About Layne: Ranney® Collector Wells

Overview
Whether you need an ocean of water, naturally filtered water or something in between, Ranney® Collector Wells can produce the supply you require, from whatever source available.

Ranney® specializes in the design and turnkey construction of high capacity water supply systems including radial collector wells, surface water intakes, infiltration galleries, riverbank filtration and sea water systems. Collector wells typically combine high yields with lower operating and maintaining costs. In most cases, they are less intrusive on the environment. Complete hydrogeological services for optimum siting are also available.

From the initial consultation and evaluation to construction, our professionals will create the most cost-effective and efficient system to deliver water in the quantity and quality you need. Layne can provide design-build or complete turnkey services to meet your project specifications for municipal, industrial and utility needs.

Ranney® Collector Well Services Our staff has extensive expertise in the design, construction and rehabilitation of water supply systems for public drinking water, industrial process or power plant cooling water. This experience includes ground water, surface water, seawater and infiltrated (riverbank filtration (RBF)) supplies across the U.S. and overseas, with extensive experience in horizontal (radial) collector wells.

Water Supply Services Layne offers a full range of services for developing water supplies. Some of the services we offer include design, construction and rehabilitation of the following:

- Radial Collector Wells
- Surface Water Intakes
- Infiltration Galleries
- 316 B Approved Intakes
- Slant Wells
- Seawater Collector Wells
- Riverbank Filtration System
- Intake Retrofit
- Effluent Outfall Diffusers
- Aquifer Recharge/ASR Units
- Large Diameter Caissons
- Groundwater Studies
- Contamination Investigations
- Groundwater Modeling

Other Services
- Induced (Riverbank) Infiltration Studies
- Hydrogeological Surveys
- Design-Build/Turnkey Construction Approaches

Ranney® Collector Well Services - Horizontal Collector Wells As an alternative to conventional vertical wells, Layne constructs radial collector wells through its Ranney® Collector Wells technology. These wells are generally comprised of a vertical reinforced concrete shaft (caisson) with horizontal lateral well screens projected out into the aquifer to collect and filter the groundwater.

Where alluvial deposits form aquifers that are hydraulically connected with surface water sources, water supply systems can be installed to induce infiltration to recharge the water being pumped from the aquifer, providing water that is naturally filtered to provide very uniform water quality and temperature. As water is pumped from the well, the

water table lowers, reversing the hydraulic gradients within the aquifer, which induces recharge to filter

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through riverbed and riverbank deposits providing a sustained flow of naturally filtered water to the well or infiltration system.

Collector wells can be utilized to develop moderate to very high capacities of groundwater or they can be located close to a dependable surface water source to take advantage of this natural filtering process referred to as riverbank filtration (RBF). This natural filtration can simplify treatment and ensure the owner of high quality and high capacity water production. Individual well yields have ranged from about 100 gallons per minute to over 50 million gallons per day.

Ranney® Collector Wells are the preferred method for developing moderate to very high capacity riverbank filtration (RBF) supplies. RBF Collector wells can be installed adjacent to surface water sources with their lateral well screens projected beneath the riverbed to optimize induced infiltration supplies or they can be installed with designated setback distances to increase the degree of filtration achieved.

In addition, Layne can install conventional slant wells to develop infiltrated water supplies if geologic conditions are favorable. The uniform water quality and temperature characteristics of RBF supplies typically simplify treatment needs. In addition to inland fresh water sources, collector wells can also develop filtered seawater supplies for desalination and other uses.

Collector wells can optimize the water production from a property while simplifying O&M for the owner, providing the most efficient water supply system in many locations.

Water Reuse With over a century of experience in the water industry, Layne has the knowledge and the organization in place to handle all your water treatment and reuse needs.

Layne's staff of engineers and operations personnel are prepared to evaluate water quality and recommend custom solutions for your operations whether you require a mobile or fixed based solution. Layne currently operates recycling systems in multiple shale plays using various technologies:

- Chemical Precipitation and Flocculation Systems
- EVRAS Evaporative Disposal/Recycling Systems
- Centralized Treatment Facilities

In addition, our staff continuously seeks new solutions and evaluates technologies to ensure we keep up with the latest options for recycling and treatment. The Layne team strives to find innovative ways to bring value to our customers throughout their operations.

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