PART 4

VI. Conclusion

The conclusions that may be drawn from this technical paper are somewhat striking, if not quite valuable and informative as well. It was demonstrated that by applying the basic laws of fluid dynamics to a model of a *distributed compressible fluid transport mechanism* (commonly referred to as a horizontal well) that the physics-based equations describing the performance of such a well, even one of a short screen length, is rather complex. In this complexity, it was proven that one simply cannot (and should not) *assume* that the performance of such a well is simple, nor easily determined or predicted through hand calculation, as the realities of the equations of state that must be developed and solved are extremely daunting, to say the least. Through a lengthy forensic study of the performance of existing horizontal wells, ones which were all *assumed* by their designers, installers and operators to be functioning as previously *predicted* and *required* to effect contaminant cleanup within the time period(s) required, over 90% *completely* failed to perform even remotely close to that desired or required. Such performance, irrespective of what object is the subject of such a rigorous study, can only be realistically concluded to be a disastrous and dismal failure.

However, through a concerted effort of some *years* in duration, it was shown that the performance of *any* horizontal (or vertical) well, regardless of physical attribute, such as length, diameter, etc., that is to be placed in any type(s) of soil(s), under any depth(s) of groundwater, whether installed uniformly or in an undulating fashion *can* indeed be predicted and *designed into the well*, by applying newly developed finite element analysis (FEA) techniques. A proprietary computer program developed by Integrity Engineering, Inc. entitled SPARGE™ is *that* program. By using this program, what would occupy a team of engineers *weeks* of effort to calculate the performance of *any* distributed compressible fluid transport system by hand, can now be executed precisely and accurately in *seconds.* By anyone's definition, such a product can only be described as *revolutionary* to the Environmental Industry, and a giant leap forward in the application of engineering in the design of remediation systems.

In the near future, an additional paper will be produced and published by Integrity Engineering that will present a typical case history of a SPARGE™ program analysis, inclusive of both the input variables needed to initiate a full FEA analysis of a horizontal well air sparge system, and the resultant performance of the subject well/sparge system as determined by the program. The reader is encouraged to obtain a copy of this forthcoming paper for future technical edification and reference.