

Public Executive Summary

Energy usage of oil in the US will increase by 30% by the year 2020. Natural gas demand is on course to double in the next two decades. Current stripper well domestic production of oil meets ~ 28% [~ 324 M barrels/ yr in 2002] of the nations needs. Natural gas production from domestic stripper gas wells produces ~ 8% [1 TCF equivalent/yr. = 8%] of current US consumption needs.

Over the past two decades in the Appalachian basin, several tens of thousands of shallow oil and gas wells [1000' – 3500'] have been completed using open hole techniques with multiple zones notched, fractured and produced. The foci for these open hole wells is Pennsylvania, West Virginia and New York. These wells are often configured with 7.0" to 8 5/8" steel surface casing cemented through the water table aquifers, then open rock hole well bore [6.25" to 7 7/8"] to the total depth of well. These wells follow a similar production performance history as their predecessor-cased wells. Several months of flush production are followed by decreasing well pressure and yield of oil/ gas. These wells quickly fall into the category of stripper well production. Down hole pressure in these wells declines to a point where the well is no longer able to lift the fluid in an unassisted manner to the surface. Often time in these multi-zone completion wells an up hole zone [s] acts as a thief for down hole higher pressure zones further confounding their operation & production. In on going stripper well production from these wells 'Beam Pumps', tubing velocity strings, small diameter tubing and plungers are often employed with some finite success. Most of these techniques do not allow the well to produce itself down to with in several tens to a hundred psi of the Fm. pressure. The result is non-captured reserves & higher operation cost for hydrocarbon produced.

This project will select and refit two- [2] existing 6.25" or larger gas or oil and gas, open hole stripper wells with a re-fit well system, 1 comprised of a slip lined 3.0" ID spooled non –metallic tubing, metal to non metal connectors, open hole packer assembly, casing stand /stop, and modified G.O.A.L. PetroPump with unique variable diameter seal cups to automatically lift fluids. The second system will be equipped with slip lined conventional steel casing and a GOAL tool system. The operating system will be designed and constructed to allow shallow up well, low pressure, gas to produce off the back side of the casing above a packer. The non- metallic spoolable tubing system coupled with modified 'GOAL Tool' with new flex diameter cups will afford automatic and regularly lift of fluids to the surface and foster improved gas and fluids production. Comparison of pre system and post system use production and cost for both the spooled synthetic tubing and referred steel casing will be developed to project applicability and upside impacts on the stripper well industry.

Historic testing of GOAL PetroPump alone under SWC subcontract #2052-BEDC-DOE-1025, jointly sponsored by NYSEDA and SWC in standard J-55 steel cased-perforated stripper wells has shown 1.5 to 3 fold improved production at a fraction of the service needed to operate other stripper well systems. Similar improvement is expected in these 2 re-fit wells. [Figures 1, 2 & 3]

This system of modified GOAL Pump, new variable diameter cups, packer assembly, metallic to non-metallic connection of spoolable tubing is unique for maximizing yield through re-completion of large diameter and or open hole wells. Coupling non metallic spoolable tubing with a new flex wall cup accommodates passage with out pressure and or fluid loss across diameter changing transitions in tubing. This simple elegant design of the GOAL tools valve control allows it to free travel with in the re-fitted well bore. The new system will allow the re-fitted wells to "pump themselves" despite declining down hole pressures. The system is "smart" in both directions, dropping down hole when pressure at the well head is low/ reduced by down hole fluid accumulation & is "smart" up hole using below tool formation pressure to lift tool and fluid [oil/brine] to the surface. The tool free floats in the well head lubricator allowing down hole pressure/ gas to flow to the process unit. At such time as pressure has declined below system control pressure, the system will once again repeating the automatic pumping cycle.

Successful application of the outlined system will have positive economic impact on the 10,000+ existing potential candidate wells. Open hole well re-fit cost at \$30,000- \$49,000/ well could be offset in a 1 to 1.5 year period at achievable 1.5 X to 3 X increase yield on target wells.