OCD ESTIMATED TANK REPLACEMENT COST**

Fiberglass Tank, 60-barrel:	
double-bottomed, double-walled	$1200
Steel Tank, 92-barrel:	
double-bottomed, double-walled	$4200
double-bottomed	$2700
Steel Tank, 45-barrel:	
double-bottomed, double-walled	$3500
double-bottomed	$2360
Steel Tank, 25-barrel:	
double-bottomed, double-walled	$1922
double-bottomed	$1619

Range of Tank Cost: $1200 - $4200

Tank Installation: $1000*
Based on a 10 hour day (8 work, 2 travel)
Includes 1 foreman, 2 workhands, 3-ton roustabout truck, backhoe and trailer

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Range of Total Cost: $2200 - $5200

*Tank installation cost constant regardless of tank type

**Estimates based on verbal and written price quotes from businesses in the Farmington area.

EXHIBIT SRIC-11

CALCULATIONS DEMONSTRATING CONTAMINATION OF SOIL AND GROUND WATER DUE TO SMALL-QUANTITY DISCHARGES INTO UNLINED PITS

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for Southwest Research and Information Center
3-31-92

Oil and gas waste in unlined pits can and do contaminate both soil and ground water. A two-dimensional, vertical unsaturated model simulation, run under a representative waste fluid loading condition and assuming hydrogeologic parameters characteristic of the vulnerable area, clearly shows that contaminants can reach ground water in concentrations that exceed ground water standards. Additional two-dimensional saturated areal modeling also demonstrates that, under the same basic conditions, contaminants can travel substantial distances through ground water in short periods of time (i.e., within five years). These modeling results support the Division's proposed rules to prohibit the use of unlined pits in the vulnerable area and to protect fresh water sources within 1,000 feet of pit locations. They also support the need to line pits located outside the vulnerable area to confer protection of soils.

Calculational Methodology

The ground water flow code SUTRA (Saturated-Unsaturated TRAnsport) was utilized in this exercise. SUTRA is a two dimensional computer code that can simulate contaminant transport and water flow through both the vadose zone and saturated zones. The solute that is modeled can be subject to equilibrium adsorption on to the porous matrix as well as to natural decay, including biodegradation. In addition, SUTRA has all of the other standard solute transport features, such as attenuation parameters, including dispersivity and molecular diffusion. All of these features were adopted in the current calculations.

Data Development

The following selected data were utilized in this modeling effort. If ranges are given, then values were selected from within those ranges:

PARAMETER	VALUE(S)
Saturated Hydraulic Conductivity (K)	~~25 to 2500 ft./day~~ 2.5 to 250 ft/d
porosity	.35
Pit water loading	~~5 bbl/day~~ 2.5 bbl/d
Pit area	144 square feet
average annual precipitation	8 inches per year
regional average hydraulic gradient	0.003
soil moisture (Sm) vs K relationship	default SUTRA Van Genuchten model
Pressure (P) vs K relationship	default SUTRA Van Genuchten model
depth to ground water	10 to 20 feet
aquifer thickness	10 to 40 feet
concentrations of BTEX-like solute in pit water	1 to 30 parts per million (ppm)
linear adsorption coefficient	$1.35 \cdot 10^{-4}$ cubic meters per kilogram
Biodegradation decay rate	~~0.095% per day~~ 0.95% /day