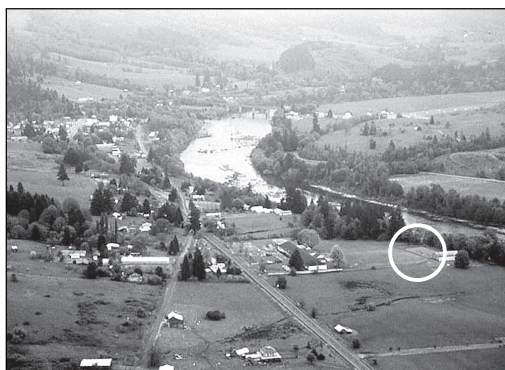


O R E G O N  
C A S E S T U D Y

## Elkton, Oregon:

*Effluent Sewer and Recirculating Sand Filter Provide Superior Treatment at Low Cost*



*This aerial view shows the community of Elkton, Oregon, with its 100 residences, stores, restaurants, and schools. Orenco's highly efficient recirculating sand filter is in the area that's circled.*


In the late eighties, individual onsite septic systems in Elkton, Oregon — along the beautiful Umpqua River — were failing, threatening the river's water quality. In addition the septic systems were limited in capacity, and merchants realized they couldn't expand their businesses without making improvements.

In 1989, Orenco installed a watertight Orenco Effluent Sewer System that conveys effluent from about 100 onsite septic systems — of which 1/3 are gravity (STEG) and 2/3 are pump (STEP) — to a 60' x 120' (18 m x 37 m) recirculating sand filter (RSF) designed to treat 30,000 gallons per day (170 mm/day). Final disposal of the treated effluent is to a sequentially dosed drainfield consisting of 11,000 lineal feet (361 m), divided into 12 zones.

Effluent quality is outstanding. In 2005, BOD<sub>5</sub> and TSS from the collection system averaged 239 and 41 mg/L, respectively. After treatment by the RSF, effluent dosed to the drainfield averaged about 7 mg/L for both!

With a total system cost of \$897,800, the average installation was less than \$7,000 per connection. The cost to homeowners continues to be minimal. After an initial \$3,500 connection charge (89% placed in a repair and replacement fund), homeowners pay a monthly fee of \$33.75, which includes system payback and regular maintenance. Maintenance is also minimal, averaging less than an hour per day for routine upkeep of the collection system and for recording daily meter readings for the RSF and dosing pumps.

The community of Elkton found a cost-effective, environmentally sound solution to its wastewater treatment needs. And because only two-thirds of the systems' capacity is being used, Orenco's Effluent Sewer technology will serve Elkton long into the foreseeable future.

  
*"The river is a big part of our lives, so protecting it is a priority. Orenco's recirculating sand filter does an excellent job at a cost we can afford."*

Linda Higgins  
Elkton City Manager



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## SUMMARY OF SPECIFICATIONS

### *Elkton, Oregon Effluent Sewer and Recirculating Sand Filter Using Orenco Systems Equipment*

#### INSTALLATION DATE

1989

#### TOTAL PROJECT COST

\$897,800 (includes engineering, construction, and inspection)

#### ON-SITE FACILITIES

135 EDUs, mostly residential  
67 STEP units, 34 STEG units

#### COLLECTION SYSTEM/PRIMARY TREATMENT

##### TANKS

**Residential:** 1,000-gallon (3,800-L), one-piece construction, single compartment concrete tanks fitted with effluent filters or screened pump vaults.

**Commercial:** Larger than 1,000-gallon (3,800-L) tanks and/or multiple tanks.

##### PUMPS

1/2 hp (10 gpm typical) effluent pumps

##### MAIN LINES

Mostly 2" (50 mm) diameter, some 3" (75 mm)

##### NOTE

The primary treatment in the effluent sewer collection system provides approximately 70% BOD<sub>5</sub> reduction and 90% TSS reduction (in residential-strength wastewater) — before any secondary treatment in the recirculating sand filter takes place.

#### RSF/SECONDARY TREATMENT

Recirculating sand filter discharging to drainfield.

Q (Design) = 30,000 gpd (170 mm/day)  
Q (Average) = 17,000 gpd (96 mm/day)  
Actual RR = 3.2:1

29,500-gallon (112,000-L) recirculation tank, with four 1 hp pumps.

Per DEQ, media depth = 35" (890 mm), D<sub>10</sub> = 3.5 mm; Cu = 1.8. (Current standards provide for media depth of 24" (610 mm) and media size of 1.2-2.5 mm.)

Flowsplitter tank divides 20% of return flow to drainfield. During low flows, motorized valve actuates, resulting in 100% recirculation.

#### DISPERSAL

3,000-gallon (11,400-L) dosing tank with three, 1/2 hp, 70 gpm pumps. Each pump doses to four valves that sequentially direct flow to hydrosplitter with five zones each.

127 2" (50 mm) laterals with 1/8" (3 mm) orifices on 24" (610 mm) spacing, placed in 12" x 48" (305 mm x 1220 mm) trenches.

11,000 LF (361 m) drainfield is located within 6 acres (2.4 ha).

#### EFFLUENT QUALITY

Over the life of the system, influent BOD and TSS average 147 and 34 mg/L, respectively. Effluent averages about 6 mg/L for both (see chart, below).

#### OPERATION/MAINTENANCE

##### ONSITE FACILITIES

Alarm calls average 4-5 per year. In 1996, a full audit was performed at each septic tank. Little maintenance was required. After more than 15 years of use, 4 residential tanks were pumped in 2006. (No others have needed pumping.)

##### COLLECTION SYSTEM

One part-time operator

##### TREATMENT SYSTEM

One part-time operator; less than 1 hr/day including daily meter readings (weekly would be adequate).

Per WPCF permit, effluent analysis performed quarterly.

RSF distribution laterals flushed annually (preventive maintenance).

##### FUNDING/FEES

71% grants, 29% loan

\$3,500 initial connection fee (89% placed in a repair and replacement fund)

\$33.75/mo/EDU < 5,000 gpd flows (19,000 L/d) (winter average)

Additional \$4/1,000 gpd for > 5,000 gpd flows

\$188.75/mo flat fee for 2" (50 mm) commercial meters

New gravity installations cost about \$2,000

New pump system installations cost about \$3,000

### RSF INFLUENT AND EFFLUENT AVERAGES

YEAR	BIOCHEMICAL OXYGEN DEMAND (BOD <sub>5</sub> )		TOTAL SUSPENDED SOLIDS (TSS)	
	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
1990	247	14.0	37	—
1991	116	7.5	25	4.0
1992	—	12.5	26	—
1993	134	4.3	40	5.1
1994	114	2.9	30	4.3
1995	122	3.9	40	11.0
1996	92	2.3	46	4.0
1997	128	5.5	38	7.7
1998	130	3.3	29	5.0
1999	146	3.2	33	5.2
2000	111	3.8	30	4.7
2001	101	3.1	28	4.2
2002	167	5.0	38	7.0
2003	161	5.3	28	7.7
2004	190	5.0	35	8.5
2005	239	7.3	41	6.6