SCCH-FE-U

Summary of Ground Water Supply Conditions, Fort Huachuca, July 1970 - Department of the Army, Sacramento District, Corps of Engineers, Sacramento, California.

Director, Facilities Engineering

Chief, Utilities Division

2 Nov 70
Mr. King/mat/3335

1. The subject report and preceding studies and reports relating to water resources of Fort Huachuca are incomplete treatments of the subject of water resources available in that they neglect consideration of waste water reuse requirements for adequate reservoir capacity of both potable and reuse waters and adequate distribution systems for both waters.

2. Paragraph 5 of the referenced summary discusses the present water supply and requires elaboration. A distinction must be made between potable water requirements for the Post and water necessary for irrigation purposes. Annually the daily water use (now all potable except for Golf Course irrigation) will range from 2 - 2½ million gpd in winter to 5½ million gpd just before the rainy season in summer. After the rainy season starts the water usage will drop to 2 - 2½ million gpd again on days when no irrigation is done. This indicates that the potable water requirements are essentially constant throughout the year for a constant population and the seasonal fluctuations of water usage are a function of irrigation requirements. This is further verified by the relatively constant sewage flow throughout the year.

CC: MR. KING

3. Quantitatively, on the above basis, it would be entirely possible to meet the annual irrigation water requirements from reuse of annual flow of sewage effluent. This would require adequate storage capacity for effluent during non-irrigation seasons for makeup of demand during peak irrigation seasons. Further, it would require reliable adequate treatment of the effluent to make it acceptable for all irrigation purposes. Most of the effluent seasonal storage capacity exists in the East Range Pond. Effluent treatment would have to be upgraded at both sewage plants to obtain the required quality. Present technology can provide the facilities to obtain the required quality effluent at reasonable cost.

4. A complete irrigation distribution system serving all post areas would have to be installed. To avoid any possibility of drawing any water from the system for drinking purposes the system should be a total underground sprinkler installation including all housing areas.

5. Maximum water usage during a 24 hour period occurred in June of 1970 - 5,500,000 gallons. By June of 1971 there will be approximately 14 additional acres under irrigation plus 100 units of new family housing with attendant increased water usage and irrigation. This will add approximately 500,000 gallons per day to the maximum demand for a new high of 6,000,000 gal/day.

6. At the peak water demand season the newly installed canyon water reclamation systems will be supplying approximately 150,000 gpd to the potable water system. Approximately 350,000 gpd of potable water that was supplied for Golf Course irrigation in June of 1970 is now being supplied by sewage effluent. This leaves a

net of 5,500,000 gpd peak to be supplied from wells in June of 1971.

7. To pump 5,500,000 gpd in 16 hours requires 5,750 gpm well pumping capacity. Present well pumping capacity is 3900 gpm. This leaves a deficit of 1850 gpm well capacity for June 1971 - equivalent to 3 additional wells.

8. Present Post reservoir capacity is 5,450,000 gallons, of which only 5,000,000 gallons can be pumped safely. Reserving half of that as required minimum for fire protection leaves a net of 2,500,000 gallons to supply demand. With a maximum demand of 5,500,000 gallons per day there is a deficit of 3,000,000 gallons of reservoir capacity to meet Post maximum demand of known loads that will exist in 1971. The present water mains supplying water to the reservoirs will have to be augmented to permit delivery of the increased flow to the reservoirs. Unless the above situations are at least partially relieved before May of 1971 there will be need to curtail water for irrigational uses at that time.

9. The foregoing discussion has not treated with the short range effect of the second nine holes added to the Golf Course. The present irrigation system for the Golf Course is served solely from the effluent pond at Sewage Plant No. 1 with potable water make-up for any deficiency of effluent production. The requirement that effluent can only be used at night on the course in play will lead to the necessity to do total irrigation of all 18 holes at night next spring when the new nine is in play. To do this a second pump must be installed at the pond to furnish sufficient water to meet the irrigation requirements. Under these circumstances and with the most efficient utilization of present pond reservoir capacity a maximum of approximately 500,000 gallons of effluent could be reclaimed each day and used for a 10 hour irrigation period. The requirements would be approximately 1,000,000 gallons per irrigation period making it necessary to make up 500,000 gallons per day from the potable water system. The added 500,000 gallon per day demand on the potable water system could only be met by further curtailing other irrigation uses throughout the Post.

RECOMMENDATIONS:

1. As an immediate measure to meet the water needs of late FY 71 the pumps and boosters in wells 1, 2, 4, and 6 can be replaced with the increased capacity pumps on hand to give a net 600-800 gpm of additional pumping capacity or 865,000 to 1,150,000 gallons per day. The main water header along Brainard should be connected with a latteral intercept to the 18" line to Libby Field to permit delivery of the increased flow without prohibitive pressure drop. Also, the booster pumps at the Wherry Booster Station should be replaced with the pumps on hand to increase the pumping capacity up to the 1½ million gallon reservoir. These measures should be accomplished by 1 April 1971.

2. The effluent pond at Sewage Plant No. 1 should be enlarged or augmented to 1½ million gallon capacity to permit accumulation of all the daily effluent production from the plant without drastic drawdown of pond level. A second irrigation water pump should be installed parallel with the pump now at the No. 1 plant pond, and made an automatic pressure system responsive to irrigation demand. Convert the manual potable water makeup to an automatic system responsive to critical low pond level. These measures should be accomplished by 1 April 1971.

3. The secondary treatment facilities at Sewage Plant No. 2 should be installed as expediciously as possible in order to support effluent requirements for Golf Course irrigation. Only when this effluent is available will it be possible to meet the Golf Course irrigation requirements without potable water makeup.

4. On a long range basis the following should be done:

a. Install 3 to 5 million gallons of additional reservoir capacity in the potable water system. The added capacity is necessary to provide the flexibility for the cyclic surge in the storage system throughout the day period.

b. Drill 3 additional wells along Highway 90 between the East and North gates, north of Libby Field. This will permit drawing from a water source not being shared with nearby communities as is the case with the present wells. This will allow a degree of management of water table drawdown throughout the well field.

c. Install the necessary facilities to treat the effluent from both sewage plants to the degree necessary to qualify for all Post irrigational purposes. This will supply approximately 2 million gallons of water per day that would otherwise have to be drawn from the groundwater resource.

d. Enlarge the East Range Effluent Pond to an approximate capacity of 300 million gallons to act as an accumulation basin for impounding unused effluent during periods of minimum irrigation. The pond can then be used as a source for makeup during periods of maximum irrigation. With the upgrading of impounded effluent the pond can be used for recreational purposes also.

e. Install an irrigation water distribution and sprinkler system throughout the Post to handle a peak load of 5 million gallons per day of sewage effluent. This will permit the usage of the 500 plus million gallons of sewage effluent reclaimed yearly for irrigational purposes and reduce the water pumped from the well field by that amount annually.

SCCH-FE-U 2 November 1970
SUBJECT: Summary of Ground Water Supply Conditions, Fort Huachuca, July 1970

CONCLUSION:

Accomplishment of recommendations #1 and #2 are essential before the new nine holes of the Golf Course can be put into play because of the restriction that effluent may be used only at night on an active course. Recommendation #3 must be completed before the probability of severe curtailment of irrigation water use is eliminated. Accomplishment of recommendation 4a is important for the flexibility it will afford in storage and the ability to avoid pumping operations during periods that would add to the peak electrical demand charge.

Recommendations 4b through e are important for the ecology of the region. To eliminate the annual depletion of ½ billion plus gallons of ground water reserves is an important example of active conservation participation to the region, the state and the nation. By this means the Fort Huachuca water requirements from ground water resources can essentially be cut in half.

1 Incl
Dept of Army Report on Ground Water Conditions

ROBERT S. KING
Chief, Utilities Division
Facilities Engineering Directorate