

IN COOPERATION WITH HOMER SOIL AND WATER CONSERVATION DISTRICT AND ALASKA ASSOCIATION OF SOIL AND WATER CONSERVATION DISTRICTS

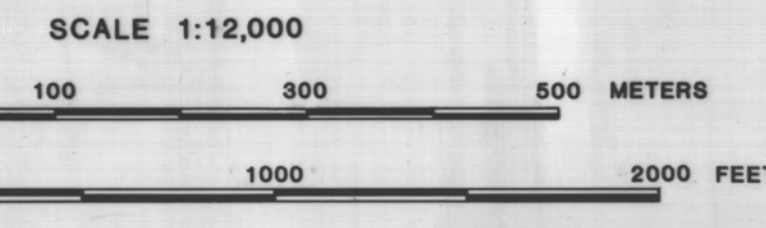
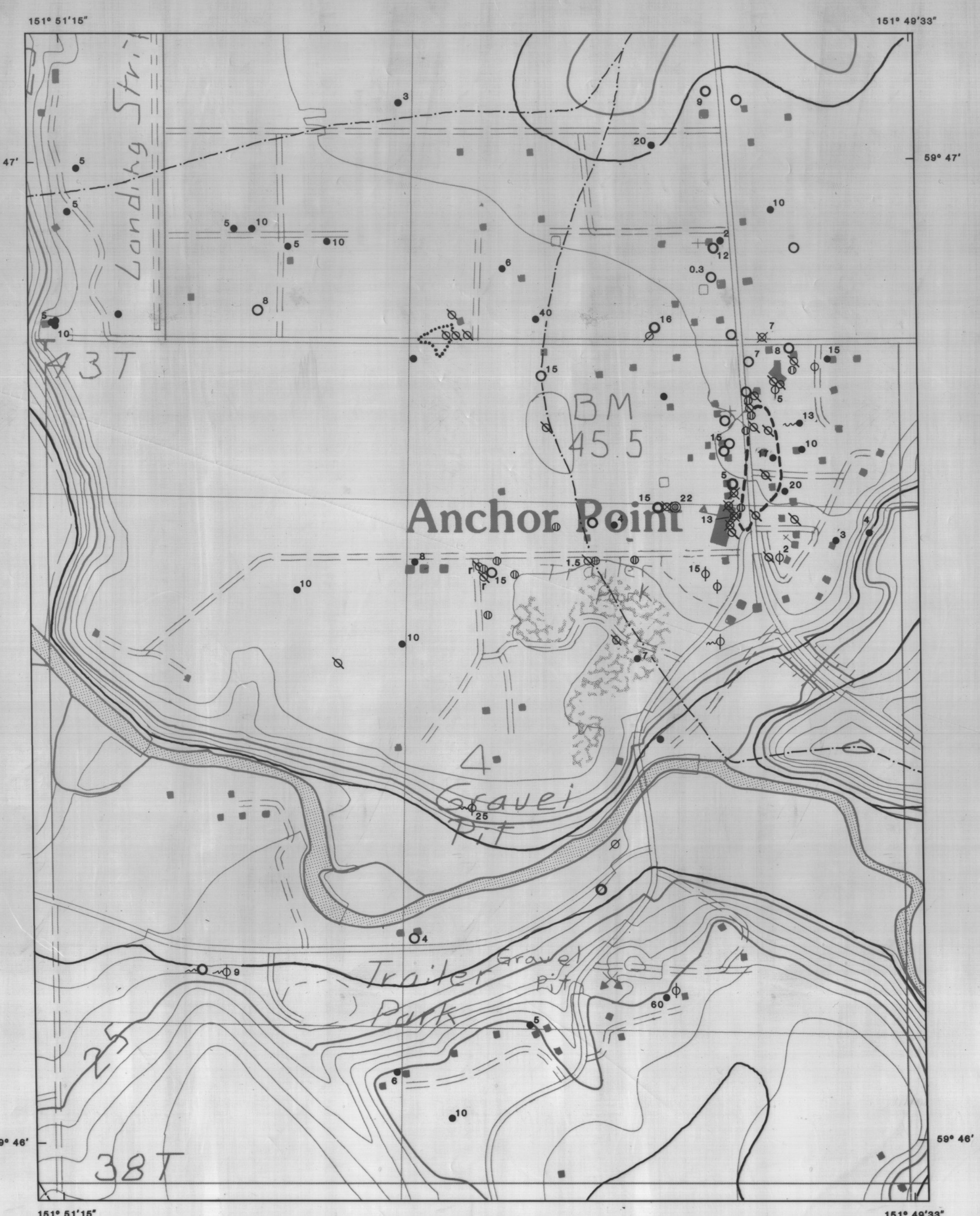
Petrik (1993), Sheet 1 of 1



EXPLANATION

DESCRIPTION OF MAP UNITS

- Qal** ALLUVIAL VALLEY AQUIFER - Youngest aquifer in study area - estimated age: present to 18,000 years before present (ybp). Elongate-shaped deposits comprised of pebble-cobble gravel and sand with few to numerous boulders beneath modern stream floodplains; silt and clay layers as overbank and floodplain deposits; well-sorted and medium- to thick-bedded, locally crossbedded; homogeneous deposits relatively small in areal extent; surface smooth, except for low local scarps. This aquifer is unconfined and relatively thin due to control by near surface bedrock and subsequent resistance to downcutting by the Anchor River. Of 13 wells drilled in this aquifer, three were shallow test holes, one had inadequate data to determine the aquifer they extracted water from, and five found insufficient yields and continued into the bedrock aquifer seeking sufficient supply. Two of the wells continued into bedrock and were terminated dry. Organic mat, topsoil, loess, or fill comprised up to 10 feet (3.1 meters) of the top of the aquifer as reported from eight well logs for this aquifer. Initial bedrock penetration occurred between 12 and 28 ft (3.7 and 8.5 m) below land surface (bls) in these five wells. Alluvial terraces and low floodplains are included in this aquifer. Poorest reported yielding aquifer for the project area. Despite the paucity of reported data, very high yielding strata (85 gallons per minute (gpm) (5.4 liters per sec (l/s)) probably exist in this aquifer, but may be thin and small in areal extent. This aquifer may be suitable for developing an infiltration gallery near the Anchor River or its tributaries which could result in a maximum estimated potential yield of 250 gpm (15.8 l/s).  
*Reported Yield:* 0 to 10 gpm (0.5 to 0.6 l/s)  
*Potential Yield:* 0 to 85 gpm in most areas (5.4 l/s)  
*Maximum reported depth to aquifer bottom:* reported to 37 ft (11 m) bls  
*Susceptibility to contamination:* moderate to high in general. Where present, silts and clays act as relatively impermeable barriers to vertical flow causing low to moderate susceptibility to underlying strata; however, contaminants can flow laterally and down-gradient along these layers. High permeability of coarse sand and gravel lithologies cause potentially high susceptibility to contamination in some areas. If contaminated, aquifer may benefit from periodic flushing by high Anchor River flows.
- Qd2** KETTLE MORaine AQUIFER - estimated depositional age approximately 18,000 to 25,000 ybp. Comprised of pebble-cobble gravel, sand, silt and clay, and numerous sub-rounded boulders deposited directly by melting Kachemak Bay glacier of early Naptowne age, Mooseshorn Stade (18,000 to 25,000 years old). Particle size varies between extremes of homogeneity to heterogeneity below gravel level. Lower aquifer generally finer and comprised mostly of clay and silt with trace to some fine to medium gravel with trace to some medium sand and few cobble dropstones laid down in glacial lake. Upper part generally coarser but ranging from pebble-cobble gravel to clay; surface slightly irregular to irregular with numerous ponds, small lakes, and peat fans present in depressions. Twenty wells tap this aquifer. Another well drilled through it was an oil and gas exploration well 14,705 ft (4,485 m) deep. Reported data from seven well logs indicate that up to 4 ft of organic mat, loess, peat, volcanic ash, and fill exists atop this aquifer. Above average aquifer for reported and potential yield for the project area.  
*Reported Yield:* 1.5 to 30 gpm (0.1 to 1.9 l/s)  
*Potential Yield:* 0 to 55 gpm (3.5 l/s)  
*Depth to aquifer bottom:* reported to 119 ft (36 m) bls  
*Susceptibility to contamination:* moderate but highly variable depending on texture. Contamination susceptibility increases with particle size.
- Qgl** GLACIOLACUSTRINE DEPOSITS AQUIFER - estimated depositional age 18,000 to 120,000 ybp. Comprised of layers of sorted sand, silt, and clay deposited predominantly from the north as strand deposits, submergent, or deltaic sediments during pre- and early Naptowne glaciation, Mooseshorn Stade. The upper half of this aquifer is mostly well sorted sands varying laterally with channel deposits of gravel or pea gravel, with trace to some sand and silt, clastic coal, and occasionally sub-rounded boulders deposited directly by melting Mooseshorn stage glaciers. Upper unit generally grading finer from west to east. Lower part of aquifer system composed of relatively homogeneous medium- to poorly-sorted fine sand, silt, and clay. Clastic coal more common in lower unit than upper. Well-graded gravel with trace to some medium sand and silt deposited as outwash channels exist. This aquifer is interpreted to have been deposited as the depositional environment changed from glacially dammed lake to beach deposits and to fluvial deposition upon glacial retreat. The aquifer is overlain in places by up to 10 ft (3.1 m) of organic mat, loess, peat, volcanic ash, and fill. The surface is mostly regular to planar with few incised short coastal stream reaches. One-hundred thirty-three groundwater data records are located in this aquifer area. Twenty well records not having lithologic descriptions, including five aquifers, have been interpreted to tap the aquifer. One-hundred nineteen wells tap the aquifer including three dry wells and six dry shallow (less than 11 ft) test holes and five have insufficient data to conclusively indicate which aquifer they use. Eight wells were drilled through this aquifer into the underlying bedrock aquifer seeking water. Depths to bedrock in these wells varies between 65 and 98 ft (19.8 and 29.9 m) bls. This aquifer has average reported and potential yield for the project area.  
*Reported Yield:* 0 to 60 gpm (3.8 l/s)  
*Potential Yield:* 0 to 70 gpm (4.4 l/s)  
*Depth to aquifer bottom:* reported to 126 ft (38 m) bls  
*Susceptibility to contamination:* moderate to high but variable depending on texture, depth of aquifer, and absence of confining unit (Munter and Maurer, 1992). Contamination susceptibility increases with particle size, decreasing depth to aquifer, and decreasing thickness of confining unit.
- Qac** ALLUVIAL CHANNEL AQUIFER - comprised of elongate-shaped and often sinuous fillings of well-sorted, clean pebble-cobble gravel and gravelly medium to coarse sand with rare to numerous boulders deposited in former drainage channels; upper 3 ft (0.9 m) commonly composed of medium sand; medium- to thick-bedded; surface smooth, except for low local scarps. Quaternary age (18,000 to 33,000 ybp). Well records reported 24 wells drilled in this aquifer in the study area. Sixteen of these tap the aquifer. Of these wells, seven have well logs data indicating six are open-ended and one is perforated. Sixteen well logs had sufficient data to report that up to 8 ft (2.4 m) of organic mat, topsoil, loess, peat, volcanic ash, or fill overlies the aquifer. Seven wells were drilled through this unit into the moraine aquifer, to a maximum reported depth of 82 ft (25 m) bls. One of the wells drilled into the underlying moraine aquifer, to a maximum reported depth of 82 ft (25 m) bls. One of the wells drilled into the underlying moraine aquifer was dry. The other well penetrated the moraine aquifer into the bedrock aquifer, the top of which was found at 78 ft (23.8 m). The alluvial channel aquifer is average in reported and potential yield for the project area.  
*Reported Yield:* 5 to 15 gpm (0.3 to 0.9 l/s)  
*Potential Yield:* 0 to 60 gpm (3.8 l/s)  
*Depth to aquifer bottom:* reported to 37 ft (11 m) bls  
*Susceptibility to contamination:* moderate to high due to the relatively coarse nature of the aquifer deposits.
- Qd1** MORaine AQUIFER - blankets of heterogeneously mixed and variable percentages pebble-cobble gravel, sand, silt, and clay. Deposited primarily by southward flowing glacier down Cook Inlet during pre-Naptowne and Naptowne glaciation, Mooseshorn Stade (18,000 to 120,000 ybp). Also contains minor glaciolacustrine deposits of early Naptowne glaciation. Locally overlain by laminated to massive-bedded clay and silt with few to numerous pebble dropstones laid down in glacial dammed lakes. Surface smooth to slightly irregular, locally channelled and terraced. Twenty-one wells were drilled into this aquifer type, only one well indeterminate of aquifer utilized. Organic mat, peat, topsoil, loess, or fill up to 8 ft (2.4 m) were reported from 11 well logs for this aquifer. One well passed through 17 ft (5.2 m) of alluvial channel aquifer deposits before utilizing the moraine aquifer beneath. Two other wells were drilled through the moraine aquifer into the underlying bedrock aquifer. These wells encountered bedrock at 91 and 99 ft (27.8 and 30.2 m) bls. The moraine aquifer exhibits slightly above-average reported and potential yields among aquifers in the project area.  
*Reported Yield:* 0 to 50 gpm (3.2 l/s)  
*Potential Yield:* 0 to 75 gpm (4.7 l/s)  
*Depth to aquifer bottom:* reported to 120 ft (37 m) bls  
*Susceptibility to contamination:* moderate but highly variable depending on deposit texture. High susceptibility in layers of gravels and sands and low to very low susceptibility in silt and clay layers, respectively.
- Tkb** BEDROCK AQUIFER - Also known as the Beluga Formation of the Kenai Group of Tertiary age (2,000,000 to 30,000,000 ybp). This aquifer consists of moderately to weakly indurated fine- to medium-grained sandstone interbedded with siltstone, shale, claystone, and thin layers of bony coal (Adkinson and others, 1975). This aquifer underlies all surficial deposits in the project area and is the oldest aquifer unit. Very limited outcrops of this unit occur in the bluffs located in the extreme southwest corner of the study area. Water is generally obtained from saturated sandstone and coal layers in this aquifer. Depths to bedrock vary as outlined in each aquifer description. There are a total of 15 wells in the project area that utilize the bedrock aquifer. Three of these wells are dry, two are test holes, and one is an observation well. The deepest water well in the project area was drilled in this aquifer (SC5-15-4ABDC2-27). It is 380 ft (115.9 m) bls and obtained water from 140 to 143 ft (42.7 and 43.6 m) bls. The remainder of the hole was reported non-water producing and used for storage. Most well records with lithologic descriptions do not show clear and unequivocal contacts between bedrock and unconsolidated deposits. Interpreted contacts defined as part of this study have low confidence levels because drillers descriptions are commonly imprecise and subjective. Overlying till and lacustrine deposits of fine sand, silt, and clay can give the impression of bedrock because of their compactness, texture, and color. The main indicator of entering the Beluga Formation is the presence of massive coal (0.5 to 1 ft (0.2 to 0.3 m) thick), as observed in project area outcrops of this formation. Northerly dips averaging 5 degrees occur in bluff outcrops at Homer (Walker and others, 1968). Easterly to northeasterly dips of similar inclination occur at Diamond Gulch, 3.5 miles (5.6 kilometers) south of the project area boundary. Strikes observed in bedrock outcrops at the southwest corner of the project area appear similar but dips appear horizontal to three degrees north or east. Evaluating the assets and liabilities of this aquifer implies at best, an average chance for exploiting substantial yields of good quality water.  
*Reported Yield:* 0 to 20 gpm (1.3 l/s)  
*Potential Yield:* 0 to 100 gpm (30.5 l/s)  
*Depth to freshwater/saltwater interface:* estimated 400 to 600 ft (122.0 to 183.0 m) bls  
*Susceptibility to contamination:* low unless poorly constructed wells act as conduits.



INSET MAP  
MAP SYMBOLS

- Aquifer boundary
- - - Watershed boundary
- - - 5 ppb benzene concentration contour of contaminant plume in unconfined aquifer, sampled April 4-7, 1992 (Texaco, 1992)
- ..... 10 ppb benzene concentration contour of contaminant plume in unconfined aquifer, sampled October 28 - November 2, 1991 (Rozak, 1992)
- 15 Reported well yield
- Well used for domestic-water supply
- Well used for public-water supply
- ⊙ Well used for irrigation-water supply
- ⊗ Observation well
- ⊘ Observation well equipped with a recorder
- φ Unused well
- ∅ Dry well
- ⊗ Destroyed well
- ⊙ Test hole
- ~○ Spring used for domestic-water supply
- ~○ Spring used for public-water supply
- ~φ Unused spring

AQUIFERS AND HYDROLOGY AT ANCHOR POINT, ALASKA

by  
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