

PRELIMINARY STRUCTURE CONTOUR MAP ON TOP OF MIDDLE MISSISSIPPIAN-AGE WARSAW LIMESTONE IN SOUTHWESTERN KANSAS

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Abstract

This work produced a preliminary geologic map showing the top of the Warsaw Limestone in southwestern and south-central Kansas, between the Central Kansas Uplift and the Hugoton Embayment of the Anadarko basin, specifically in Greeley, Wichita, Scott, Lane, Ness, Hamilton, Kearny, Finney, Hodgeman, Edwards, Morton, Grant, Haskell, Gray, Ford, Kiowa, Marion, Stevens, Seward, Meade, Clark, and Comanche counties. The subsurface geology data depicted on the map represents the Warsaw Limestone within the Merameucian Stage of the Middle Mississippian Series. The Warsaw Limestone consists mostly of crystalline limestone, interbedded with wackestone/dolomite and varying amounts of chert. The Warsaw contains large amounts of glauconite and in southwestern Kansas contains gradal, vitreous quartz. Where the Warsaw unconformably underlies Pennsylvanian rocks, it consists of conglomerate, sandy, shelly, dolomitic shale or breccia containing large clasts of crystalline limestone in a shale. The Warsaw is unconformable on Keokuk-Burlington beds (top of Osagian) in central and eastern Kansas and seemingly conformable in western Kansas. The Warsaw is 30 to 40 feet thick in eastern Kansas (Forest City and Salina basins) and 250 feet thick in western Kansas (the central part of the Hugoton embayment). The data shows the distribution of bedrock from overall shallow depths in the north and west (~1,500 to ~2,000 ft) to deeper depths in the south (~4,000 to ~4,600 ft). Work on the map continues, as new data are incorporated to refine and better constrain its interpretation.

Methods

Top data for the Warsaw Limestone in the state of Kansas were obtained from the Kansas Geological Survey Data Resources Library (KGS DRL) and compiled into an Excel database. The dataset was cleaned by correcting topographical errors, adjusting intersect well elevations, datums, and top picks, and removing redundant or irrelevant data. Initial mapping of data points was performed using ArcGIS ArcMap. To improve data coverage in sparsely sampled areas, additional well data were gathered from the Robert F. Walters Digital Geological Library and by identifying wells with LAS 3.0 files that had unpublished formation tops in the KGS DRL. Where appropriate, new logs were interpreted by examining annotated well logs and correlating them with nearby LAS 3.0 log signatures and overlying formation tops. All newly interpreted and picked logs were added to the Excel database and loaded into Petrel software. A surface representing the Warsaw Limestone top was generated by interpolating the point data using the convergent interpolation algorithm method. From this raster surface, structural contours were generated at 100-foot intervals and imported into ArcGIS ArcMap. These contours were refined manually and further smoothed using ArcMap's built-in smoothing tools. An updated surface from the contours was generated by interpolating the line data using the "raster to raster (spatial analyst)" tool. To aid in the interpretation, a previously published regional structural contour map of the top of the Mississippian in Kansas (Merriam, 1963), as well as structural maps of the top of the Merameucian and Osagian stages (Ortega-Ariza et al., 2024a, 2024b), were used as reference base maps. These references assisted in identifying regional structural trends, guiding contour construction, and confirming the presence of two minor faults extending through the Warsaw Limestone.

About

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program, STATEMAP award number G25AK0041 (FY2024).

This map was produced using the ArcGIS system developed by Esri (Environmental Systems Research Institute, Inc.).

This map is a preliminary product and has had less scientific and cartographic review than the Kansas Geological Survey's M-series geologic maps. The KGS does not guarantee this map to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations made from the map or decisions based thereon.

Sources

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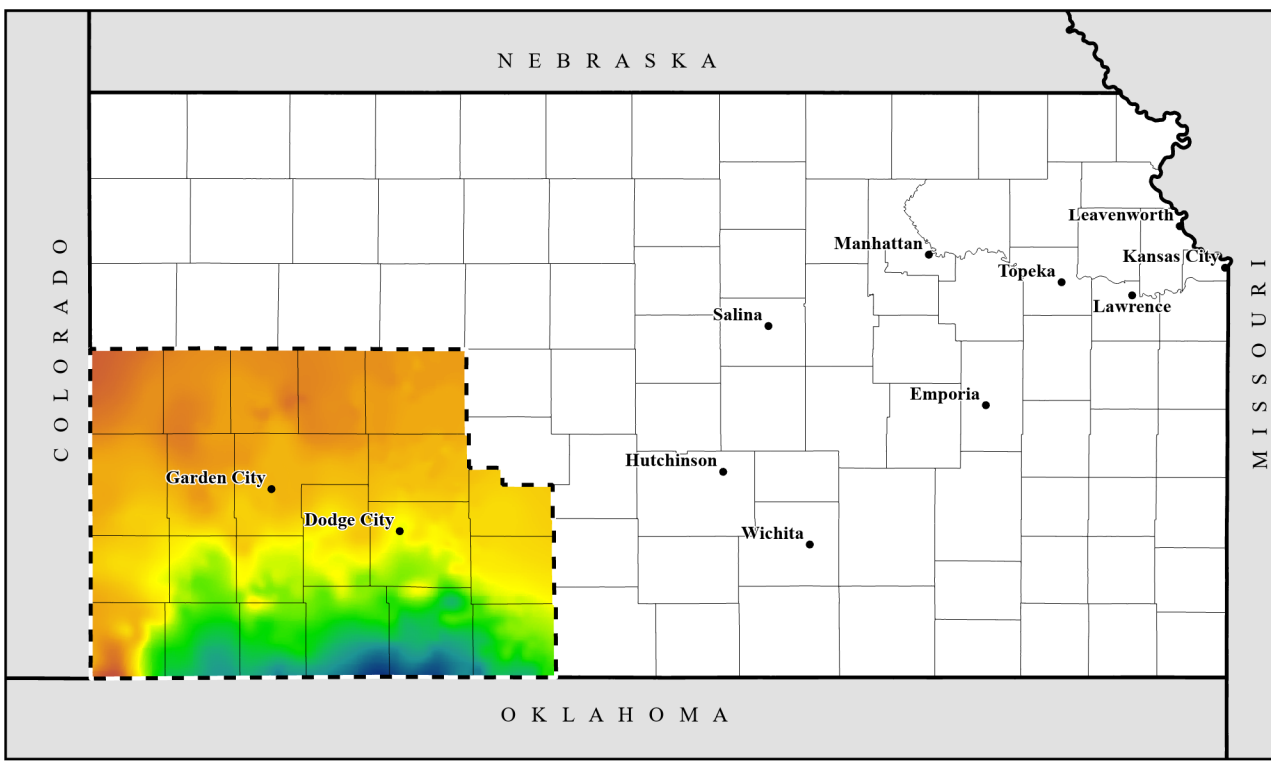
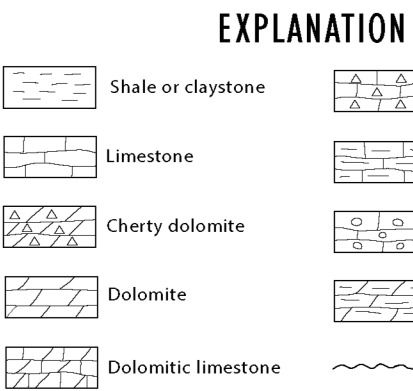
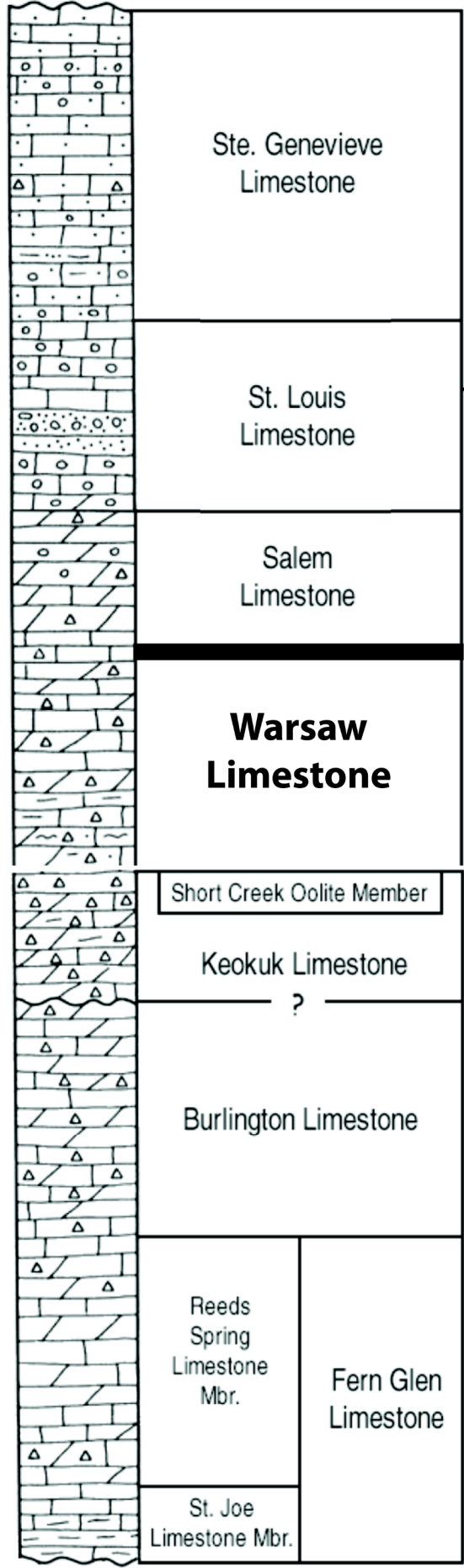
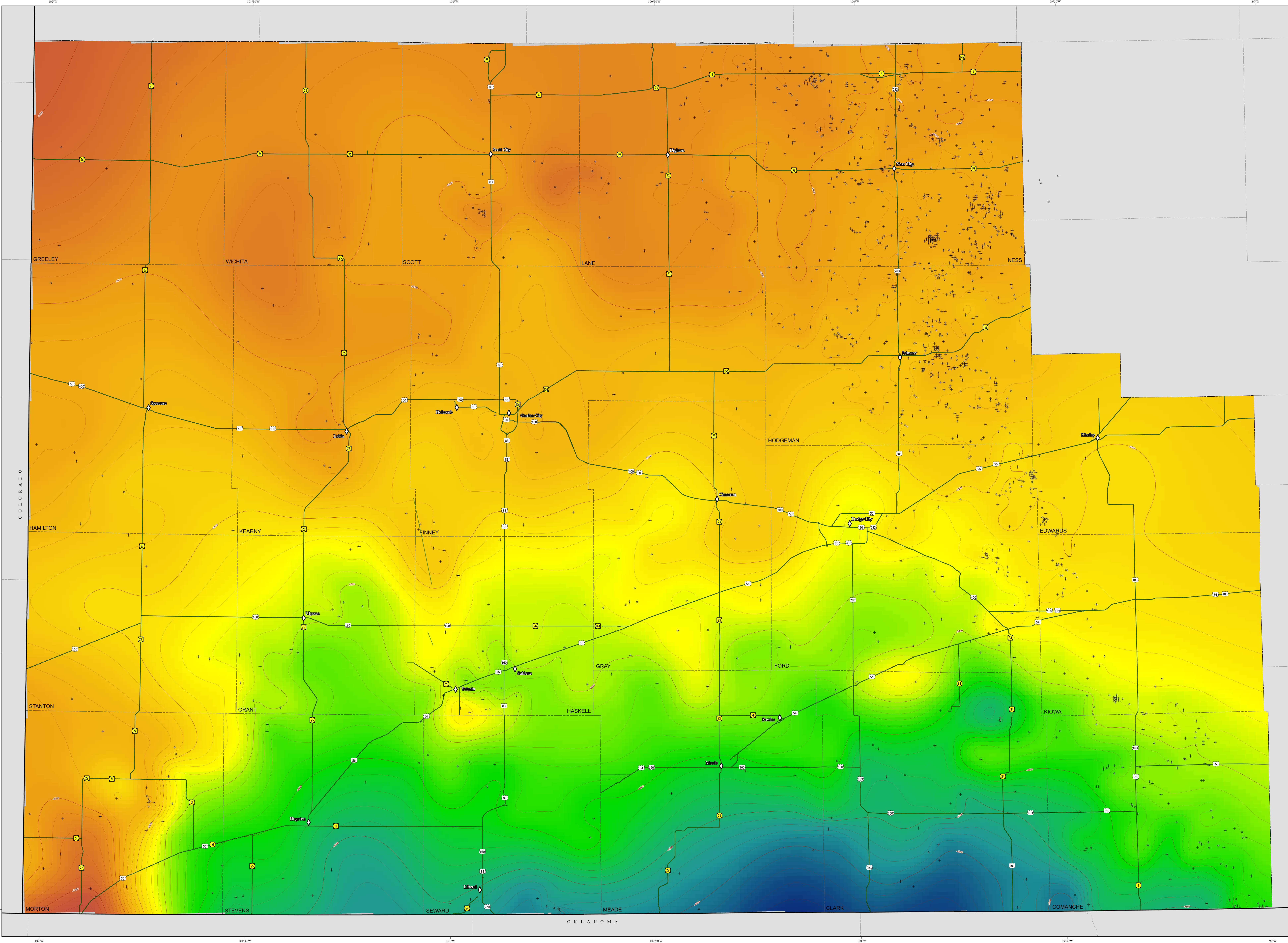
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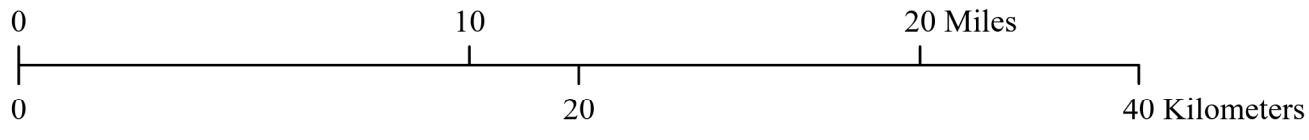
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SUGGESTED REFERENCE TO THE MAP

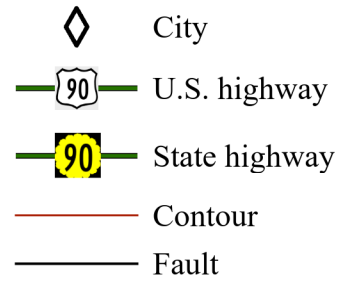
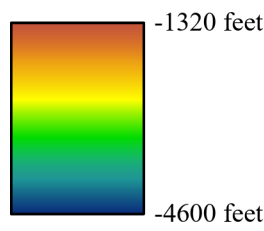
Ortega-Ariza, D., Arimes, A., Andrzejewski, K., and Chitta, K., 2025, Preliminary Structure Contour Map on top of Middle Mississippian-age Warsaw Limestone in southwestern Kansas: Kansas Geological Survey, Open-File Report 2025-44, scale 1:270,000, unpublished.



Dickman 4 core (14,664-14,680 ft) in Ness County. Although its stratigraphic position is uncertain, this core may be time-equivalent to the Warsaw Limestone, as suggested by the KGS Top database and Mississippian submap. The lower half of the core consists of brownish-tan to light gray wackestone/packstone/grainstone facies. The upper half is dominated by brownish-tan wackestone/packstone facies. The middle portion of the core at the top highlights silica-replaced evaporite textures (KGS - Images of Kansas Core: https://gimaging.kgs.ku.edu/windows.net/web/web_1/WebDocs/Images/2013/1044235141_001.jpg)



SCALE 1:270,000
LAMBERT CONFORMAL CONIC PROJECTION
WITH STANDARD PARALLELS AT 33 AND 45°N
CENTRAL MERIDIAN 100°30'W
NORTH AMERICAN DATUM OF 1983



Contour Interval = 100ft
Depths at Mean Sea Level (MSL)

