Public-data File 85-35

WATER-LEVEL DECLINES IN WELLS IN SOUTH ANCHORAGE, ALASKA
Presentation to the Alaska Water Board

By

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INTRODUCTION

You have in your information packets a copy of DGGS Public-data File 85-13 entitled "Water-level declines in wells tapping lower Hillside aquifers, Anchorage, Alaska", which includes background information obtained prior to this summer's field work. The report shows that water-levels were declining at a rate of 1-5 ft/yr, that significant numbers of private, domestic wells have low tolerances to water-level declines, that a few wells were known to have failed, and that potential large increases in water consumption in the area created a significant potential for large numbers of well failures.

The objectives of field work carried out during the summer of 1985 by DGGS and DLWM personnel were to identify the extent and magnitude of water-level declines in south Anchorage, so as to facilitate DGGS projections of the effects of current and anticipated ground-water pumpage in the area. The field work consisted of measuring water levels in selected private water wells that met the following criteria:

1. A driller's well log with a reported static water level at the time of well construction was available;
2. The well was reported to have a column of water in the bottom of the well 30 ft or less in height;
3. The well could be located in the field;
4. The well was located in Sections 12, 15, 21, 22, 23, 27, or 28 of T12N, R3W SM, (please refer to fig. 1 on page 2 of PDF 85-13); and
5. The well owner consented to having a water-level measurement made in the well.

Water levels were successfully measured in 98 wells, a small proportion of the total number of wells in the area. Also, records of reported well failures in south Anchorage have been maintained by DGGS.

RESULTS OF FIELD WORK

The geographic area affected by declining water levels is approximately bounded by Birch Road on the east, and Rabbit Creek Road on the south. North and west of the lower Hillside area, water-level declines merge with declines that have occurred throughout the Anchorage confined aquifer system as a result of historic ground-water pumping.

Within the area west of Birch Road and north of Rabbit Creek Road, not all wells observed have exhibited water-level declines. In some areas, shallow wells (40 to 100 ft deep) have experienced water-level rises, while nearby wells over 200 ft deep have required deepening because only a few feet of water was present in the bottom of the well. The most pronounced area of water-level declines and residential well failures occurs in the SW¼ of section 10 and the west half of section 15 (please refer to fig. 5 on page 8 of PDF 85-13). Most of the 28 well failures that are currently known to have occurred during 1984 and 1985 are located in this area. Typically, water-level declines of about 20 ft appear to have occurred in this area.

CAUSE OF WATER-LEVEL DECLINES

Rapid growth in south Anchorage has been served exclusively with local ground water because Anchorage Water and Wastewater Utility's (AWWU) distribution network from Ship Creek and downtown Anchorage currently extends no farther south than Abbott Road. Public water service in south Anchorage is provided by discontinuous water-distribution systems supplied by non-connected

wells. The water-level declines observed in the lower Hillside have been caused by a combination of pumping from public and private water-supply systems throughout the lower-Hillside/south Anchorage area. The water-supply wells primarily responsible for water-level declines in specific areas of south Anchorage have not been identified.

MAGNITUDE OF PROBLEMS RELATED TO DECLINING WATER LEVELS

Problems stemming from declining water levels are currently found in private domestic wells up to 300 ft deep. In most places the probability is high that aquifers deeper than those currently suffering from low water levels are available and adequate for domestic supply.

Ground-water problems on the lower Hillside are comparable in many ways to problems associated with the Eagle River confined aquifer system with which state and municipal water managers are familiar. The two areas are similar geologically; also, large and small water users draw from the same aquifer system. Ground-water problems resulting from declining water levels on the lower Hillside, however, appear to be of a greater magnitude than they have ever been in Eagle River. Water levels have declined more, for a longer time, and over a larger area on the lower Hillside than in Eagle River. Many more well failures have occurred on the lower Hillside than are known to have occurred in Eagle River, and the potential for future well failures is larger on the lower Hillside than it has ever been in Eagle River. Effective management actions were taken in Eagle River in time to avoid widespread disruption of water-supply capabilities of existing wells. In the lower Hillside, such avoidance may already be impossible to achieve.

POSSIBLE RESOURCE DEVELOPMENT

Water-supply development in the lower Hillside area can be expanded by four processes: 1) deepening or redrilling of individual wells as required; 2) connection of problem areas to public water systems as problems occur; 3) limitations on future ground-water extraction and consumption in south Anchorage; and 4) importation of water to areas of south Anchorage currently served by public water systems that utilize local ground water.

The first process described above is already occurring. One senior water-rights holder is known to have deepened his well while junior water-rights holders and unpermitted water users take water from the same aquifer system. Other water-rights holders may also have had to deepen or redrill their wells. This is relevant to DLWM water officers who must decide the fate of current water-rights permit applications in view of the possible adverse effects of additional appropriations on existing water-rights holders.

The second process of connecting existing neighborhoods to public water systems may be unworkable and self-perpetuating because: 1) many lots are large and are distant from existing public water systems, causing costs to be prohibitively high; also 2) water for expanded public water systems will have to come from local wells (Anchorage Water and Wastewater Utility, pers. commun., September, 1985), causing further declines of water levels in nearby areas. The process does not address the fundamental cause of declining water levels, it merely utilizes a cosmetic approach of dealing with problems as they arise.

The third process of limiting ground-water use in south Anchorage can only be accomplished by enacting water-conservation measures, or by curtailing growth in residential, irrigation, commercial, and institutional water use.

Importation of water to south Anchorage requires an analysis of AWWU water production, treatment, and transmission capabilities, and the capability of area water resources to sustain production. The three sources of water with the possible capability of supplying south Anchorage are Eklutna Lake, Ship Creek, and north Anchorage ground water. Eklutna Lake is recognized as the long-term source of water for the Anchorage area. Because problems in south Anchorage are already occurring, however, near-term options warrant consideration. A cursory examination of AWWU water-production data, Ship Creek streamflow data, and north Anchorage ground-water levels suggests that alternate importation of Ship Creek water during the summer months, and importation of north Anchorage ground water during the winter months might effectively utilize Anchorage's water supplies with minimal adverse effects. A detailed analysis of this scenario is beyond the scope of this report. The current lack of water mains from north Anchorage to south Anchorage is a major obstacle to implementing such a scenario.