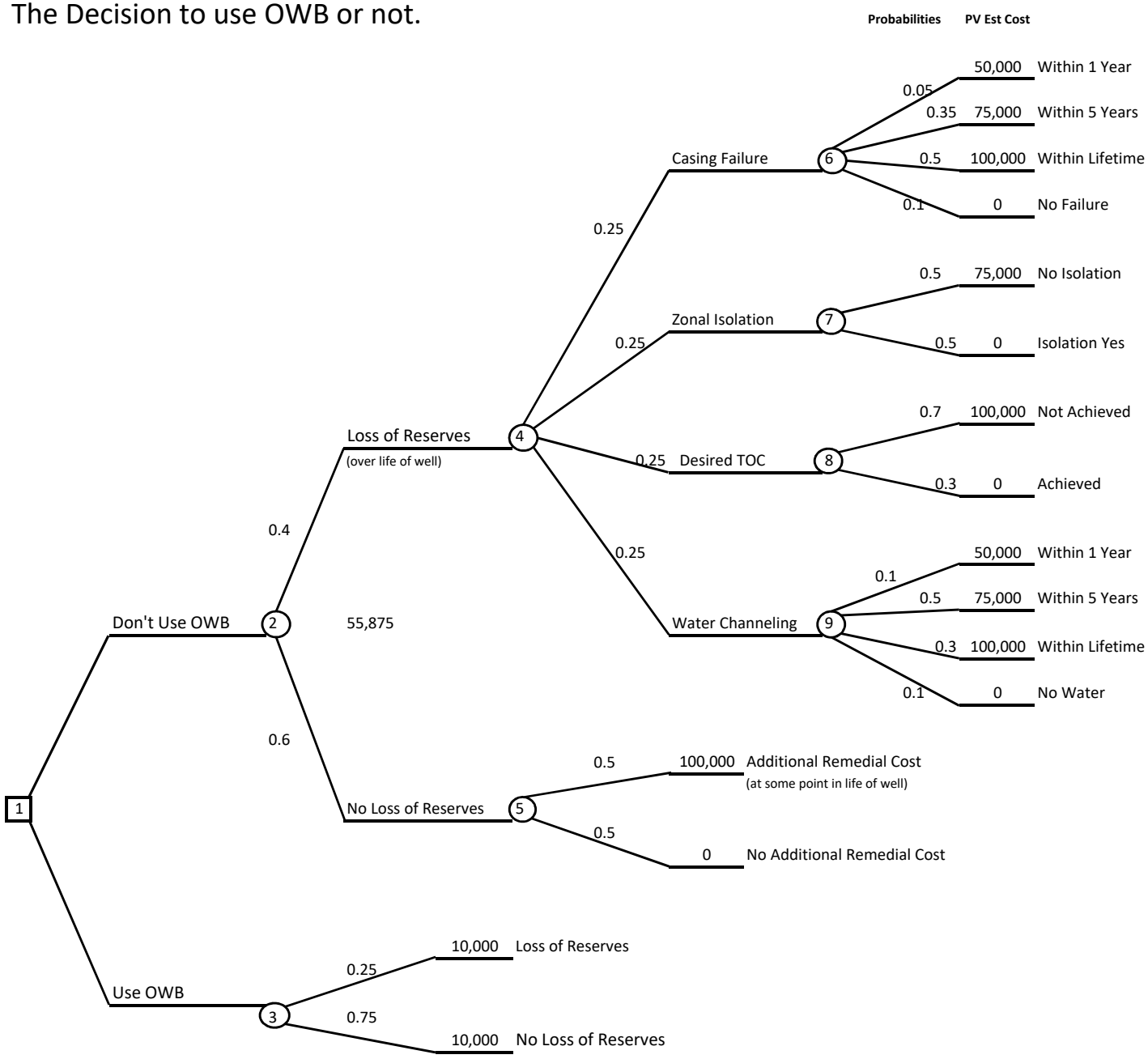
OWB Cement Control Additive - DECISION TREE ANALYSIS
Comparative Cost with or without Loss of Reserves
Risk Arising From Well Construction Failure
The Decision to use OWB or not.



Node	Sequence and components of node EV cost calculations	EV Cost
6	EV(6) = 0.05(50000) + 0.35(75000) + 0.5(100000) + 0.1(0) =	78,750
7	EV(7) = 0.5(75000) + 0.5(0) =	37,500
8	EV(8) = 0.7(100000) + 0.3(0) =	70,000
9	EV(9) = 0.1(50000) + 0.5(75000) + 0.3(100000) + 0.1(0) =	72,500
4	EV(4) = 0.25(78750) + 0.25(37500) + 0.25(70000) + 0.25(72500) =	64,688
5	EV(5) = 0.5(100000) + 0.5(0) =	50,000
2	EV(2) = 0.4(64687.5) + 0.6(50000) =	55,875
3	EV(3) = 0.25(10000) + 0.75(10000) =	10,000
1	EV(1) = Minimum{EV(2), EV(3)} =	10,000
	Minimizing EV Cost - Choose to use OWB Branch	

Background

Industry studies show that five to seven per cent of all new oil and gas wells leak.
As wells age, the percentage of leakers can increase to a startling 30 or 50 per cent.
Most casing leaks and water channeling effects are not recognized until production has already been impacted.
Most remedial attempts, both succesful and unsuccesful, are not captured in any kind of external public data or studies.

Assumptions:

Loss of Reserves are at some level and don't have to be a total loss when going down the "Loss of Reserves" branches.
Loss of Reserves doesn't necessarily mean casing or well failure, as in the case of channeling behind pipe.
Value of Reserves is not calculated, only that there is some probability of loss of reserves with certain decisions.
Value of OWB is based upon 500 pounds. Most remedial jobs require substantially less.
The Present Value Cost (PV) can be adjusted to fit any owner/operator's cost structure.
The probabilities are based upon various industry studies providing failure estimates - these may be adjusted for a given area and well type.

DECISION TREE ANALYSIS:

Decision tree analysis is a convenient way to analyze project decisions having one or several important uncertainties.
The initial decision is but a link in a chain of future decision options and contingencies.
All of these future options and probable outcomes must be considered when evaluating the initial decision.
The decision rule at any decision node is to select the alternative (branch) that has the highest EMV or lowest EV cost.
Minimizing EV cost is exactly equivalent to maximizing EMV. In this analysis, the object is to minimize cost.