**Title:**

Oil Shale Processing, Water Treatment and $CO_2$ Sequestration with Plasma

**Abstract:** (Your abstract must use 10pt Arial font and must not be longer than this box)

Water and green house gas emissions are two critical and emerging issues in the development of shale oil from the Green River Formation of Colorado, Utah and Wyoming. According to estimates by Los Alamos National Lab and Earth and Environmental Sciences, 3.5% to 8% of the 5.3 million acre-ft/yr of water allocated to these Upper Colorado River States may be utilized for oil shale production.[1] A recent issue for the development of oil shale is concern about the quantity of $CO_2$ co-produced as oil shale kerogen is pyrolzed. A recent model confirms that power plant emissions are likely the dominant source of $CO_2$ and that uncertainty about the heat required to produce a barrel of shale oil remains a critical uncertainty.[2] A suite of plasma technologies has been developed for treating solids, liquids and gases that will operate in an arc, plasma arc or plasma electrolysis mode. Over the past 36 months, a carbon arc installed in a hydrocyclone has been demonstrated for water treatment with a focus on removal of arsenic, selenium, sulfides and organics such as benzene. Likewise, a multi-plasma torch system firing 2 torches tangentially into a refractory lined vessel has been tested for treating shale drill cuttings containing up to 6% oil retention on cuttings. A temperature over 1,000°F was achieved with a feedrate of ½ lb/second with a resident time of one second at an out-of-wall power rating of 60 kw-hr(34 watts/lb = 68 kw/ton = 232,152 BTUs/ton). Colorado School of Mines has provided a sample of oil shale with a high content of marlstone from an outcrop of the Mahogany zone Piceance Creek Road near Rio Blanco, CO. The oil shale will be plasma steam reformed to test both gasification and water treatment in a combined plasma arc whirl gasification and water treatment reactor. Based upon shale cuttings data preliminary designs for a six torch 720 KW 250 ton/day pilot plant and a 6 torch 90 MW full scale design (30,000 tons/day at a production of 20,000 BPD) CAPEX per barrel/day range from $833 to $3,000 with operating costs at $7/bbl.

[1]**WILSON, Cathy J.** and FOSTER, Jean M., Earth and Environmental Sciences, Los Alamos National Lab, EES-10, MS J495, Los Alamos, NM 87544, cjw@lanl.gov

[2]**Jeremy Boak**, Colorado School of Mines, “Estimate of CO2 Production for In-Situ Production of Shale Oil from the Green River Formation in Western Colorado.

**Important notes:**

Do **NOT** enter author and affiliation information on this document. You will be able to enter this information online when you submit the abstract.

Do **NOT** write outside the boxes. Any text or images outside the boxes **will** be deleted.

Do **NOT** alter the structure of this document. Simply enter your title and abstract in the boxes. The document will be automatically processed – if you alter its structure your submission will not be processed correctly.