

# NEW RESORT IMPLEMENTS PVC WELL CASING

## IDAHO HYDROGEOLOGIC CONSULTING FIRM ENDORSES PVC WELL CASING FOR TAMARACK RESORT'S WATER SUPPLY WELL PROJECTS

BY JASON HATHAWAY

**N**estled in the heart of Idaho's scenic Payette River Mountains, Tamarack Resort is the first new four-season destination resort to open in North America in more than 20 years. Located in Donnelly, Idaho, Tamarack Resort opened in 2004, and boasts an award-winning golf course, world-class mountain biking, hiking, and high-speed lift skiing, along with a host of other outdoor adventures and amenities.

With so many exciting features, it often is easy to overlook the underlying infrastructure and utilities that make the resort run, such as Tamarack's water supply. Tamarack Resort is located in Idaho's Valley County region, an area with recent high growth in population and a strong dependence on well water, due to the area's dry climate. To date, Tamarack Resort has had 10 wells drilled – a combination of exploratory wells and water supply wells.

Hydro Logic Inc., a hydrogeologic consulting firm in Boise, Idaho, has been the hydrogeologic advisor to Tamarack Resort since the beginning of the Resort's planning process in 2000, with respect to its ground water development program. Ed Squires, president of Hydro Logic Inc., has designed and inspected the construction, development and testing of more than 300 large-bore municipal, commercial and irrigation supply wells throughout Idaho, including five supply wells at Tamarack. Due to the sub-surface conditions in Idaho, one consistent item on Hydro Logic's well specification sheets is polyvinyl chloride (PVC) well casing – specifically Certa-Lok PVC well



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CERTA-LOK PVC WELL CASING IS READY TO GO ON THE JOBSITE.

casing, manufactured by CertainTeed Corp. Beginning in 2002, with Idaho's first large-bore municipal PVC well for the City of Meridian, Squires has designed 23 large production water wells using PVC casing and, when conditions allow, PVC pump column. Hydro Logic recently completed a water well project for the City of Caldwell, Idaho, using 17-inch PVC casing and a 100-HP submersible pumping plant on CertainTeed PVC drop pipe.

The ground water used for municipal supply at Tamarack Resort has a purity comparable to rain or mountain spring water. Because of this quality, and the very low concentrations of dissolved minerals in the Tamarack ground water, it is classified as both "soft" and "aggressive" water, as it tends to dissolve minerals, rather than precipitate them. The highly dilute ground water, which is excellent drinking water quality, also is corrosive to steel casing, which leads to shorter well life and staining/taste problems from the iron dissolved from the casing. An additional consideration in Valley County, where Tamarack Resort is located, is the widespread occurrence of iron bacteria in domestic water wells. Because Tamarack Resort's ground water does not carry elevated concentrations of inorganic iron, using a non-steel casing ensures that the iron bacteria cannot proliferate because there is no iron in the well construction materials to sustain them.

"Our firm is a strong proponent of PVC well casing because of the widespread corrosion we have observed in

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a preponderance of steel-cased wells in Idaho," Squires says. "Having operated a down-hole video inspection service in hundreds of water wells for the past 12 years, we have documented, firsthand, the significant extent of corrosion in steel-cased wells across Idaho and the intermountain west. Our opinion is that the quality of off-shore steel casing – mostly from Korea and China – has declined significantly over the last 15 years, resulting in thick-wall [0.375-inch] steel-cased wells showing corrosive break-through after as short a period as nine years."

Other benefits of using PVC well casing at Tamarack Resort: PVC's resistance to scaling and buildup of encrustation on the inside wall of the casing; the ease of installing pumping plants with PVC wells; the elimination of galvanic corrosion from the juxtaposition of dissimilar metals and telescoped pump columns in the well; and the elimination of welded joints. Welded joints are believed to accelerate corrosion of low-carbon steel casing in the vicinity of the welds.

Working with drilling contractors Treasure Valley Drilling Inc. of Weiser, Idaho, and McLeran Well Drilling LLC, of New Plymouth, Idaho, Hydro Logic, has completed five wells to date at Tamarack, using SDR17-rated Certa-Lok PVC casing. The 12-inch to 16-inch nominal diameter production wells are used for drinking water for 2,000 domestic units, snowmaking for the ski slopes, and golf course irrigation purposes at the resort.

Tamarack's most recent water well, Well #10, is an 846-foot deep well that utilizes 580 feet of 17.4-inch O.D. Certa-Lok casing and 330-feet of 10-inch diameter Johnson-brand stainless steel well screen. As such, no low-carbon steel was used in the well construction, with the exception of the wellhead. The wellhead consists of a short length of 18-inch steel casing to protect the PVC from ultraviolet rays, and to provide a standard flanged casing for wellhead plumbing. The well was drilled and constructed in November 2007 by Treasure Valley Drilling. McLeran Well Drilling developed the well, and Layne of Idaho Inc. of Nampa, Idaho, was the pump-test contractor.

According to Tamarack Resort's water well requirements, Well #10 was constructed with full-depth surface seals, using approved grouts, from the top of the aquifer to the land surface. As with all previous Tamarack Resort well projects, Treasure Valley Drilling & Pump used direct mud-rotary drilling on Well #10. Direct mud rotary drilling allows for great flexibility in determining how deep to bore for a well, and often cuts costs for the customer. The superior seals created by this method prevent surface waters and shallow contaminated ground water from entering new wells. Also, because the mud-rotary method is an open-hole drilling method, the PVC casing can be lowered into place within the open bore and grouted.

The PVC casing was grouted over the 580 feet from the top of the aquifer to land surface, using a combination of cement grout and high-solids bentonite grout, with the PVC casing centralized in the bore for a uniform seal. Hydro Logic designed Well #10 to provide golf course irrigation in the summer and snowmaking water during the winter.



**INSTALLING THE PVC CASING.**



**PREPPING FOR INSTALLATION.**



**ON SITE DURING THE WELL DEVELOPMENT PHASE.**

Well #10 then passed a 30-hour pumping test at 2,500 gpm, with only 125 feet of drawdown. The well was pumped as high as 3,200 gpm during development testing, as high as the test pump equipment could go.

Treasure Valley Drilling appreciated working with the PVC casing because of the quick installation it allowed. They were able to avoid welding and waiting for welded joints to cool prior to submersion, which saved them at least a day of labor, making them all the more competitive in the marketplace. Not having to weld steel casing also provided a safety benefit, owing to the location of the tight well site within a dense forest environment and the associated risks of fire. The project was conducted during one of the worst fire seasons in Idaho history, so it was very important not to add to flame to the fire.

The rapid installation also was a major advantage, when considering the subsurface borehole conditions. Deeply buried swelling clay strata within the geologic section of the Tamarack Resort area allows only a short time to install the well casing before the borehole diameter diminishes. PVC also allows for quick withdrawal from the well, should a down-hole problem develop during construction.

PVC well casing is steadily catching on among drilling professionals in Idaho, where steel well casing still is the standard, largely due to the fact that more than 80 percent of drilled wells in the state are drill-and-drive air-rotary domestic wells. Another impediment to the use of PVC casing is a rule that requires drilling contractors to apply for a waiver from the



**ACHIEVING 3,300 GPM AT TAMARACK'S #10 WELL.**

Idaho government allowing them to use PVC. Although this rule is aimed more at ensuring that drillers who use PVC casing do not use low-grade PVC, it still creates a regulatory obstacle for the contractor. Squires and other drilling professionals are continuously working with state ground water agencies to promote the benefits of using PVC well casing and the open-hole drilling methods that facilitate its use. By doing this, they hope to give well owners and drillers more incentive to use PVC over steel.

"We want to make it easier for Idaho well-drilling professionals to include PVC in their projects," Squires says. "We are gaining a foothold, thanks to an impressive number of highly productive and reliable PVC wells now in use. I think, in the future, there will be

a lot more ground water consultants, hydrogeologists and drilling contractors switching over to PVC wells, as those in other states have done."

Squires, who has been a consulting hydrogeologist for more than 15 years, founded Hydro Logic in 1999. He remains as part of the adjunct graduate faculty at Boise State University, and teaches a class in field hydrogeology in the geosciences department. Squires also is a former geosciences department head of United Water Idaho, Idaho's largest water utility. Treasure Valley Drilling & Pump was incorporated in 1994, and has drillers with 20 years to 30 years experience. The company is licensed for drilling in Idaho, Utah, Nevada, New Mexico, Oregon and Wyoming. **ND**

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