porosity analysis and fracture analysis. It was applied in the West Short Junction Unit 1101 and in the West Short Junction Unit 109H.

1) **Full image creation**: This step utilizes geostatistics to generate an image that represents full core. This image is then calibrated to provide a detailed view of the rock's properties.

2) **Calibrated FMI* Microresistivity curve with 0.2" vertical resolution**: This curve is used to analyze the resistivity variations within the core, providing insights into the rock's permeability and porosity.

3) **Image to core companion**: This step compares the image data with physical core samples to ensure accuracy and consistency in the analysis.

4) **Response of Portex in Deep Shaly environment**: This analysis focuses on understanding the response of Portex in deep, shaly environments, which can be crucial for identifying reservoir quality.

5) **Response of Portex in Organic Mud Mound**: This analysis examines Portex's response in organic-rich mud mounds, which can affect the rock's porosity and permeability.

6) **Response of Portex in Shallow Shelf**: This analysis looks at Portex's response in shallow shelf environments, which can provide insights into the rock's reservoir characteristics.

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**Image**

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**Formation: Hunton**

**Sequence Cycle**

- **8185**: Bioclastic wacke/mudstone with argillaceous lime-mudstone.
- **8188.5**: Argillaceous lime-mudstone.
- **8190**: Other texture.
- **8195**: Slab photo point.

**Remarks**

- **8190**: Partially lenticular/wavy-bedded with scattered pyrite and very few bioclasts, such as gastropods.
- **8195**: Irregular flaser structures cyclonically developed.
- **8200**: Argillaceous lime-mudstone, partially shaly, containing very few bioclasts, such as gastropods.
- **8205**: Irregularly wavy-bedded, argillaceous lime-mudstone, partially shaly, containing very few bioclasts including tiny crinoids.
- **8210**: Thinner shale lenses are as thin as 5-8 cm thick. Note also wispies which are resulted from combination of calcareous lime-muds and dark argillaceous wispies.
- **8215**: Irregularly wavy-bedded, argillaceous lime-mudstone, partially shaly, containing very few bioclasts, such as crinoids.
- **8220**: Fractures and in-situ brecciation.
- **8225**: Wackestone with multiple bioclasts.
- **8230**: Carved, fractured, slightly argillaceous wacke/mudstones and interbedded limey shale, dominantly argillaceous mudstones, mostly flaser and lenticular structured, with minor ostracode and echinoderm fragments.
- **8235**: Gray wackestone, fractured, slightly argillaceous.
- **8240**: Karst filling breccias.
- **8245**: Fractured and locally brecciated, with irregular dead oil stained spots. Alizarin Red stained.
- **8250**: Fractured wackestone with bitumen filled voids and burrows.
- **8255**: Light gray wackestone, fractured and locally micro-brecciated.
- **8260**: Fractured and locally brecciated, with bitumen fillings in parts of the vertical fractures. Dead oil stained wackestone. Alizarin Red stained.
- **8265**: Fractured wackestone with bitumen filled voids and burrows.
- **8270**: Unconformable contact of Sylvan shale.
- **8275**: Unconformable contact of Sylvan shale.

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**Lithology**

**Slab photo point**

- **8273.3**: Mud-bearing, bioclastic lime-mudstone shows irregularly shaped lime-mudstone and argillaceous wispies.
- **8278.5**: Argillaceous lime-mudstone and argillaceous lime-mudstone.
- **8282.3**: Wavy/lenticular bioclastic lime-mudstone with very shaly wispy laminas.
- **8285**: VCSd.
- **8288.5**: Argillaceous lime-mudstone.
- **8290**: Section. Irregular flaser structures cyclonically developed.
- **8295**: 4 inches or slightly argillaceous, bioclastic wacke/mudstone.
- **8300**: 2 mm gastropod (?). Limey mudstones, flaser and lenticular structured, with minor ostracode and echinoderm fragments.
- **8305**: Crinoids in calcareous shale.
- **8305.3**: Crinoids in calcareous shale.
- **8310**: 2 mm gastropod (?). Gray, argillaceous mudstones, flaser and lenticular structured, with minor ostracode and echinoderm fragments.
- **8310.2**: A trilobite shell in the wackestone.
- **8315**: Irregularly wavy-bedded, argillaceous lime-mudstone, partially shaly, containing very few bioclasts, such as crinoids, echinoids and shells of crinoids.
- **8320**: Partially lenticular/wavy-bedded with scattered pyrite and very few bioclasts including tiny crinoids.
- **8323.0**: Fractures and in-situ brecciation. Crinoid, echinoid and shells of crinoids.
- **8325**: Wackestone with multiple bioclasts.
- **8330**: 4 mm gastropod (?). Gray wackestone, fractured, slightly argillaceous.
- **8335**: Fractured wackestone with bitumen filled voids and burrows.
- **8340**: Dark gray and black limey shale highly fractured and in-situ-brecciated, with bitumen fillings in parts of the vertical fractures. Dead oil stained wackestone. Alizarin Red stained.
- **8345**: Dark gray and black limey shale highly fractured and in-situ-brecciated, with bitumen fillings in parts of the vertical fractures. Dead oil stained wackestone. Alizarin Red stained.
- **8350**: Fractured wackestone with bitumen filled voids and burrows.
- **8350.4**: Fractured wackestone with bitumen filled voids and burrows.
- **8355**: Fractured wackestone with bitumen filled voids and burrows.
- **8360**: Unconformable contact of Sylvan shale.
- **8364.7**: Unconformable contact of Sylvan shale.
- **8369**: Unconformable contact of Sylvan shale.
- **8374**: Unconformable contact of Sylvan shale.
Overall a total of 5 FMI image facies were identified and below is represented the output of the porosity classification analysis:

1) High background matrix resistivity with discrete fracture presence
2) Medium to High background resistivity with high presence of fractures
3) Medium background resistivity with segmented fractures
4) Low background resistivity with vuggy texture
5) Low background resistivity with vuggy texture and fractures

**FACIES 1**
Low presence of heterogeneities
Discrete fractures are the contributors to reservoir properties

**FACIES 2**
Low presence of heterogeneities and if present connected to fractures
High presence of fractures is the contributor to reservoir properties

**FACIES 3**
Increased presence of heterogeneities of various nature
Segmented fractures and heterogeneities equally present

**FACIES 4**
Increased presence of heterogeneities and overall increased matrix porosity. Heterogeneities seem to be predominant along boundaries, connected or isolated.
Fractures do not represent a predominant feature

**FACIES 5**
Increased matrix porosity and increased heterogeneity presence. Vugs connected to fractures are the most predominant feature.
Fractures and vugs are equally highly contributing to increased reservoir properties