UEC's Meeting with OMB

EPA's Part 192 Rulemaking

November 16, 2016 – 1PM

The Devil is in the Detail - 40 CFR Part 192

- Lack of Transparency. EPA did not consult Industry, State Regulatory Agencies, or Trade Associations before adopting rules.
- EPA did not study a single thread of existing datasets as recommended by their own Science Advisory Board.
- Underestimated cost to industry. EPA could not define risk or human mortality.
- Designed to add years on to the front end of permitting. Presently 5-7 years are required to obtain the necessary 5 permits to commence mining. Now longer to permit an ISR water treatment facility than a nuclear power plant.
- Will add unnecessary burden and cost on an already much over-regulated industry that is a strategic resource for US nuclear energy.

Closed Minded EPA

- Despite publicly acknowledging there is no evidence that in-situ uranium recovery has ever had an adverse impact on an underground source of drinking water, the EPA is moving full steam ahead.
- Industry has tried to work with the EPA on this rulemaking. In May 2015, the industry offered to work collaboratively with the EPA to review the reams of existing groundwater data. Industry even offered to conduct additional sampling if warranted. But the agency never responded.

USGS Study on Texas Uranium Restoration released in 2009

Report used by EPA to claim that ISR uranium mines have not been able to be restored back to baseline.

Did not address the health effects. Had EPA spent a little time studying the data and engaging industry they could have saved themselves considerable time and expense.

This presentation will illustrate that the mining process is environmentally benign and beneficial to our nation.

USGS Study on Texas Uranium Restoration released in 2009

- The USGS report did not fully address health risks/effects of the various ions reported.
- Also the USGS report compared the difference between baseline values and “Amended Restoration Tables” which in many cases were much, much higher in value than the actual restored values, which were much, much lower.
- It is important to note that the EPA did not have a Maximum Concentration Limit (MCL) for uranium until December, 2000. All mining sites contained groundwater that far exceeded EPA’s MCLs for Uranium, Radium, Total Dissolved Solids (TDS), Sulfates, Chlorides, and often times for Arsenic and Selenium.
- Restoration to these baseline levels has always been the goal of industry. Groundwater quality prior to mining is essentially the same as that after mining and restoration. Some ions are restored to lower than baseline concentrations, some slightly above..

The “U” Word

- The word “Uranium” is frequently used to grab attention to promote concern because it naturally triggers the public’s alarm. This natural occurring element is recognized as a source of extreme power, which is true in highly enriched concentrations.
- However in low concentrations found in nature, uranium is no more hazardous than other common heavy metals such as: arsenic, and selenium which are found naturally in drinking water aquifers throughout many regions of the United States.

Comparison of Radiological Activities

- EPA clearly acknowledges that uranium is first and foremost, like other naturally occurring heavy metal, dangerous because of its toxicity, **NOT** because of it's radioactivity.

Uranium and cancer	"Neither the National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), nor the EPA have classified natural uranium or depleted uranium with respect to carcinogenicity."

US Dept. of Health and Human Services, Feb 2013 - Toxicological Effects of Uranium
https://www.atsdr.cdc.gov/toxprofiles/tp150.pdf page 5

- This is a very important fact that EPA has omitted. The focus of all EPA's attention is on the Uranium as being the harmful ion because some believe is it cancer causing. It isn't. In fact it's Radium and Radon's daughters that EPA's attention should be focused on in these discussions, not uranium.

USGS Study on Texas Uranium Restoration released in 2009

- Associated cancer risk exposure pathways should be based not just on uranium, but should include radium and radon too. Radium is significantly a much larger health risk and greatly overshadows uranium contributions in these environments.
- The fact is cancer risk is reduced after mining and restoration because radium and radon are significantly removed from the groundwater after mining and restoration by the ISR process.
- Dr. Thomas E. Johnson, a past member of the SAB, pointed this fact out to EPA, but his pronouncement never resonated within EPA. EPA is ignoring the facts.

Comparison of Pre-mining and Post Restoration EPA Values

- The following series of tables contain data obtained from the USGS report of 2009.
- There are 26 individual ions analyzed during background/ baseline sampling. Of these, 9 are considered EPA Primary Standards and 6 others are classified as EPA Secondary Standards.
- EPA Secondary Standards are not indicative of affecting health as they only affect appearance and odor.
- The remaining 11 ions have no standards at all. i.e are not health related. Calcium, Carbonate, Bicarbonate, Potassium, and other benign elements.

26 Ion Restoration Table Elements and EPA Standards

	EPA Primary Standard	EPA Secondary Standard
Calcium	None	None
Magnesium	None	None
Potassium	None	None
Carbonate	None	None
Bicarbonate	None	None
Ammonia- N	None	None
Molybdenum	None	None
Silica	None	None
Conductivity	None	None
Alkalinity	None	None
Sodium	None	None
pH	None	6.5 – 8.5
Iron	None	0.3 ppm
Manganese	None	0.05 ppm
Sulfate	None	250 ppm
Chloride	None	250 ppm
TDS	None	500 ppm
Fluoride	4 ppm	2 ppm
Nitrate-N	10 ppm	None
Arsenic	.010 ppm (10 ppb)	None
Cadmium*	.005 ppm	None
Lead*	.015 ppm	None
Mercury*	.002 ppm	None
Selenium	.050 ppm (50 ppb)	None
Uranium	.030 ppm (30 ppb)	None
Radium-226	5 pCi/l	None

★ High
• Low

TDS

Mine	Baseline (ppm)		Restored Value (ppm)	Amended Value (ppm)	Change between Baseline and Restored Value
Bruni-5-2	2282		1366	2282	-40%
Bruni-5-1	2282		1395	2282	-39%
Pawnee	903		710	900	-21%
Benavides-4	1211		1088	1211	-10%
O'Hern-2	979		890	**	-9%
Longoria-1	1928		1860	1928	-4%
Brelum-2	6349	★	6155	6349	-3%
Holiday-3	1442		1414	1442	-2%
Benavides-1	1211		1351	1211	0%
Brelum-1	5970		6065	5971	0%
Bruni-6	1333		***	1333	0%
El Mesquite-1	1071		1075	1071	0%
Nell-1	5383		5372	5383	0%
Trevino-2A	1635		1628	1884	0%
Trevino-2B	1635		1627	1635	0%
Trevino-1	1577		1661	1700	+5%
McBryde-1	1580		1727	1738	+9%
Longoria-2	2013		2208	2200	+10%
Benavides-2	1663		1875	2100	+13%
Benavides-3	1356		1560	1358	+15%
El Mesquite-3	786	•	900	910	+15%
Everest Karnes	1111		1379	1492	+24%

Total Dissolved Solids Take Away

Total Dissolved Solids
EPA's Current Maximum Concentration Limit (MCL) is 500 mg/l.

- All baseline qualities were significantly **greater** than EPA's MCL
- Average Baseline **prior** to mining was 2077 mg/l
- Average Restored value **after** mining was 2062 mg/l

Groundwater did not meet EPA's drinking water standard before mining nor did any meet those standards after mining.

★Calcium, Bicarbonate, Carbonate and Sulfate are ions that are not returned exactly to, or below baseline in many instances as they are pH dependent.

★ High
• Low

Arsenic

* EPA Arsenic standard when restored

Site	Baseline mg/l		Restored Value mg/l	EPA Drinking Water Standard* mg/l	Restored Value Compared to EPA Standard
Benavides-1	0.004	•	0.002	0.05	25 Times Lower
Benavides-3	0.037		0.002	0.05	25.0 Times Lower
Brelum-2	0.013		0.003	0.05	16.7 Times Lower
Bruni 5-2	0.009		0.003	0.05	16.7 Times Lower
Benavides-2	0.008		0.004	0.05	12.5 Times Lower
El Mesquite-1	0.007		0.004	0.05	12.5 Times Lower
Bruni 5-1	0.009		0.005	0.05	10.0 Times Lower
McBride	0.041		0.007	0.05	7.1 Times Lower
Holiday-3	0.08		0.010	0.05	5.0 Times Lower
Nell-1	0.028		0.012	0.05	4.2 Times Lower
Pawnee-1	0.05		0.016	0.05	3.1 Times Lower
Trivino-1	0.05		0.016	0.05	3.1 Times Lower
Brelum-1	0.074		0.017	0.05	2.9 Times Lower
Longoria-2**	0.023		0.021	0.05	2.4 Times Lower
O'Hern-4	0.042		0.039	0.05	1.3 Times Lower
Longoria-1	0.023		0.025	0.05	2.0 Times Lower
El Mesquite-3	0.08		0.027	0.05	1.9 Times Lower
Trevino-2b	0.032		0.026	0.05	1.9 Times Lower
Trevino-2a	0.032		0.036	0.05	1.4 Times Lower
O'Hern-2	<0.2	★	0.047	0.05	~Equal
Benavides-4	0.004		0.010	0.05	5.0 Times Lower
Everest Karnes	0.15		0.323	0.05	6.5 Times Higher

Arsenic Take Away

Arsenic -
Baseline values ranged from .004 - .15mg/l.

All sites were restored to less than baseline values, except one.

At the time these 22 mining projects were mined and then restored, the EPA's maximum contaminant level (MCL) was .05 mg/l. All were restored to levels below the then existing .05 mg/l MCL.

In 2002 EPA lowered the Arsenic MCL to .01 ppm.

1 mg/l = 1 ppm = 1 part per million

★ High
• Low

Selenium

ISR Site	Final Restoration Value mg/l	EPA MCL mg/l	Restored Value Compared To EPA Standard
Brelum 2 •	.001	.05	50 Times Lower
Nell 1	.001	.05	50 Times Lower
Pawnee 1	.001	.05	50 Times Lower
Trevino 1	.001	.05	50 Times Lower
Brelum 1	.002	.05	25 Times Lower
O'Hern 2	,002	.05	25 Times Lower
Trevino 2a	.002	.05	25 Times Lower
Longoria 1	.003	.05	16.7 Times Lower
Benavides 3	.004	.05	12.5 Times Lower
Everest Karnes	.004	.05	12.5 Times Lower
McBride	.004	.05	12.5 Times Lower
Trevino 2b	.004	.05	12.5 Times Lower
Benavides 1	.005	.05	10 Times Lower
Holiday 3	.006	.05	8.3 Times Lower
Longoria 2	.008	.05	6.3 Times Lower
El Mesquite 1	.008	.05	6.3 Times Lower
Benavides 4	.010	.05	5 Times Lower
Bruni 5-1	.012	.05	4.2 Times Lower
Bruni 5-2	.015	.05	3.3 Times Lower
Benavides 2	.033	.05	1.5 Times Lower
O'Hern 4 ★	.039	.05	1.3 Times Lower
El Mesquite 3	.102	.05	2.0 Times Higher

Selenium Take Away

Selenium –
EPA's MCL is .05 mg/l .

All wellfields were restored to significantly less than EPA's MCL, except one.

★ High
• Low

Radium 226

ISR Site	Baseline (pCi/l)	Compared to Drinking Water Standard (5 pCi/l)*	Final Restoration Value (pCi/l)	Restored to Baseline
Pawnee-1	274	54.8 Times Above	149	Yes
Travino-1	274	54.8 Times Above	149	Yes
Bruni 5-2	90.5	18.1Times Above	88	Yes
Benavides-4	83	16.6 Times Above	61.3	Yes
Bruni 5-1	90.5	18.1 Times Above	59.6	Yes
Longoria-1	97	19.4 Times Above	47.93	Yes
Hobson-1	45.1	9.0 Times Above	41.87	Yes
Benavides-3	173.1	34.6 Times Above	40.5	Yes
McBride	365	73 Times Above	27.8	Yes
Longoria-2	36.72	7.3 Times Above	27.01	Yes
Holiday-3	429.8 ★	86 Times Above	23.6	Yes
Nell-1	57.2	11.4 Times Above	23	Yes
Brelum-2	9.36	1.9 Times Above	18.7	No
Benavides-1	83	16.6 Times Above	17.35	Yes
El Mesquite-3	116.68	23.3 Times Above	17.1	Yes
O'Hern-2	48.2	9.6 Times Above	16.2	Yes
Travino-2b	19	3.8 Times Above	13.6	Yes
Travino-2a	60	12.0 Times Above	13.2	Yes
El Mesquite-1	9.98	1.9 Times Above	8.6	Yes
Brelum-1	9.36 •	1.9 Times Above	5.8	Yes
Benavides-2	45.17	9.0 Times Above	5.2	Yes
O'Hern-4	29.49	5.9 Times Above	No Data	----

Radium Take Away

Radium 226 -

Before mining all sites exceeded EPA MCL of 5 pCi/l. Baseline values ranged from 10 – 430 pCi/l.

After restoration ALL sites were restored to below baseline except one and that was marginal**. Aquifer still non-potable.**

1 Curie = 1 gram Ra_{226} = 3.7 x 10^{10} dps
1 picoCurie = 10^{-12}

★ High
• Low

Uranium

ISR Site	Baseline (ppm)* Standard(.03 ppm)	Compared to Drinking Water (ppm)	Final Restoration Value (ppm)	Baseline vs Restored Value (ppm)
Bruni 5-2	0.461	15.4 Times Above	3.02 ★	2.569
El Mesquite-3	0.840	28 Times Above	2.53	1.690
Longoria-2	0.037	1.23 Times Above	1.81	1.773
Benavides-3	0.120	4 .00 Times Above	1.5	1.380
Longoria-1	0.047	1.57 Times Above	1.21	1.163
McBride	0.831	27.7 Times Above	1.2	0.369
Bruni 5-1	0.461	15.4 Times Above	1.185	0.724
Benavides-1	0.083	2.77 Times Above	1.04	0.957
O'Hern-4	0.307	10.2 Times Above	0.96	0.653
Benavides-4	2 ★	66.7 Times Above	0.95	-1.050
Trevino 2b	0.036	1.20 Times Above	0.7	0.664
Pawnee-1	2	66.7 Times Above	0.672	-1.328
Trevino-1	2	66.7 Times Above	0.672	-1.328
El Mesquite-1	0.029	~ The Same	0.308	0.279
Trevino-2a	0.036	1.2 Times Above	0.293	0.257
Benavides-2	0.078	2.6 Times Above	0.279	0.201
Everest Kames	0.025 •	Less than the standard	0.206	0.181
Holiday-3	1.60	53.3 Times Above	0.134	-1.466
O'Hern-2	0.371	12.4 Times Above	0.124	-0.247
Brelum-1	0.037	1.23 Times Above	0.025	-0.012
Brelum-2	0.030	At the Standard	0.013	-0.017
Nell-1	0.041	1.37 Times Above	0.013 •	-0.028
Average	**0.521**	**17.4 Times Above**	**0.857**	

(1.6 Times higher than baseline)

Uranium Take Away

Uranium

- On average all wellfields restored to within .33 mg/l U_3O_8 of baseline. Less than <1 ppm. Eight of the 22 were restored to below baseline. Nine others restored to less than 1 ppm.
- At the time these wellfields were mined and restored, EPA did not have a MCL for U.
- To lower uranium in the remaining wellfields would further consume mega-gallons of perfectly good groundwater and would not yield a significant difference to the water quality – it remains a non-potable aquifer as it was prior to any uranium extraction.
- Presently EPA's MCL for Uranium is 30 parts per billion - .03 mg/l, established in Dec, 2000 well after these wellfields were restored.

Existing Groundwater Restoration Reality

- Reverse Osmosis processing is used to restore mining water back to baseline quality. An existing, pre-mining contaminated aquifer or a post mining and restored aquifer are almost identical in quality and can yield drinking water for the same cost using Reverse Osmosis technology.
- All 26 ions are required to be restored back to “baseline” quality, or consistent with “baseline” even though many have no health issue consequences.
- If a few ions are above baseline, the operator submits an amended baseline table that must be approved by regulator. This has no health impact on the aquifer.
- Two (2) years of post restoration stability. Ample time.
- In over 40 years of ISR operations, there has never been a well, “public” or “private,” ever harmed by this industry.

Legal Overview Part 192

- EPA failed at quantifying the number of deaths that would be averted by adopting their Proposed Rules. “Zero”
- Confusing RCRA rules which were developed to address man-made hazardous materials with “natural occurring materials.”
- Multiple Programs affected: Underground Injection Control, UMTCRA, Radioactive Material Licenses, Aquifer Exemptions.

Technical Overview Part 192

- EPA wrongly states that operators can terminate their license soon after restoration is complete, “sometimes less than 1 year.”
- Does not recognize “class of use” to conserve groundwater resources.
- EPA Proposed Rules state that restoration is achieved when all ions are below baseline values. Consumptive use of water and time to achieve without any significant benefit.
- Point of Compliance is the Aquifer Exemption Boundary not the Monitor Well Boundary. EPA is confused here again.

Economic Overview Part 192

- EPA Economic Model is grossly flawed and overly simplistic.
- Credits DOE sales as ISR production for recent years.
- Does not factor in the costs for:
  - Maintaining the cost of surety for 30 years, nor
  - Cost for maintaining major infrastructure for 30 years,
  - Cost for land payments,
  - Cost for license fees.
  - Cost for maintaining technical and maintenance staff,
  - Cost for Insurances, taxes, health, etc.,
  - Cost for consultants and additional hearings.
- EPA assumes added costs can be passed on to the consumer, i.e. the electrical utility. Not true.
- Proposed rules significantly increase the cost to mine.
- EPA assumed US industry sells 52 million pounds a year @$57/lb. $3 billion in revenue. **Government accounting?** Fact, Most of the annual consumption is from foreign countries that do not have to restore. Australia, Kazakhstan.

Conclusions

- ISR mining has shown an exemplary level of environmental stewardship over decades of operating experience. Restoration of EPA's Primary Standard ions to below MCLs and/or baseline values has been documented by USGS when their data is studied.
- Stability should be determined on a case by case basis and not a generalized blanket rule where one size fits all.
- Radium concentrations in groundwater are significantly reduced after mining/restoration leading to much lower radiological risks.
- EPA has only provided lip service to those that have presented valid concerns and observations about the proposed rule. They have never engaged in any direct dialogue with the responsible stakeholder. EPA never provided "Response to Comments" report after receiving a myriad of comments offered during the public comment period.

Conclusions continued

- Existing, naturally occurring contaminated groundwater and post mining-restoration groundwater are of the same use and classification. They both can be treated similarly and transformed into drinking water for about the same cost using Reverse Osmosis technology.
- The proposed Part 192 rule should be sent back to EPA and handed over to NRC for further consideration.