GROUND WATER FOR IRRIGATION IN THE
NARA VISA AND PORTER AREAS,
QUAY COUNTY, NEW MEXICO
By F. D. Trauger
July 1953

OFR: 53-258

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STATUS OF REPORT

Name of report: GROUND WATER FOR IRRIGATION IN THE NARA VISA AND PORTER AREAS, QUAY CO. N.M.

Author(s): F. D. Trauger

Cooperator(s): N.M.Bureau of Mines and the State Engineer of N. M.

Initial draft completed:(date) 6/10/53 Final draft completed:(date) 6/11/53

Initial draft criticised by: C. S. Conover (name) (date) 6/11/53

(name) (date)

Final draft approved by:(name) (date)

Final draft reviewed by:(name) (date)

(name) (date)

(name) (date)

Review of final draft completed:(name) (date)

Manuscript approved by:(name) (date)

Manuscript sent Washington:(date) 6/11/53 (In letter form) for approval or release to:

and for publication by:

Manuscript returned from Washington:(date) 6/23/53 with remarks: Retype in memo form in accordance with editorial suggestions and return Wash for review & approval.

Corrections to manuscript made by:(name) C. S. Conover (date) 6/23/53

Revised manuscript returned to Washington for release, ~~accompanied by proposed press release~~:(date) 6/24/53

Report approved for: publication by: (name) and for

and released to public (~~8/18/53~~) and open file (8/18/53) (date)

Distribution: (Planned; Name & Address) (date sent) (date revision sent)

1st typing:

Original: C.A.Grimes, Co.Agt,Tucumcari

Copies: 1st carbon: Bliss
2d " : Sayre
3d " : Callaghan
4th " : office (to Borkstresser)
5th " : office (to Trauger)
6th " : office
7th " : office

RETYPED 6/24/53 in accordance with Wash. corrections & distributed:
Original and 1 copy Washington 6/24/53
Retyped 8/21/53 & mailed: Bliss, Callaghan & Grimes
3/10/51 copy to Tom Meeker

For names of individuals and agencies desiring copies and by whom consulted see separate sheet. (This form must be initiated by author for all reports by time initial draft is completed and must be attached to "office copy" when original is mailed to Washington. Status should appear on other copies when filed or distributed.)

GROUND WATER FOR IRRIGATION IN THE NARA VISA AND PORTER AREAS, QUAY COUNTY, NEW MEXICO /

By F. D. Trauger
U. S. GEOLOGICAL SURVEY

July 1953

This memorandum was prepared in response to a request from Mr. C. A. Grimes, County Agent, Quay County, for information concerning the availability of ground water for irrigation in the vicinity of Nara Visa and Porter, Quay County, N. Mex. It is based on a reconnaissance made by the writer and Mr. Paul Kemp, of the County Agent's office, on May 21 and 22, 1953. The reconnaissance was made as a part of a study of the ground-water conditions in Quay County under the cooperative program with the New Mexico Bureau of Mines and the State Engineer of New Mexico.

The problem, according to Mr. Kemp, is whether shallow ground water is available in sufficient quantities to justify the expenditure of the money necessary to develop irrigation wells. Mr. Kemp introduced the writer to several landowners who were interested in developing irrigation wells.

Because of the short time available to examine the areas in question, it was necessary to rely on the landowners for much of the information obtained concerning water levels in existing wells and the types of rocks penetrated by these wells. However, rock outcrops were examined in a few places and water levels measured in a few wells. Water samples were collected from two wells near Porter and one spring near Nara Visa for the purpose of determining to some extent the quality of the water that may be developed.

In the vicinity of Nara Visa the rocks underlying the land surface belong to the Ogallala formation of Pliocene age. The Ogallala formation consists of partly cemented conglomerate, sandstone, siltstone, clay, and caliche. It is overlain locally by a covering of Quaternary alluvium derived largely from the underlying rock. The thickness of this alluvial cover ranges from a few inches on some of the higher ground to more than 20 feet in some of the stream valleys.

/ Open-file report. Not reviewed for conformance with editorial standards and stratigraphic nomenclature of the U. S. Geological Survey.

No well logs were available that would indicate what the maximum thickness of the Quaternary fill might be in these valleys. The thickness of this fill is important because present evidence suggests that any shallow ground water to be obtained in quantities large enough for irrigation will come primarily from the Quaternary fill, and not from the Ogallala formation. Several wells were reported to tap water-bearing gravel at the relatively shallow depth of 15 to 25 feet. One dragline pit was examined and found to be about 20 feet deep. The bottom of the pit was at ground-water level, and the material at that depth was a clean, coarse, sandy gravel.

Information supplied by landowners in the area indicates there is no uniform horizon at which water is encountered. Water may be reported obtained in good quantities in a certain well whereas the supply in a nearby well of similar depth may be reported to be meager. These differences in yield may be due, in part, to the methods used to finish and develop the wells. However, from the information furnished as to the types of materials penetrated, it appears the great differences in yield are the result of differences in the character of the water-bearing materials, and that wells tapping the Quaternary gravel and sand deposits are the wells having the good yield whereas those tapping the Ogallala formation are the wells reported to be poor.

It is possible that wells properly drilled and finished in the Ogallala formation would yield water in sufficient quantities for irrigation. Some exploratory drilling would seem to be justified inasmuch as this same formation furnishes water to irrigation wells in the vicinity of House in southern Quay County. However, the prospects of obtaining irrigation water from the Ogallala formation in the vicinity of Nara Visa do not appear to be as favorable as for getting it from the Quaternary deposits.

Shallow ground water that may be obtained from the Quaternary deposits and possibly from the Ogallala formation in the vicinity of Nara Visa has its source in the precipitation that falls within the local drainage area. There is no evidence to indicate that recharge may come from areas outside the local drainage. As a consequence, it may be concluded that the total quantity of water available for development is relatively small. Just how much might be recovered can be determined only by making a detailed ground-water study of the area. It is probable that a few wells, favorably located, could recover for beneficial use much of the shallow ground water that is presently draining away through the gravel and sand deposits underlying the present stream valleys. Proof that water is being wasted is evidenced by the patches of meadow and bog land along some of the stream courses.

An analysis of water from a spring (SE¼ sec. 23, T. 16 N., R. 36 E.) that emerges from a sandstone bed of the Ogallala formation, on the R. C. Bell property about 3 miles east of Nara Visa, had a chloride content of 24 ppm, a sulfate content of 29 ppm, and an alkalinity (carbonate) of 209 ppm. The specific conductance was 452. If the well waters of the area have approximately the same composition they would be excellent for irrigation purposes. A sample of water taken from a well at Obar had a specific conductance of 593.

The ground-water situation in the vicinity of Porter is similar to that about Nara Visa, with one important difference. The Ogallala formation is not present. The Quaternary alluvial cover, not shown on the geologic map of New Mexico, lies upon the Chinle formation (Triassic). The Chinle formation is not generally a good source of water. It consists mostly of clay, shale, and siltstone hence the yields are commonly low, and the quality is often so poor as to make the water unfit for any use. In the vicinity of Porter, the Quaternary alluvial cover and channel fill must be depended upon to furnish all water for domestic, stock, and irrigation purposes.

One well on the Jackson property (SE¼ sec. 36, T. 12 N., R. 34 E.) was drilled to a depth of about 42 feet and obtained water in a medium to coarse sand and fine gravel. The well was test-pumped and yielded about 300 gallons per minute. A second well drilled about 300 feet toward the north did not develop a good yield and consequently was not cased.

According to Mr. Jackson, the wells were bottomed in a reddish-colored clay which was penetrated to a depth of 3 to 4 feet. If, as it seems probable, this red clay is part of the Chinle formation, there is no point in drilling deeper. However, the clay could be a comparatively thin Quaternary deposit, derived from the Chinle, with more gravel below it. Further drilling in this vicinity should test this possibility by penetrating the red clay to a greater depth.

The water levels in the two wells on the Jackson property were within 15 feet of the ground surface, and according to Mr. Jackson this comparatively shallow water table has developed within the past 40 years. Some 200 feet west of the drilled wells is an old dug well which Mr. Jackson reports had a water level about 35 to 40 feet below the surface some 30 or 40 years ago. The history of the water level in this well, as recalled by Mr. Jackson, indicates there has been a more-or-less steady rise in the water table during the past 40 years.

Mr. Jackson's property lies athwart a poorly defined drainageway in a shallow valley about three-fourths to one mile in width. According to Mr. Jackson, the grounds about the house and wells are subject to occasional flooding. During such occasions, water stands for several days but gradually infiltrates or drains away. Mr. Jackson has observed some rather sharp rises in the water level in the dug well following these periods of flooding.

It seems reasonably certain that the water obtained in the wells on the Jackson property is water stored in the Quaternary gravel and that this gravel, according to what is known of other wells in the area, does not constitute a continuous or widespread aquifer. If irrigation wells are developed in this aquifer, the water will come from storage in the gravel. The amount that can be removed annually without seriously depleting the supply will depend on the annual recharge. There is not sufficient data available at this time to determine what the safe yield might be.

The situation that prevails on the Jackson property appears to prevail at a number of places in the vicinity of Porter, and the same conclusions are believed applicable. The aquifers are local in character and will need to be searched out by test drilling. They should be considered as reservoirs easy to empty and comparatively slow to fill. Any program of development of irrigation wells should be considered carefully with the prospect in mind that the wells would not be a fully dependable source of water for a long period of time. The individual aquifers might support a small development for an indefinite period of time.

Samples of water obtained from two of the drilled wells on the Jackson property showed a relatively large content of dissolved solids. Water from the well that test-pumped at 300 gpm had a specific conductance of 1,180, a chloride content of 96 parts per million, a sulfate content of 184 parts per million, and a carbonate alkalinity of 367 parts per million. Water from this well would be generally satisfactory for irrigation. Water from the well not cased or finished had a specific conductance of 2,660, a chloride content of 330 parts per million, a sulfate content of 656 parts per million, and a carbonate alkalinity of 396 parts per million. Water of this quality normally would be of doubtful suitability for irrigation.

It is possible that further investigations planned for Quay County will appreciably alter the conclusions reached in this rather hasty appraisal of the situation.