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PROCEDURES FOR THE OPERATION OF TRINIDAD RESERVOIR PURSUANT TO THE DECREE OF THE LAS ANIMAS COUNTY DISTRICT COURT (CIVIL ACTION 19793)

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES
MARCH, 1983

Preliminary

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Foreword.

This report was prepared by Lawrence E. Dezman, P. E., Senior Water Resources Engineer; under the direction of D. Rao Suvarna, P. E., Chief, Water Supply Branch; Harold D. Simpson, P. E., Assistant State Engineer, Engineering Section; and Jeris A. Danielson, P. E., State Engineer.

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INTRODUCTION

The decretal portion of the 1965 Model storage transfer decree (Las Animas County District Court, Civil Action 19793) instructs the State Engineer of Colorado to make flow determinations and to provide certain assurances for the administration of Trinidad Reservoir. This is to be done in such a manner that the ten-year continuing progressive series of the Pugatoire River at a stream gage (Thatcher) below Van Bremer Arroyo remains the same as it would have been had the Model Reservoir storage right not been transferred to Trinidad Reservoir. In November, 1980, the State Engineer solicited recommendations from downstream water users as well as the Purgatoire River Water Conservancy District on procedures to make these flow determinations. The engineering responses received indicated a general agreement on the important hydrologic variables to be considered.

This report includes a brief history of the Trinidad Reservoir project and sets forth the technical development of the flow determinations. A summary of reservoir operation to date and a comparison against the flows determined for the "no-project" situation is presented.

HISTORY

Interest in a water project in the Trinidad area started in the early 1930's with concerns over severe flooding in the Purgatoire Valley. Several alternatives to reduce or eliminate damage, including channel modification and dams, were reviewed by the Corps of Engineers. Preliminary design of a dam at Sopris, about one mile upstream of the present Trinidad Dam, was circulated for review in the late 1930's. Subsequent economic studies revealed that a single purpose dam, either flood or irrigation, was not feasible. However, a multi-purpose dam and reservoir could be justified.

The Corps of Engineers studied the flood control and construction aspects of the project while the Bureau of Reclamation (USBR) studied irrigation and water supply. The USBR (1964) found that no decrease in available downstream water would occur if inefficient lands (class 6W) in the Trinidad area were removed from irrigation, an upper limit of 19717 acres was irrigated (up to 40000 acres had been irrigated historically) and Colorado water law was observed.

A list of Federal documents concerning the development, analysis and design of the project is included in the Appendix. Notable among those are Volumes 1 and 2 of the Irrigation Report, Trinidad Project, Colorado (Corps of Engineers), Upper Arkansas River Basin, USBR Region 7, 1964.

The 1965 Model transfer decree, granted by the Las Animas County District Court in Civil Action 19793, addresses the transfer of the Model Reservoir storage right and a change in use from winter direct flow to storage for project ditches, and was the last obstacle to final design and construction of the dam. Concerns of downstream water users prompted inclusion in the decree of the language, "...the quantity of water occurring in the ... Purgatoire River...below Van Bremer Arroya shall remain and be the same, as determined by the State Engineer, during any period of ten consecutive years reckoned in continuing progressive series...as it would have been had the Model Reservoir Right not been transferred to Trinidad Reservoir," (Civil Action 19793). Other conditions such as "Operating Principles - Trinidad Dam and Reservoir Project" and the Arkansas River Compact are included in the decree.

The Purgatoire River Water Conservancy District (PRWCD) was formed in the early 1960's as the entity responsible for repayment and operation of the project. Pursuant to the 1965 transfer decree, PRWCD controls water rights of 11 ditches and operation of the reservoir. The 11 ditches (Table 1) are all below the reservoir and above the entrance to the Purgatoire Canyon near Alfalfa (Figure 1).

In March 1967, a decree confirming execution of a contract between PRWCD and the United States allowed start of the construction phase of the project. The Corps of Engineers began work in 1971 with the outlet works and tower. Embankment construction for the rock and earthfill dam commenced in 1972 and proceeded from the abutments inward until early in 1975 when only the closure at the river remained. Concurrent with embankment construction, the Colorado and Wyoming Railroad and State Highway 12 were relocated beyond the perimeter of the reservoir. The embankment was completed in 1976 and storage began in mid-August, 1977.

Table 1
Project Ditches.

Ditch	Decreed Direct Flow (cfs)	Decree Date
Baca Joint	6.00	11/30/1861
	2.82	11/15/1862
	2.70	03/11/1877
	14.38	11/04/1883
	14.73	06/21/1886
	15.00	03/12/1887
	45.56	06/12/1920
Chilili	7.00	04/30/1862
South Side	0.50	06/30/1863
	1.40	04/30/1868
	6.00	11/01/1875
	34.00	02/17/1876
	4.00	12/25/1876
	18.60	04/07/1877
	4.00	12/15/1882
	16.84	11/23/1883
	60.00	04/30/1884
	9.70	02/15/1888
	8.00	03/01/1888
Victor Florez	2.00	11/23/1897
	2.00	12/31/1903
El Moro	1.18	11/15/1862
	1.30	03/11/1877
Model	200.00	01/22/1908
Johns Flood	4.00	03/20/1862
	1.28	01/01/1863
	1.25	01/01/1864
	5.10	04/10/1864
	7.35	10/07/1865
	2.25	05/31/1866
	2.40	04/01/1873
	100.00	10/20/1902
Hoehne	4.72	01/01/1863
	0.80	04/10/1864
	16.65	10/07/1865
Burns Duncan	6.00	01/01/1866
Lewelling-McCormick	3.75	01/01/1864
	4.00	06/01/1865
	10.00	10/21/1886
Salas	2.54	04/10/1864
	4.00	02/01/1866
	2.25	05/31/1866

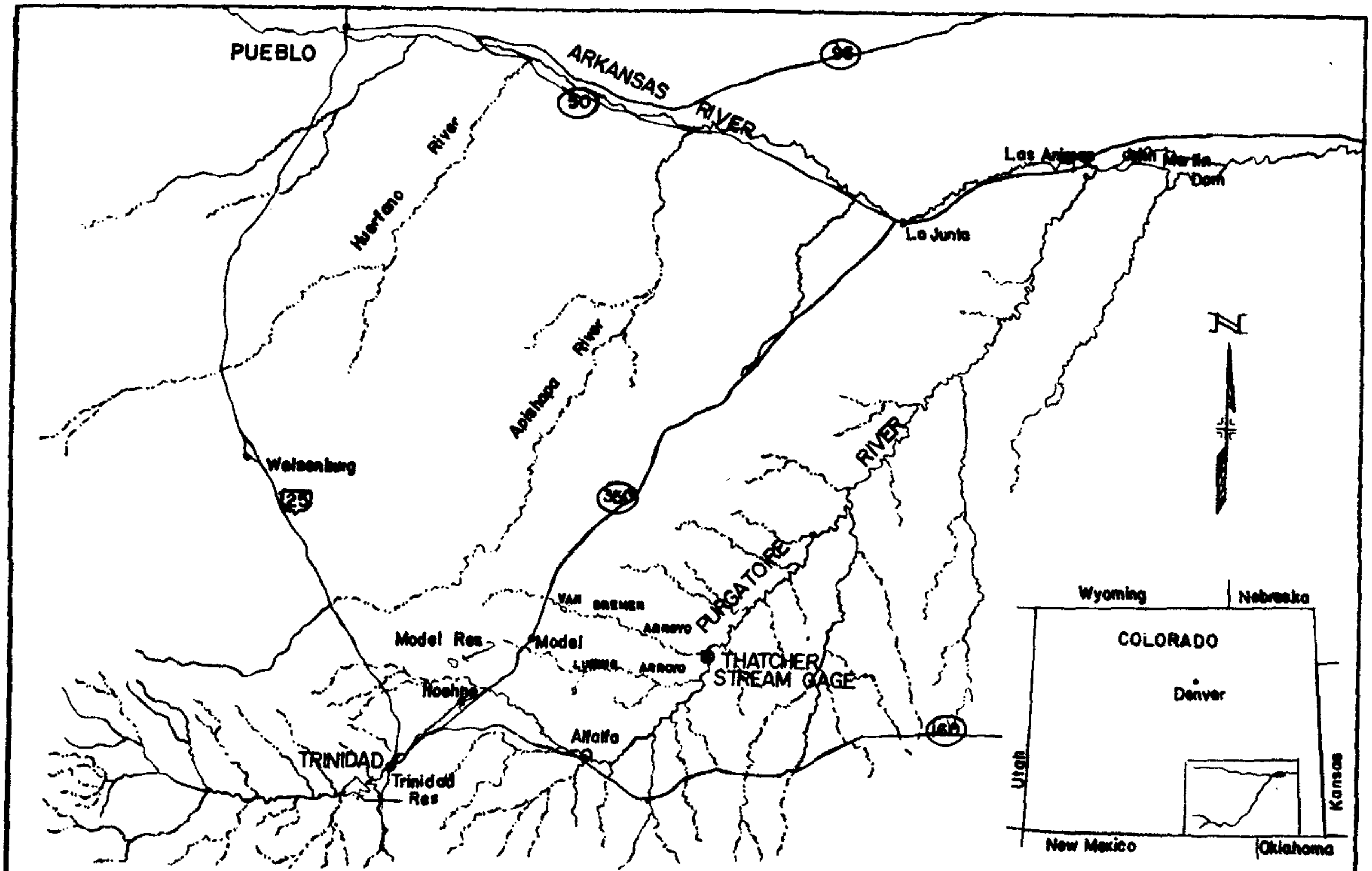

FIGURE 1. LOCATION MAP

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BASIN DESCRIPTION

The basin tributary to and land served by Trinidad Reservoir are located in south-central Colorado. The reservoir is situated at the intersection of the Front Range of the Rocky Mountains and Great Plains. Irrigated lands are on the plains, adjacent to the river except for the Model tract, which is several miles north (Figure 2) Basin elevations range from 14,047 feet above mean sea level at Culebra Peak along the western boundary of the basin to 6,210 feet at the reservoir. The Pugatoire River then drops to 6,000 feet at Trinidad, 4,790 feet at the Thatcher stream gage, and 3,860 feet at its confluence with the Arkansas River.

On the plains below Trinidad, the river flows northeasterly for approximately 15 miles then southeasterly for another 15 miles to the location of the former stream gage near Alfalfa. The river then turns northeasterly for the remainder of its route to the confluence with the Arkansas River below Las Animas and above John Martin Reservoir (Figure 1). Immediately below Alfalfa, the river enters a rugged canyon that in places is 700 feet deep. Above the

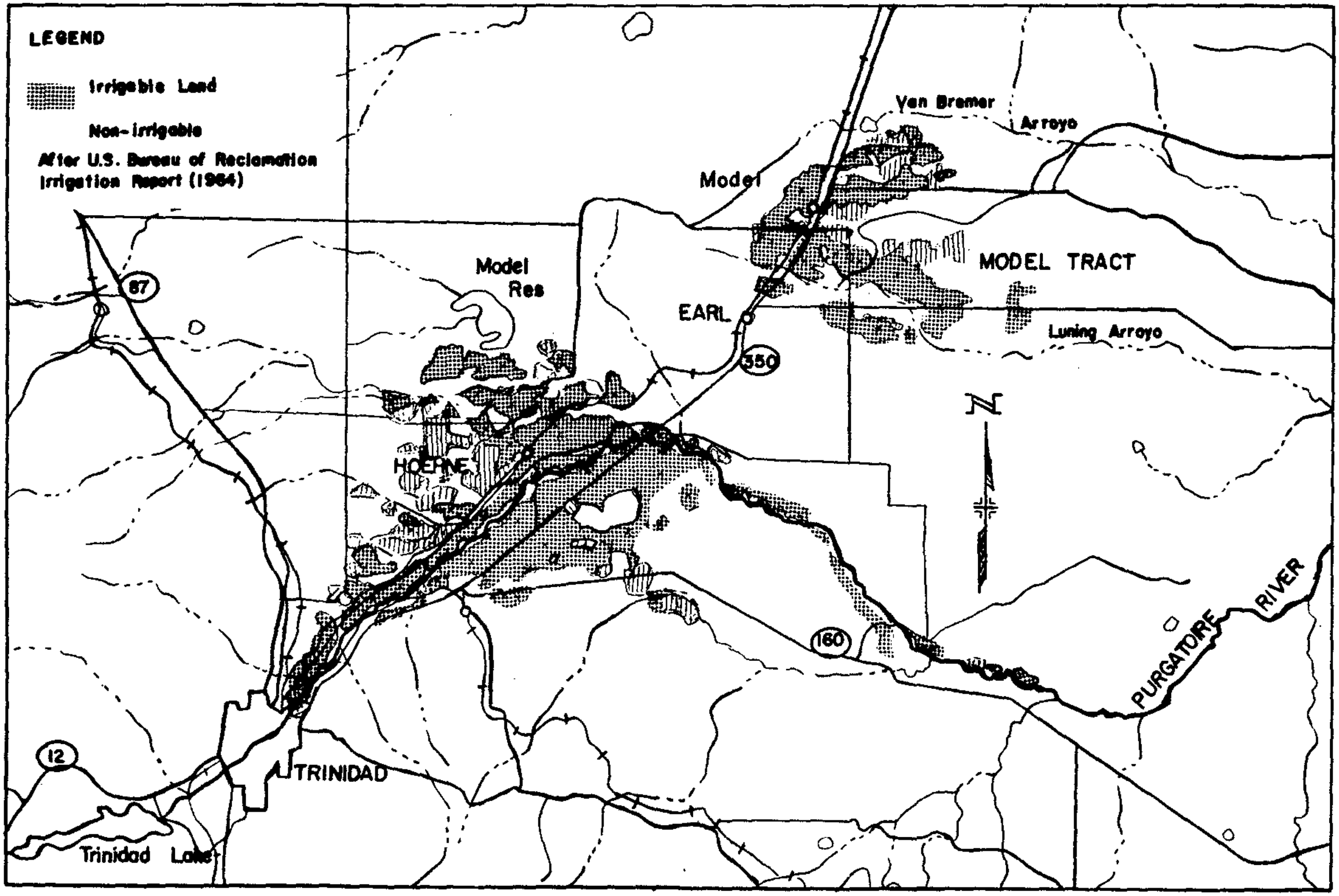

FIGURE 2. VICINITY MAP AND IRRIGABLE AREAS.

Highland Irrigation Company headgate 75 miles downstream of Trinidad, the river emerges from the canyon and remains in a plains setting to its confluence with the Arkansas River.

Most of the irrigated lands served by the project are supplied by ditches with headgates on the northeasterly reach of the Purgatoire River downstream of Trinidad (Figure 2). Return flows return directly to the river. The Model tract of 6,000 acres is more than four miles from the river and return flows from irrigation are tributary to Luning and Van Bremer Arroyos.

Extensive climate variations occur in the basin. Average annual temperatures range from 41.5 degrees F. at the 8,800 foot elevation of North Lake station, to 52 degrees F. at the lower plains stations. Annual precipitation ranges from 40 inches along the Culebra Range to 20 inches at North Lake to 13 inches on the plains. Table 2 lists the climate stations considered in this study.

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Table 2
Climatological Stations

Station Name	Location (Distance & direction from Trinidad)	Type of Data
Dehli	42 mi. NE	precipitation temperature
Doherty Ranch	37 mi. ENE	precipitation
Branson	36 mi. ESE	precipitation temperature
Trinidad FAA AP	10 mi NE	precipitation temperature
Trinidad	in town	precipitation temperature
North Lake	30 mi. WNW	precipitation temperature
Apishapa	33 mi. WNW	snow course
Bourbon	35 mi. W	snow course

DEVELOPMENT OF THE FLOW PREDICTION METHODOLOGY

General.

In order to administer Trinidad Reservoir, the State Engineer must measure Purgatoire River flows at Thatcher as well as predict what flows would have been observed at Thatcher had the Model Reservoir storage right not been transferred. This section deals with the question of predicting the latter.

Two basic types of models are available for prediction of stream flows - physically based deterministic models or statistical models. A physical model, with its inherently desirable characteristics such as wide range of applicability and adjustable individual components, was not formulated because of insufficient data. Model calibration would require stream and climatological data for inflow, outflow and storage for each hydrologically different reach of the river. These data are not available through the historical record. Several years would be required to instrument the system and collect sufficient data and would be extremely expensive. Additional problems related to altered return flow regimes resulting from project operation would have to be overcome.

Due to the constraints noted above and the immediate necessity for a workable prediction methodology, a statistical approach was taken. The concepts considered indeveloping the methodology are set forth in the text of this report.

Relationships Investigated.

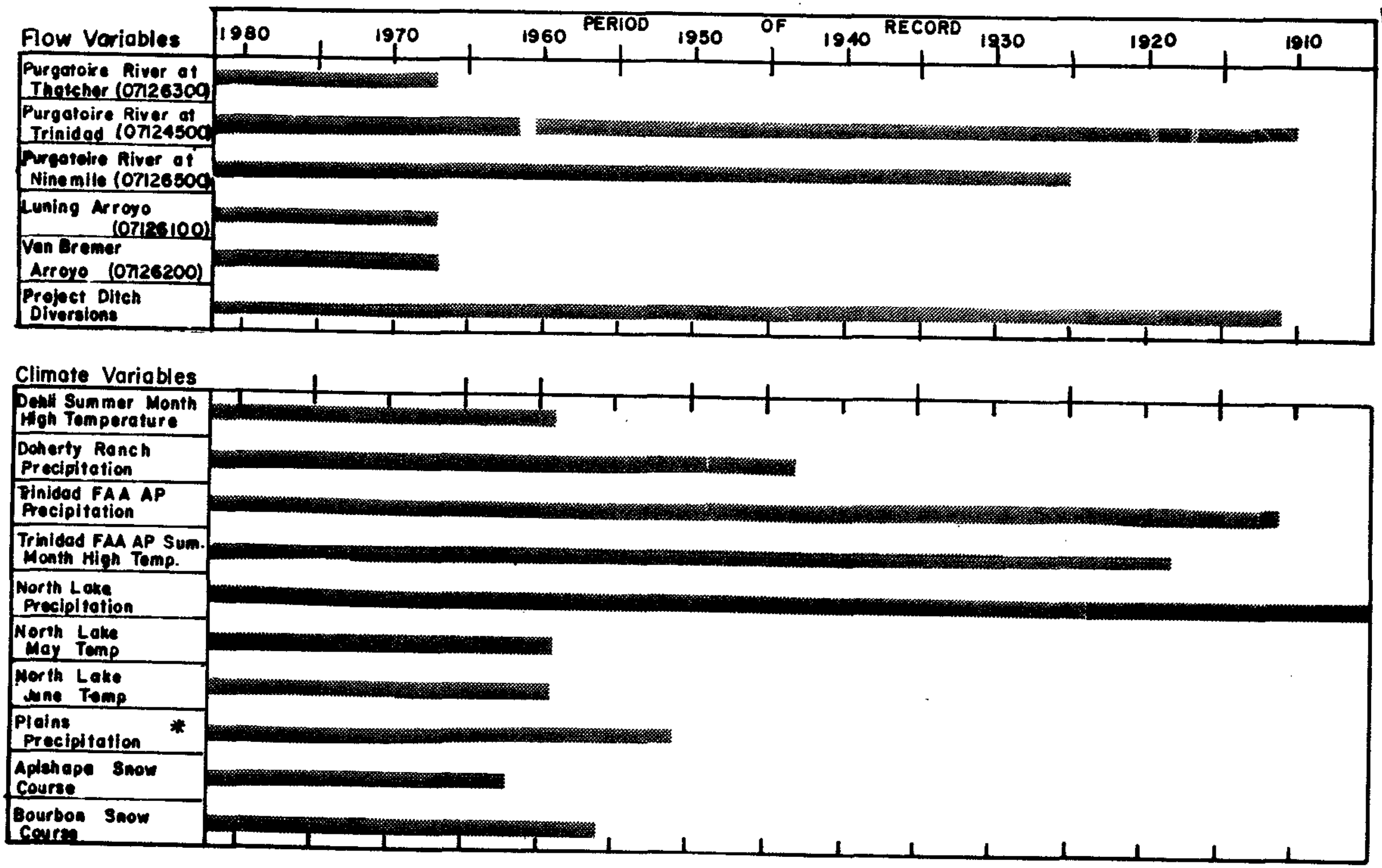
Several types of relationships were investigated before a final decision on an annual regression analysis was made. Among these were, monthly relationships between Pugatoire River at Thatcher flows, project ditch diversions and Purgatoire River flows at Trinidad. Lagged monthly flows, hydrograph separation and precipitation were also considered. None of the above yielded satisfactory results. It was concluded that despite reasonable correlations through the summer months, lack of precisely defined relationships through the remainder of the year severely impaired accuracy. Apparently the hydrologic system does not completely and consistently respond on a monthly basis.

Mass and double mass diagrams were also investigated. Because the time since reservoir operation began is short, no satisfactory conclusions could be reached.

Analyses indicated that relationships between variables on an annual basis were feasible. The two major classifications of variables considered are flow, and climate variables. Figure 3 summarizes the data available in each of these classifications and their periods of record. Flow data are from mainstem and side channel stream gages and diversion records. Climatological data include temperature and precipitation for both plains and mountain weather stations. An additional precipitation variable, plains precipitation, was synthesized from a Thiessen polygon and existing precipitation stations.

Computational Method Used.

Annual regression equations were computed by the stepwise multiple regression program (STEPR) contained in the IBM Application Package resident on Colorado State University's CDC Cyber 172 computer. This flexible program can select on the basis of statistics the important independent (predictor) variables in a stepwise sequence or allow the user to make specific choices of such variables. Both options were used in this study. Initially, all seemingly applicable variables were used to allow the computer to generate several equations (each with one more independent variable than its predecessor). These results were then analyzed to determine physical reasonableness and overlap between variables (multicollinearity). Results were



* Plains Precipitation = f (Dehli precip., Branson precip., Doherty Ranch precip., Trinidad FAA AP precip. and Thiessen Polygon).

FIGURE 3. VARIABLES USED IN ANNUAL REGRESSION ANALYSES.

then used as a guide in selecting independent variables. In this manner a prediction equation was designed to maximize physical meaning and statistical accuracy.

Selection of an Annual Regression Equation.

Lengthening the sample of the dependent variable and one of the independent variables was first examined. The dependent (predicted) variable, Purgatoire River flow at Thatcher (Q_{th}) and a potential independent (predictor) variable, Van Bremer Arroyo flow (Q_{vb}) have a period of record only since 1967 as a result of the 1965 Model transfer decree. Extension of Q_{th} back to 1925 was possible by correlation with flows of the Purgatoire River at Trinidad (Q_{tr}) and Ninemile Dam near Higbee (coefficient of multiple correlation, R=0.97). A similar extension was not possible for Q_{vb}.

Initial multiple linear regressions (MLR's) involved the lengthened record for the predicted variable, Q_{th}. Unfortunately, the best MLR's computed for the long record included diversions to project ditches. The problems with the lengthened record MLR's were threefold:

1. The statistical population of project ditch diversions has changed since Trinidad Reservoir operation began; diversions cannot be used as an

independent variable in the prediction mode,

2. The coefficient of multiple correlation was low and standard error of estimate was large,

3. Accuracy is limited by regressed input data.

Higher multiple correlation coefficients and smaller standard errors (item 2, above) may have resulted if a large scale integrator of the diverse areal precipitation on the plains had been available. The synthesized variable, plains precipitation, was an unsuccessful attempt to accomplish this.

While other MLR's were attempted using Van Bremer Arroyo flow as a predictor (independent) variable, the best MLR obtained for the 11 year period 1967-1977[1] is

$$Q_{th} = 3216 + \underset{(0.18)}{1.04}\, Q_{tr} - \underset{(1197)}{2875}\, SP_b + \underset{(2.09)}{4.35}\, Q_{vb} \qquad \text{(A)}$$

Where Q_{th} is the annual flow of the Purgatoire River at Thatcher, Q_{tr} is the annual flow of the Purgatoire at

[1] 1977 storage adjusted data used since minimal storage occurred late in the water year (August 19, 1977) and project ditches irrigated according to historical practices.

Trinidad, SP_b is the April 1 snow water equivalent at the Bourbon snow course and Q_{vb} is the annual flow of Van Bremer Arroyo. All flows are in acre-feet and snow water equivalent in inches. April 1 snow data is used since it generally represents the maximum accumulation available for stream flow. Standard errors of regression coefficients are given in parenthesis below the equation. The coefficient of multiple correlation and the standard error of estimate for this equation are 0.93 and 7,600 acre-feet (27 percent of mean annual flow), respectively. These are better than any obtained for lengthened record MLR's.

As an aid in understanding the physical significance of the variables in equation A, the following concepts are presented. A simplified mass balance of the hydrologic system can be presented as the equation

mountain snow pack runoff + mountain rainfall
runoff - consumptive use + plains precipitation
runoff $\pm$ storage change = flow at Thatcher

(B)

A distinction between mountain precipitation types is necessary for this discussion since the two are consumptively used to varying degrees. The storage change term includes influent or effluent groundwater effects and is assumed negligible on an annual basis.

The first three terms of equation B are principally addressed by

$$1.04\ Q_{tr} - 2875\ SP_b + \text{some portion of } 3216$$

in equation A . Notice the coefficient of Q_{tr} is nearly one. If no snowpack occurred during a year, the bulk of Q_{tr} would reach Thatcher. This is because runoff from thunderstorm events (i.e., mountain rainfall) cannot be used efficiently for irrigation, so consumptive use would be low. Considering the other extreme, if the snow pack was very deep, much less of Q_{tr} would would reach Thatcher since the longer snowmelt hydrograph is more useful for irrigation and, therefore, consumptive use would be high (note negative coefficient of SP_b).

The remaining two terms on the left side of equation B are principally addressed by

$$4.35\ Q_{vb} + \text{remaining portion of } 3216$$

in equation A. Van Bremer Arroyo flow integrates the rainfall amount, intensity and abstractions into a flow variable. Use of Q_{vb} is the single large improvement over the previously mentioned lengthened record MLR's due to this integration. Rainfall events on the plains, because of their small areal extent, did not correlate well. Use of the synthesized variable, plains precipitation, did not offer improvement. Similar reasoning can be used in regard to the use of snowpack as a climate variable for the mountains. It is more likely that snow events have a more general watershed coverage than do rainfall events. Since equation A essentially differentiates between the two inputs, it is advantageous to use the one that more accurately depicts the physical situation.

It should be noted that due to interdependence of hydrologic variables, the above explanation is valid in concept, but not absolutely accurate in every detail. Every factor in equation A plays some part in explaining each element of equation B (including the intercept, 3216). This is known as multicollinearity. Stated differently, each of the predictor variables does not add totally independent information to the equation. Efforts were made to reduce multicollinearity and thereby improve the statistical attributes and physical "feel" of the equation.

Time series are analyzed to determine if the data are stationary (time invarient). Only Q_{tr} demonstrates a long term trend. This is evidenced by a significant downward slope of a straight line fitted through the time series (Figure 4). Apparently the average annual flow of the Purgatoire River at Trinidad decreased some time after stream gaging began in 1896. A straight line fitted through

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ANNUAL SERIES

PURGATOIRE RIVER AT TRINIDAD

GAGE NO. 07124500

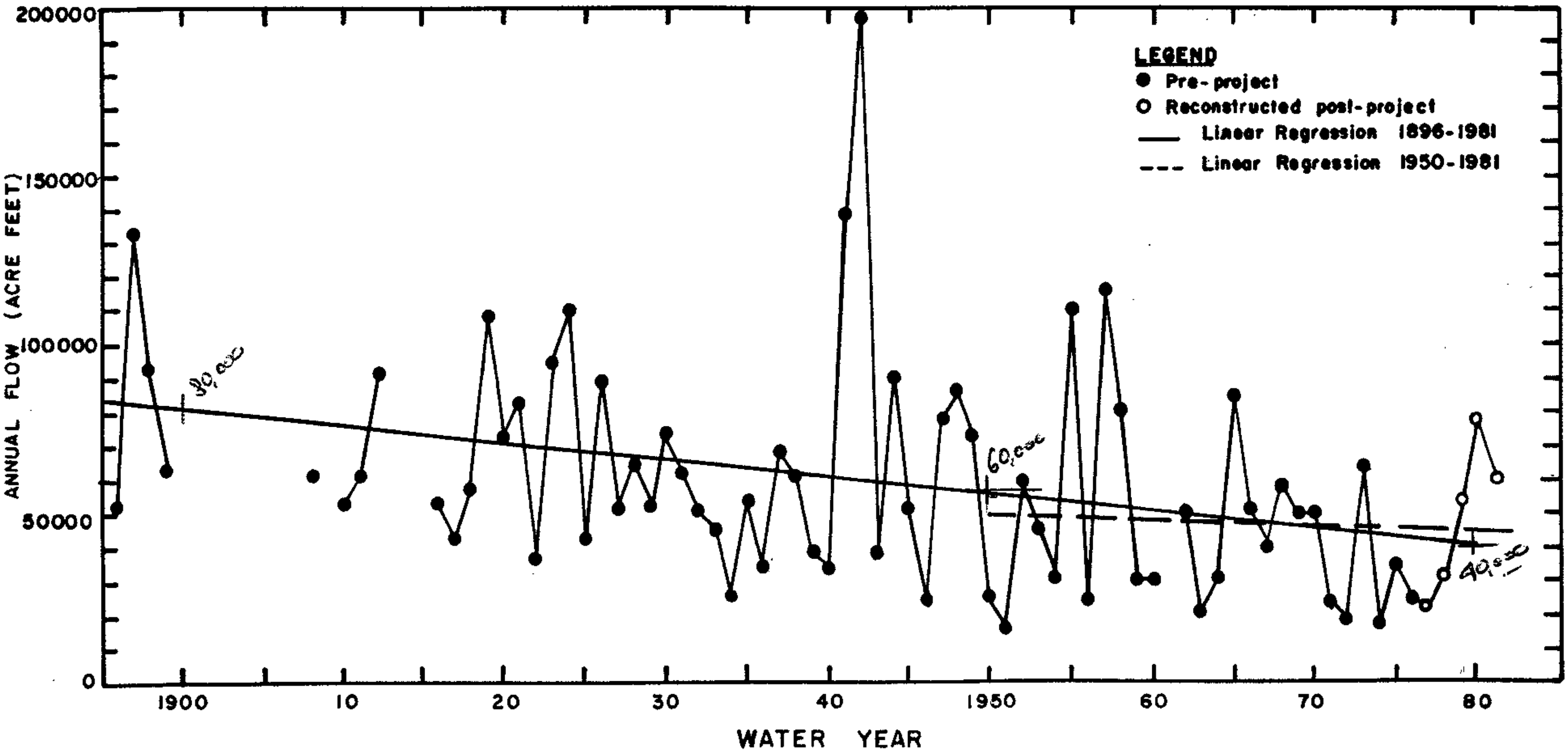

FIGURE 4. PURGATOIRE RIVER AT TRINIDAD TIME SERIES.

the 1950 - 1981 data does not have a significant slope (trend). Similar analyses on precipitation, snowpack and streamflow variables in the basin (including Purgatoire River at Ninemile Dam) show no trends. Of course, periods of record (Figure 3) for these variables are not as long as that for flow of the Purgatoire at Trinidad. The conclusion of the time series analysis is that the hydrology of the basin has been relatively constant over the last thirty years. ? 1950 - $Q_A \approx$ 60,000 a.f.
1980 - $Q_A \approx$ 40,000 a.f.

Based on the above physical and statistical reasoning, equation A was chosen as the best prediction equation for annual Purgatoire River flows at Thatcher.

RESERVOIR OPERATION

Operation to Date.

Trinidad Reservoir has been operated according to the, "Operating Principles - Trinidad Dam and Reservoir Project," which is appended to Volume I of the USBR Irrigation Report (USBR, 1964). Irrigation is limited to 19,717 acres of class 1, 2 and 3 lands and diversion of winter flows for storage is limited to native flow rather than native plus return flows as per historical practice. Accordingly, Table 3 shows the annual storage from 1977 to 1981. The reservoir is operated so that evaporation losses are replaced from storage.

In Spring 1980, 14,952 acre feet of exchange water from the mainstem of the Arkansas River was stored in Trinidad Reservoir. Since the exchange took place while ditches between the project area and John Martin Reservoir were diverting their full right, no water users were injured. In addition, the Arkansas River compact was fulfilled by the 14,952 acre feet placed into storage in John Martin.

Table 3.

Annual Change in
Trinidad Reservoir Storage

Water Year	Change in Storage Volume (af)[1]
1977	+1,170
1978	+970
1979	+16,320
1980	+21,970[2]
1981	+5,610

(1) from Water Commissioner and USGS records

(2) includes 14,952 acre-feet of exchange water

Proposed Operation.

The proposed operation of Trinidad Reservoir differs from operation to date only by use of equation A to determine the lower limit of deliveries (ten year progressive series). Operation to date has been according to the "Operating Principles, Trinidad Dam and Reservoir Project." The Principles define the ditches involved in the project, describe water rights, land limitations and water storage and use through the irrigation and non-irrigation seasons.

Proposed operation is summarized as follows:

1. Store and use water according to "Operating Principles, Trinidad Dam and Reservoir Project."

2. At the end of each water year, the State Engineer computes what Purgatoire River flows "would have been" at Thatcher absent Trinidad Reservoir using this equation (i.e., predicted flows).

$$Q_{th} = 3216 + 1.04\ Q_{tr} - 2875\ SP_b + 4.35\ Q_{vb} \quad (A)$$

Purgatoire River flows at Trinidad, Q_{tr}, are adjusted for storage and water stored by exchange after 1976. PRWCD records and the USGS publishes storage data. April 1 snow water equivalent, SP_b, is obtained from the USDA Soil Conservation Service. Q_{tr} and Van Bremer Arroyo flows, Q_{vb} are measured by the State Engineer's office.

3. Compute measured and predicted ten year sums of Purgatoire River flow, at Thatcher, Σ_m and Σ_p , respectively. Equation A is used in Σ_p after 1977.

4. Compute difference between sums, $\Sigma_m - \Sigma_p$.

5. Underdeliveries, $\Sigma_m - \Sigma_p < 0$, are to be made up from storage or project operations.

6. Adjustments in Van Bremer Arroyo flow, Q_{vb}, will be made by the State Engineer if significant base flow occurs due to changes in Model land irrigation resulting from the project and current construction.

7. Equation A is recommended for use as long as Q_{tr}, SP_b and Q_{vb} (after adjustment noted in Step 6, above) show no long term trends. The State Engineer will evaluate trends and make adjustments as necessary.

Table 4 demonstrates operation including the use of equation A through the 1977-1982 period.

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Table 4

Reservoir Operation Using Equation A, 1977-1982

Year	Measured Thatcher (Σ_m)(1)	Ten Year Sums (af) Predicted Thatcher (Σ_p)(2)	Difference ($\Sigma_m - \Sigma_p$)
1977	242 430	242 430	--
1978	230 020	224 541	5479
1979	228 940	230 071	- 1131(3)
1980	256 980	242 570	14410
1981	369 730	317 287	52443
1982	408 000	352 062	55938

(1) data from stream gage 07126300
(2) data from stream gage 07126300 until 1977, equation A used thereafter
(3) underdelivery in 1979, made up by project operation in 1980

CONCLUSIONS AND RECOMMENDATIONS

An annual regression equation is used to compute what Purgatoire River flows "would have been" at Thatcher had the Model Reservoir storage right not been transferred to Trinidad Reservoir. Other methods of predicting "would have been" flows were investigated. Lack of data precluded physical modeling of the watershed. Monthly regressions were rejected as being not statistically reasonable. Annual regressions without Van Bremer Arroyo data were not sufficiently accurate for the intended purpose. An annual equation was regressed from the 1967-1977 data set (equation A) that has a coefficient of multiple correlation of 0.93 and a standard error of estimate of 7,600 acre-feet (27 percent of mean annual flow). Results indicate that this equation includes the important independent variables, a linear relationship adequately models the situation and prediction errors do not appear to vary through the data ranges.

The proposed reservoir operation addresses use of equation A, data sources and exchange water. If the proposed operation had been implemented in 1978, the Purgatoire River

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Water Conservancy District would have underdelivered the ten year sum of Purgatoire River flows to the Thatcher stream gage in 1979. Operation to date has been according to "Operating Principles, Trinidad Dam and Reservoir Project," (USBR, 1964). Under these conditions, the project has overdelivered by the end of water year 1982.

APPENDIX

Partial List of Federal Documents
Concerning Trinidad Project

United States Bureau of Reclamation; September, 1964; Irrigation Report, Trinidad Project, Colorado, Upper Arkansas River Basin, Volumes 1 to 3; Denver, Colorado

United States Bureau of Reclamation; pre 1940; Trinidad Irrigation and Flood Control Project, Preliminary Report; report on file at Colorado Water Conservation Board Library.

Corps of Engineers, United States Army; June, 1953; Purgatoire (Picket Wire) River, Colorado, Review Report on Survey for Flood Control, Volumes 1 to 4; Albuquerque, New Mexico.

Corps of Engineers, United States Army; January, 1975; Draft Master Plan Design Memorandum No. 13, Trinidad Lake Project, Purgatoire River, Colorado; Albuquerque, New Mexico.

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SOUTHEASTERN COLORADO WATER AND STORAGE NEEDS ASSESSMENT ENTERPRISE

MINUTES

MARCH 18, 1999

The regular meeting of the Board of Directors of the Southeastern Colorado Water and Storage Needs Assessment Enterprise was held on Thursday, March 18, 1999 at 9:59 a.m., in the District Offices, 905 Highway 50 West, Pueblo, Colorado.

DIRECTORS PRESENT:

Robert Schrader	Gibson Hazard	Raymond D. Nixon
Lee Simpson	Ron Aschermann	Glenn E. Everett
Thomas R. Pointon	Leroy Mauch	Orville Tomky
Alan Hamel	Denzel Goodwin	David Sarton

DIRECTORS ABSENT AND EXCUSED:
Ralph Adkins, Edward Bailey, and Carl Genova

ASSESSMENT ENTERPRISE OFFICIALS PRESENT:
Attorney Stephen Leonhardt, Office Manager Toni Gonzales, Water Resources Manager Tom Simpson, Finance/Contract Assistant Neva Treiber, and General Manager Steve Arveschoug.

APPROVAL OF MINUTES:
Vice President Schrader asked if the members of the Board had received their copy of the Minutes of the February 18, 1999 meeting, and whether there were any corrections or additions. Hearing none, Mr. Pointon moved, seconded by Mr. Goodwin, to approve the Minutes. Motion unanimously carried.

FINANCIAL REPORT:
Treasurer Simpson reported that the Financial Report for the month of February for the Enterprise was mailed to the Board. Mr. Simpson moved, seconded by Mr. Everett, to approve the Financial Report of the Enterprise. Motion unanimously carried.

STAFF REPORT:
Mr. Arveschoug reported that David Egger and he had met with the Bureau engineers regarding the progress on the Pueblo Reservoir Enlargement Study. He said it was agreed that a completed draft study should be out for the District review and comment by the middle of April. The Bureau will then prepare the final report and present that to the Board at the May Board meeting.

Mr. Arveschoug reported that a sub-committee of the Storage Study Committee is being formed to begin work on the Project operations model developed by Colorado Springs. He said it is important that the model include consideration of the Winter Water Storage Program and the Project's east slope yield before it is used to determine the impacts of Project re-operations. The sub-committee will met on March 31st or April 1st.

Mr. Arveschoug reported that a small group of water users from east of Pueblo met in La Junta to discuss the next steps in studying the Arkansas Valley Pipeline. The group agreed to conduct a survey of domestic water providers in the Valley to determine the level of interest in a new pipeline project to deliver raw water. The survey will also develop information about future water treatment issues. The survey effort should be complete over the next few weeks. GEI will use this information to provide a preliminary configuration of a new pipeline and update the cost estimate.

Mr. Arveschoug reported that he had sent a letter to Dan Jewell, Acting Area Manager for the Bureau, to further outline the Bureau's work on the Phase II Storage Study, and the letter in response is in their Board jackets for their review. Attached to the letter from Mr. Jewell is a Memorandum of Understanding between the Bureau and the Water & Storage Needs Assessment Enterprise for the Bureau's participation in Phase II. The Bureau is agreeing to fund the first $5,000 for their expenses out of "investigation of Existing Projects" funding. Mr. Arveschoug said he will meet with the Bureau during the next 30 days on the MOU, and have it in final form for the Board's consideration at the April meeting.

Mr. Arveschoug reported the final draft of the MOA with Colorado Springs Utilities was sent to the Board for review. With last month's direction from the Board they were able to work out a compromise regarding water rights filings (paragraph 12). After discussion on this issue, Mr. Hamel moved, seconded by Mr. Pointon, to approve the MOA with Colorado Springs Utilities. Motion unanimously carried. Leah Ash presented a check for $30,000 to the Board for there contribution for the Phase II work, and she and Philip Saletta commented on how they fully support moving forward with the MOA and the strong commitment they have for this project. Mr. Arveschoug said that Appendix A-Proposed Plan of Action and Target Schedule for Preferred Storage Options Plan is attached to the MOA, and they will work toward the schedule dates. He stated his concern for keeping the project on schedule.

Vice President Schrader asked if there were any other matters to come before the meeting, and hearing none, Mr. Aschermann moved, seconded by Mr. Mauch, to adjourn the meeting at 10:15 a.m. Motion unanimously carried.

Respectfully submitted,

Toni Gonzales
Office Manager

Secretary