Dispelling Myths: The Safety, Economics, and Future of In-Situ Uranium Recovery in Texas and Beyond

By

Michael D. Campbell, P.G., P.H., C.P.G.[1]

Henry M. Wise, P.G., C.P.G.[2]

Bruce Handley, P.G.[3]

and

Kevin T. Biddle, Ph.D.[4]

Abstract

In the modern energy landscape, nuclear power has gained renewed attention as a reliable, safe, and carbon-free energy source. However, misinformation about in-situ uranium recovery (ISR) projects — a vital component in nuclear fuel production —has always fueled unnecessary skepticism. We address the common misconceptions about ISR and highlight its safety and economic benefits, and explore its critical role in supporting nuclear power expansion in Texas and beyond.

In this particular period of history, the subjects of nuclear power and in-situ uranium recovery development projects have been raised in discussions where well-founded geoscience is being ignored. Small, but media-trumpeted anti-nuclear and anti-uranium recovery groups have repeatedly used outdated arguments or incorrect assumptions in attempting to convince the regulatory agencies and general public that nuclear power plants and uranium recovery projects cannot be operated safely and therefore should never be permitted. Nevertheless, nuclear power is rapidly gaining popularity in Texas and in many other states and developed countries around the world.

The management of the I2M Corporation has concluded that Texas is not only the oil & gas capital of the U.S., but it could also become the major center for recoverable uranium resources as well, and I2M has set out to follow leads and will be attempting to confirm this potential over the coming years.

---

[1] **Michael D. Campbell** is the President and CEO for The I2M Corporation, and Chief Geologist and Hydrogeologist of the I2M Consulting, LLC, based in Katy, Texas.

[2] **Henry M. Wise** is the Vice President – Operations, for The I2M Corporation, and Geological Consultant to Government and Industry, based in Sugarland, Texas.

[3] **Bruce Handley** is the Vice President – Environment, for The I2M Corporation, Geological Consultant to Industry, based in Houston, Texas.

[4] **Kevin T. Biddle**, is the Acting Chairman of the I2M Board of Directors, and Consultant to the Energy Industry, based in Houston, Texas.

May 12, 2025

Introduction

When referring to the in-situ uranium recovery (ISR) projects, some small groups who oppose nuclear power and uranium development often use information that is either out of date, inappropriate and in many instances are not relevant to the methodology now used. The in-situ methodology is now used to recover uranium from sands that are either within known aquifers (which has been naturally contaminated by uranium over relatively limited areas of the aquifer) or when uranium occurs in sand units located well below such drinking-water aquifers. In the cases of multi-layered uranium deposits, drinking-water aquifers are separated by clay intervals that protect the shallow aquifers from the recovery fluids during production.

Many of these issues have been touched upon in an article by Dylan Baddour,[5] titled: “Uranium Mining Revival Portends Nuclear Renaissance in Texas and Beyond,” in the December 1, 2024 issue of *Inside Climate News*. It is a good example of this, and there are others as well.[6] Mr. Badour does a good job discussing why nuclear power is needed today. Unfortunately, while he states that wind and solar energy production are the cheapest sources of energy, no mention is made that these are the cheapest only because of government subsidies. He also fails to mention that both sources are unreliable and the operating costs continue to rise because the operation and maintenance costs have been severely underestimated in their planning stages.[7]

He is also incorrect in stating that the U.S. has not built a nuclear reactor in 30 years as the result of the Chernobyl disaster. The Soviet Union’s need for expediency in management of a bad Russian nuclear reactor design was at the root cause for this unfortunate incident in the Ukraine. Set-backs were also caused by the accidents at Three-Mile Island and Fukushima, in which no one died or was irradiated. The management of both incidents of over-heating of a nuclear core and meltdown was well-managed despite exaggerated media coverage of released radioactivity.

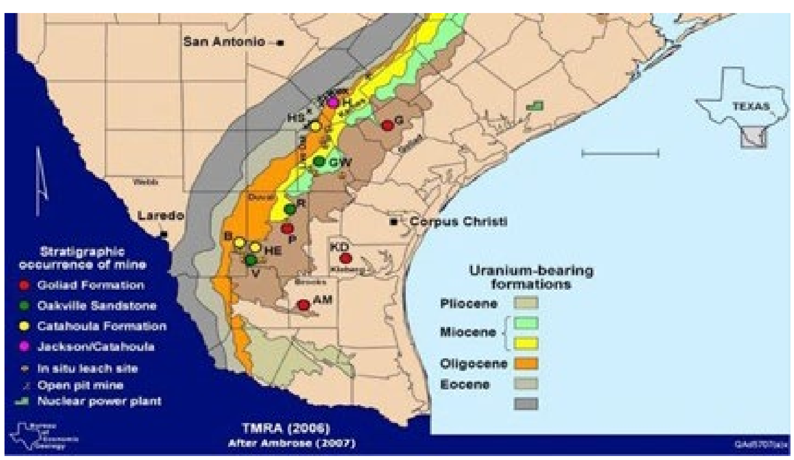
The fact is that the U.S. has brought into production two new, full-scale nuclear reactors in the past few years in Georga at the Vogtle plant site with more being planned.[8] China’s nuclear power generation capacity has grown by about 900%

in the last 20 years. France is building new large nuclear power plants and many companies and countries are planning to build the new small modular reactors (SMRs) when they arrive on the market (by the end of the decade or sooner). The old idea that if the U.S. stops using nuclear power, nobody else will use it was obviously wrong.

With the sustained rise in the price of yellowcake and with the need for American uranium to offset the cancelled contracts with Russia and associates as the result of the Ukraine War and because Russia can no longer be relied upon to provide us with a secure supply of uranium, the need for new sources of uranium is becoming critical.

Uranium is a climate-friendly source of tremendous energy to produce reliable electricity in Texas and around the U.S. This source of power is capable of providing electricity many times greater than both solar and wind sources, although they will deliver energy during the transition away from coal by the new technology coming down the road in the form of SMRs. These compact, scalable, efficient reactors can safely provide reliable sources of electricity to local suburbs, small towns, and remote areas throughout Texas by the end of this decade or sooner.[9]

Meanwhile, since Texas is gearing up to build new nuclear power plants, new uranium sources would find ready markets over this decade and beyond. [10], [11], and [12].

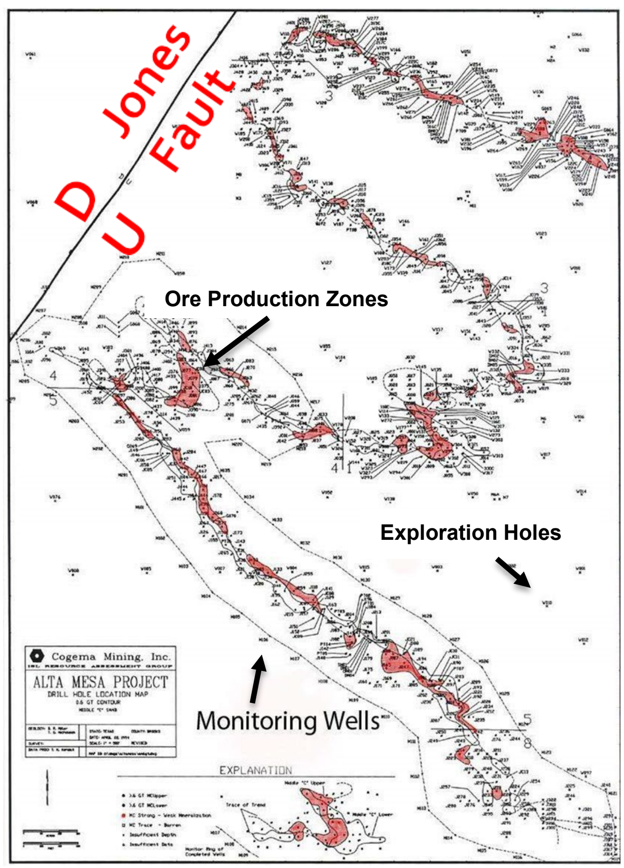


South Texas In-Situ Uranium Recovery Projects: Past and Present [13]

Although South Texas has been a well-known producer of uranium since the 1960s and was once considered to occur only in South Texas, it is now apparent that uranium occurrences are more widespread than considered possible or even likely by previous uranium geologists (see map above).[13]

What About the Risks?

But, what about the risks involving potential damage to the surface and shallow water-table wells above where in-situ uranium recovery operations would be conducted? It should be noted here that there has never been a specific project case where these risks have been realized in Texas. The existing ISR operations in South Texas have removed millions of pounds of uranium and continue to successfully remove uranium from deep deposits without impact on the environment or groundwater resources. This history demonstrates the overall environmental and economic viability of the uranium production industry in Texas.



Map View of Uranium Roll-Front Deposits in South Texas [14]

Campbell and Handley conducted an independent assessment in 2008 of the early in-situ uranium recovery operations at the Alta Mesa site in South Texas (see figure).[14] It was then, and remains now, in full environmental compliance and full operating status managed by enCore Energy.[15] Also, there has never been a substantiated claim that in-situ uranium recovery operations involving "environmental litigation" has been specifically linked to contamination of drinking-water aquifers in Texas at Alta Mesa, Rosita, Hobson, or other areas where ISR operations were conducted over the years. Further, these intervals of mineralized sands have never been considered by the TCEQ (Texas Commission on Environmental Quality) to contain groundwater of drinking-water quality, nor was it advisable for use with livestock or wildlife or for agricultural purposes. This is because the area contains naturally occurring uranium "contamination" in the groundwater at depth along specific narrow trends in sand intervals that is above the drinking water standards. Many of these uranium contaminated sands are part of the Goliad Formation of the Gulf Coast Aquifer System and are generally much deeper than the sand intervals used as drinking-water aquifers above. One example is known as the Uranium Energy Corporation's Goliad In-Situ Recovery project.[16]

As Campbell, Wise and Handley, the core management team of the I2M Corporation[17] and other personnel begin to investigate Texas areas, the I2M Team has noted that these small groups of citizens, and some individuals, tend to be opposed to developing such natural resources for misguided reasons. These same people may even have an oil well in the fields nearby that have been generating revenues for the families for decades or have one or more water wells to provide for domestic and agricultural needs. Texas is fortunate to have plenty of groundwater (assuming their wells are maintained properly), plenty of oil and natural gas, and the I2M team is now convinced that uranium is far more widespread in Texas than previously presumed by even experienced uranium geologists.

The I2M team will be addressing the normal issues surrounding the permitting process, such as describing the nature of the uranium mineralized sands and within their hydrogeological setting, the location of water wells to be sampled for establishing the base-line groundwater quality within and surrounding the mineralized zones. In addition, these factors will constrain the methods of production, the processing of uranium fluids and their radioactive contents, and other conditions present on the site.

When it can be demonstrated that there is no apparent threat to public safety in the groundwater or in the general environment, there is still the need for widespread public support of such uranium projects in the same way most citizens have supported oil and gas production projects around Texas in the past.

While some actual issues can occur, they can usually be resolved by negotiation with the state and those citizens affected, without the need for unnecessary and costly litigation of matters that have real, as opposed to feared impact.

Needed Sources of New Uranium Deposits and Potential Roadblocks

The question then arises: Where is all the uranium needed to fuel these new nuclear power plants going to come from? The short answer is from the U.S., Canada, Australia, and a few other friendly countries. But there are roadblocks that hinder the development of U.S. uranium resources.

Mr. Baddour uses Uranium Energy Corporation's the Goliad ISR project[18] as an example to illustrate why ISR projects should not be discussed using the same old comments used over the years when open-pit mining was employed to mine shallow uranium deposits. As will become obvious, the comments remain either misleading or incorrect or just bad information. Campbell and Wise have been monitoring such anti-uranium rhetoric for decades.[19] I2M's personnel have further concerns about Mr. Baddour's reporting because they will no doubt have to confront such opposition in their permitting efforts as well as their projects develop.

Mr. Baddour indicated that Mr. Ted Long, a neighbor to UEC's Goliad operation, is concerned that his water well will be affected. This is, of course, a legitimate concern, however, no mention is made that the UEC uranium operation is required by TECQ rules to be surrounded by groundwater monitoring wells to detect any excursions. This ring of monitoring wells not only surrounds the operating area horizontally, but also in sands above and below the uranium recovery zone. These wells are periodically sampled to characterize changes in the groundwater quality. Should an excursion occur, the TCEQ requires remediation efforts be immediately implemented.

Mr. Baddour states that TCEQ records show active cases of groundwater contaminated uranium, radium, arsenic, and other pollutants from defunct uranium "mines" and tailing impoundments without mentioning that all of the facilities were open-pit mines that were in use many decades ago, unrelated to ISR facilities. Open-pit mining in South Texas did "disturb" the ground surface and exposed the uranium deposits to the open air as they were being mined.

Tailings were created when the overburden and other mining waste were piled on the ground surface. Due to the shallow depth of the open pit, groundwater would seep from below into it and had to be remediated in surface ponds. In addition, these facilities were mined in the 1960s and the early 1970s, a time when environmental regulations were not as protective as they are today.

Once the surface mining was completed, the groundwater would flow back into the open pit and create a pond that would leach out any remaining uranium. This resulted in recharging the slow-moving groundwater containing uranium, radium, and other contaminants until they migrated beyond the oxidized zone near the surface to zones where reduced conditions exist. At this point, all such contaminants would precipitate out of solution and back into solid form to remain within the roll-front of the mineralized zone.

In past years, company management could decide to go out of business (for such reasons as a commodity price decline of yellowcake, or resource depletion, etc.), leaving a mess for the State of Texas to clean up. Since that time, all such operations, including ISR facilities, must maintain either a bond or insurance policy that would cover the anticipated cost of any needed cleanup. This must occur before even being authorized to begin operations as part of their permitting responsibilities. Today, if an ISR company needed to go out of business there would be funds available for any TCEQ-mandated clean-up.

Mr. Baddour is also incorrect and/or misleading in discussing the ISR process. The ISR process is similar to an oil and gas water-flood activity. Yes, solvents are used to dissolve the uranium, but the term "solvents" by itself is misleading. When most people hear the term "solvents" they think of something hazardous, such as acids or organic solvents. The solvent used to dissolve the uranium in the groundwater is oxygen with carbon dioxide added to the injection fluids. HTH, added if necessary, is a compound used in swimming pools to control bacteria scaling (usually iron bacteria and sulfate-reducing bacteria). This common bacterial scaling and plugging of well screens of both injection and recovery wells can become a problem in some production patterns. This is also common in many domestic water wells when regular check-ups are not conducted by qualified and experienced water-well contractors.

Hydrogen peroxide (H_2O_2) may be used instead of oxygen (O_2). H_2O_2 breaks down to form water and O_2. That's it. All drinking water contains oxygen and carbon dioxide. This solution causes the uranium to dissolve in the water, similar to the process of sugar dissolving in a glass of tea.

By the way, there is no uranium dust produced during pattern-production operations, as mentioned in the subject article referring to surface mining. The dissolved uranium is removed via a recovery well at the center of the 5-spot pattern as a liquid, not a slurry, then pumped to a water-treatment plant to load resins. These resins are then transported to a processing plant to be stripped of the uranium and then filtered and dried in the form of yellowcake ready for sale in 55-gallon drums each weighing about 600 pounds. The ISR produced water is then filtered to remove solids and pumped back into the ground via the injection well(s), along with added oxygen and carbon dioxide. During production, the fluids in the production patterns are under strict control by balancing the wells' injection and recovery pressures and removal rate of the uranium fluids. This takes place within the hydrogeological environment of artificial cones of pressure relief (not cones of depression that directly affect the water table) as long a pumping is underway. This eliminates any fluids migrating out of the production pattern.

Personnel are especially important in ISR operations where experienced and licensed hydrogeologists are required to design and control the subsurface hydrodynamics involved in the production of uranium fluids recovered and pumped to processing plants. The cycle of uranium recovery continues until the concentration of uranium dissolved in the groundwater declines to a predetermined non-economic level.

After a few months, when uranium concentrations reach that level, the operation of the individual injection and recovery wells of the 5-spot production pattern ceases and the system would then be remediated shortly thereafter. This involves the removal of submersible pumps which are then prepared for possible reuse in other production patterns.

Once the ISR operations cease, the aquifer will naturally return to its original reduced state. The oxygen present in the groundwater would be adsorbed by the sediment, except where naturally oxygenated plumes of a fully developed biogeochemical cell(s) of one, or a series of uranium roll-fronts, exist at depth. This also occurs when the scattered remains of an earlier cell are encountered. These are partially reclaimed by the reducing conditions existing where the uranium and associated constituents have been immobilized having precipitated back into solid form and are no longer mobile in the groundwater environment.

When the well field is no longer needed, the PVC screen and casing is then filled with bentonite and/or cement up to the near surface and the upper few feet of the casing are removed, leaving a few feet of soil above for possible future soil cultivation. Neither during nor after production ceases, It should be noted here that very few production-fluid excursions registering at monitoring wells have been reported in the history of the ISR operations in South Texas, even in the early days of perfecting this method of uranium recovery, with zero instances of any productions fluids contaminating a drinking-water well.

Furthermore, the hydrogeological flow system is designed so that more groundwater is being extracted from the pattern area in a natural flow inward towards the center of the production pattern and from areas surrounding the ISR operations even outside the ring of monitoring wells. As long as slightly more water is being pumped than being re-injected, all ISR fluids will be contained within the production area. By analogy, think of a shower. As long as the shower is flowing into the bathtub at a rate slower than the bathtub's drain can remove, the bathtub will never overflow. In other terms, subsurface pressures at the ring of monitoring wells and throughout the mineralized zones are managed to induce a pressure gradient that directs flow of fluids only toward the recovery (pumping) well in the center of the production pattern.

Use of Groundwater During Operations

With regard to how much groundwater is used, 99% of the extracted groundwater derived from the naturally "contaminated" aquifer is reused. The unused 1% is stored in tanks and disposed of in a disposal well, which is permitted by the Texas Railroad Commission. These disposal wells inject fluids deep below any drinking water aquifer, just as those used for disposing of produced brines from oil and gas well are required to do. These disposal wells inject produced water into deep sands containing highly saline groundwater and are regulated by the TCEQ. It should also be noted that I2M's Campbell was one of the authors of a major EPA guidance investigations and resulting document on deep wastewater disposal wells (1977).[20]

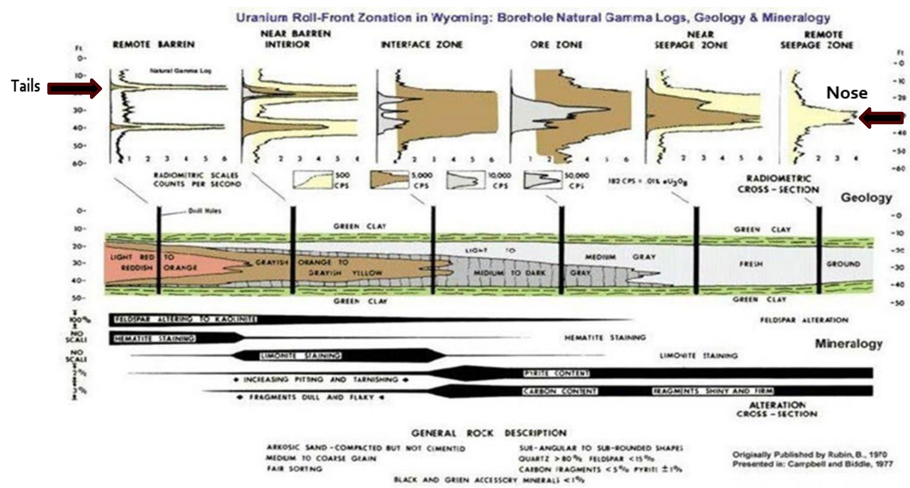
The Formation of Uranium Roll-Front Deposits

So, what about groundwater contamination from ISR project areas? First to be understood is why uranium is where it is in the first place. Geologists have determined that certain geological formations naturally contain uranium, albeit very low concentrations, such as are present in units where volcanic fragments (containing uranium) became part of the sediments (that may also contain lignite) millions of years ago.[21] Rainfall infiltrates into the water table, recharging the groundwater system and migrating very slowly through permeable sands.

Because uranium will dissolve in oxygen-rich water (coming with the recharged rainfall), it is dissolved and migrates with the groundwater down-dip until it becomes part of what is termed a biogeochemical cell within the sand unit along a mobile interface containing bacteria.[22] This, in turn, encounters and interacts within environments that are oxygen-rich and adjacent to that containing a strong reductant. The latter can be residual organic material or methane migrating upwards along faults from very deep oil and gas deposits. This results in the uranium precipitating out as a roll front of bacterial excrement (a waste consisting of particles of uranium).

The uranium formation process is a naturally occurring reaction within favorable sand units that takes millions of years to build up to create roll fronts of uranium mineralization. Concurrently, these cells migrate very slowly down a hydraulic gradient at a much slower rate than the groundwater within the sand units of the local hydrogeological system. This process often, but not always, forms uranium deposits at only favorable locations along the boundary interface of oxygen-rich and oxygen-poor (reduced) sediments.

When the roll-fronts are located by drilling to exist in sufficient volume, uranium grade, and lateral extent to be economically of interest according to the prevailing yellowcake market price, only then can such deposits be developed by the in-situ recovery methods now being deployed at a few locations in the U.S. and the world. Texas just happens to have favorable sites.



A Cross-Section of the Principal Features of a Uranium Roll-Front (after Rubin, 1970) [23]
For additional details, see: Campbell, Wise, and Rackley, (2007). [22]

The uranium concentrations (aka ore grades) are measured via down-hole geophysical logging – by the natural gamma log in particular. Extensive delineation drilling reveals the thickness, depth, and continuity of the mineralized zone and these data, combined with the drilling cost and recovery factors and sale price of the resulting yellowcake, and other costs, to determine the economic viability of a particular uranium deposit.

Uranium deposits are usually located in remote regions in Texas, Wyoming, Utah, Nebraska, North & South Dakota,[24] and [25]. But some are located closer to human activities such as in areas of farming and ranching, where deposits (as in the case of the UEC Goliad uranium deposit) are also located within aquifers that have been naturally contaminated in some relatively small areas by the formation of uranium roll fronts, while the vast area surrounding the uranium deposit contains drinking-water aquifer(s) used for domestic or agricultural purposes.

Deposits in areas of Texas also occur in deep sands and many are located well below sands that are in use as drinking-water aquifers. Thick clay units are often present above that serve to protect the aquifers from the uranium-mineralized groundwater within the sand intervals below.

It should be re-emphasized here that groundwater migrates very slowly in such sands. That environment is nothing like the "underground rivers" of limestone caverns where groundwater (containing natural contaminants) could move quickly over long distances.

Original Groundwater Quality in ISR Areas?

After the uranium has been removed from one of the sand intervals via the first few production patterns, the sites would then begin to be remediated. This is not performed at the end of the project, as some poorly informed reporting has claimed. This process includes bringing the groundwater quality "back to baseline hydrochemical levels," as was recorded by the pre-operations sampling of the water wells present in the area. As indicated above, reducing conditions are restored and all contaminants (uranium, radium, etc.) in solution are hydrochemically forced to precipitate back into insoluble forms. This is followed by plugging all production or injection-related wells and restoring the land surface above wherever disturbed. This typically consists of drill-rig tire tracks, ruts, temporary access roads and miscellaneous surface facilities and equipment. Re-contouring the surface and re-seeding and re-planting are then undertaken in cooperation with the landowner.

So, What Was the Original Water Quality of the Area Groundwater?

TCEQ regulations require that, prior to any permits for the ISR project being approved, as indicated above, selected water wells in the general area and within the areas of the prospective production intervals would be sampled and groundwater analyzed to determine the pre-existing hydrochemical baseline (before any operations were begun). Misinformed people have often put forth the argument that most of the ISR facilities needed to change their baselines *after* ISR projects have been completed to meet TCEQ closure requirements. This is an example of leaping to a conclusion before the geoscientific facts are known. Such a claim does not take into account that ISR operations began at many locations in the 1970's, when there were only a few regulations, including determining baselines.

When the background regulations were first developed, it was assumed that all of these facilities had produced uranium fluids from aquifers of drinking-water quality, since they can also occur in sands serving as drinking-water aquifers. However, this did not take into account that those areas where the groundwater in the sand intervals previously contained naturally occurring uranium mineralization. Therefore, those sand intervals did not contain groundwater of drinking-water quality.

These uranium roll-fronts deposits also often contain daughter products (radon and radium), and other constituents like selenium, molybdenum, etc.[26] that in addition to uranium are also deposited at various segments around the roll fronts. Selenium may be present in the roll-front and in the lingering end of the roll front in so-called "tails" (behind), and molybdenum may occur along the interface of the "nose" (or leading edge of the uranium cell fronts) in one or more sand intervals.[27] Around 1979, when the above regulation was first enacted, Wise, while working for US Steel at their South Texas uranium ISR facilities, (and now Vice President - Operations at the I2M Corporation), was asked to determine what the original groundwater quality was for the areas around their George West facilities prior to any ISR operations.

Wise said:

> "I used the available laboratory reports dated prior to the existence of ISR facilities for groundwater sampling data from all available private drinking water wells in the area and found that all drinking-water wells that were located within the boundaries of the uranium mineralization (identified by drilling for the ISR facilities) and which produced groundwater from the same interval as the uranium mineralization exhibited gross alpha and gross beta concentrations on the order of thousands of picocuries per liter. Drinking-water standards were 15 picocuries per liter. These sites were never of drinking-water quality in the first place. This is why the older ISR sites needed their baselines to be adjusted. Unfortunately, not all private water wells had been sampled for water quality by their owners,

> and if they did, they often did not include the various radiation constituents for analysis.”

Several years later, Wise spoke with a geologist of the U.S. Geological Survey (USGS) who said he had conducted a similar study in George West and found all wells were within the drinking-water standards. But Wise asked about the date of the water samples used and was told that they had recently sampled and laboratory-tested all available water wells in the area. Wise then explained to him that the reason he had obtained a different result was because after a permit is granted for an ISR facility, a specific area of the groundwater aquifer is withdrawn from all other uses.

Therefore, there would not be any sampling of the “drinking-water wells” located within the permitted ISR facilities. The USGS’s results also confirmed that the ISR operations did not impact existing drinking-water wells in the aquifer outside of the designated area of the ISR operations, as indicated by the regular sampling of the groundwater from the monitoring wells surrounding the operations.

In a similar Texas uranium anecdote of years past, while Campbell was working for Conoco as District Geologist in Australia, then Wyoming in the late 1960s, he reviewed reports on what became the Conoco Conquista Surface mine in South Texas. The uranium deposit was initially discovered by a Conoco geologist sampling shallow water wells in the Smiley, Texas area in Karnes County in the 1960s. Campbell said:

> ”One water well, indicating groundwater samples with 300 ppb uranium and associated constituents, had been in continuous domestic use for a number of family generations, with no apparent or reported health issues.“

Conoco purchased the ranch and surrounding properties and the Conquista Smith Pit Mine was put into production of yellowcake. Additional surface mines were produced in the immediate area, including the Griffin Pit, Friar-Knandel Pit, Thomas Pit, Korth-Hartman-Finch Mine, and the Smith Mine, all of which became part of Conoco’s operation at the time.

A follow-up genealogical investigation would be in order to determine if any of the family members who lived in the areas of the mine sites have had health effects that emerged over the decades from uranium, radium, or radon exposure. However, a cancer mortality study was conducted in Texas in the early 2000s. Boice, et al., (2003)[28] indicated:

> "No unusual patterns of cancer mortality could be seen in Karnes County over a period of 50 years, suggesting that the surface uranium mining and milling operations had not increased cancer rates among residents."

It was not common for water wells to be sampled for uranium or radium in those days.

The photograph below shows a working face of Conquista's largest open-pit mine of the 1960s and 70s. It also shows the essential features of a uranium roll-front as illustrated in the cross-section discussed above. This includes the presence of the selenium and molybdenum roll-front zones as well, as mentioned earlier.

A 1960s Photograph of the Highwall of Open-Pit Conquista Mine in South Texas [26]

ISR Project Closure and Role of TCEQ

What about contamination after the site was closed? The TCEQ now requires that the groundwater must be cleaned up to the baseline conditions prior to their being allowed to officially close the ISR facility. As soon as all economically feasible uranium had been removed from the subsurface sands, the ISR facility operations would recycle almost all the fluids in that system and then transfer the small volume of wastewater (1% of total water used) to a tanker truck and then delivered to an offsite disposal well facility.

The injected reductants would then bring the groundwater back to its original reduced state returning the aquifer to its original condition (little or no free oxygen). The reductants are oxygen scavengers that are a formulation of natural materials that react with oxygen, re-precipitating any of the remaining uranium and other metals in solution preventing migration.

The TCEQ will not allow a site to be closed until all groundwater sampling of monitoring wells indicate that baseline levels of water quality have been confirmed for at least one year after production has ceased, which would confirm that either no changes in water quality of water wells have occurred or that production sands have been restored to reducing conditions, and considered to be a restored aquifer although still containing naturally occurring uranium, now immobilized in the groundwater system.

UEC's Goliad project has dealt with these issues because the uranium mineralization is located within the current drinking-water aquifers of the area. Many other projects will not have to deal with those issues because the mineralized sand intervals are located well below the drinking-water aquifers in use and are separated by thick clay intervals between the lowest aquifer and the upper mineralized sand interval.

TCEQ Funding Criticisms

Critical arguments have been made that the TCEQ has an incentive to allow ISR projects because the TCEQ receives their funding from the permits issued. This is incorrect. The TCEQ receives its funding only from the State of Texas General Fund and the U.S. Environmental Protection Agency. Fees from any permits or fines go into the State of Texas General Fund and are usually used for other State projects. Therefore, the TCEQ has no incentive but to meet the needs of the people of Texas and their elected leaders.

On a recent note, the TCEQ has funded a recent study, "Uranium Resources in the State of Texas - A Comprehensive Review," by Texas A&M University at

Kingsville, which recommends strong support for the uranium industry in Texas, by indicating in part:

> "This assessment will lead to the development of recommendations for Texas to incentivize the development of the uranium mining industry and its processing to become fuel adequate for current and future nuclear reactors.
>
> Geopolitical changes in international locations for uranium supply have generated uncertainty on the availability of this critical resource. Therefore, incentivizing local uranium production and processing will generate a resilient domestic uranium supply chain system capable of supporting current nuclear industry needs and the significant growth expected in Texas and across the US." [29, page 2]

Improving Public Views of Nuclear Power, But Fuel is Required

The management of the I2M Corporation have noticed what appears to be an interesting change of tactics on the part of anti-nuclear energy proponents. Many of them have apparently come to the conclusion that nuclear power is the only reliable source of electricity that can meet the needs of producing massive quantities of electricity in limited space and still be carbon-free. However, this apparent change of opinion has been tempered by their consistent opposition to any production of uranium. This is comparable to allowing free access to guns but not allowing the production of bullets. In support of this odd perspective, House Bill 1523 was introduced to the Texas Legislature on December 5, 2024. [30]

This bill would ban all uranium operations in Goliad County. The reason for this action is clearly a last-ditch effort to prevent Uranium Energy Corporation's (UEC's) Goliad in-situ recovery (ISR) operations from going into production. The Goliad County Groundwater Conservation District has been fighting UEC for decades despite having no direct or indirect evidence of any violations or imminent threat to the drinking-water aquifers in the surrounding areas, and despite UEC obtaining all appropriate permits from the TCEQ. If this bill passes, it could be only the first step to banning all in-situ uranium recovery projects in Texas.

The Texas legislature is showing renewed support of in-situ uranium projects in recent legislation, which will not only support TCEQ's efforts to provide reasonable environmental permitting requirements in support of the expansion of nuclear power projects in Texas, but also to the uranium industry to move forward with developing uranium projects,[31] and [32].

Texas Uranium Drives Nuclear Power

Finally, in the 1950's through mid-1970's the U.S. not only produced all of the uranium to meet its needs but was also a net exporter of uranium. Today, the U.S. produces only 1% of the uranium it uses, although numerous deposits are now being developed, mostly as in-situ recovery operations in South Texas, Wyoming, Utah, Colorado, and South Dakota. Alaska could also offer substantial resources in uranium and rare-earth elements.

As indicated previously, the U.S. has been obtaining uranium in the past from countries that do not have strict regulations on mining and ISR that the U.S. has developed over the years. But regulations notwithstanding, the lack of local and state support has limited the U.S. in building back the needed uranium reserves for the new developments in nuclear power technology that will be available by the end of the decade or sooner.

Also, much of the produced uranium yellowcake contains less than 1% U^{235} and must be enriched to about 7% U^{235} to be fuel for nuclear power plants. Of special note: nuclear bombs must contain greater than 90% U^{235}. Such fuel have in the past decades been supplied to the U.S. from Kazakhstan and Russia and other potentially unfriendly and unsecure sources.[33]

Russian uranium is now banned from the U.S. by the U.S. Congress due to the Ukrainian War, and Kazakhstan has encountered some serious ISR technical problems that have resulted in the shutting down of most of its production. The U.S. uranium-producing companies are now[34a] and [34b] and other companies are increasing enriched-fuel supplies for the new technology[35] and [36].

There are plenty of uranium reserves in the U.S. that could be produced to meet the needs of the U.S. for many years to come if there is a willingness to develop it with all due regulatory and associated reasonable environmental controls in place. Local representatives[37] and state support[38] are critically needed to ensure the growth of nuclear power in Texas and the availability of Texas uranium to fuel that growth.

Campbell, Wise and the growing team of the I2M Corporation have recently concluded that based on their investigations over the past few years that Texas is not only the oil & gas capital of the U.S., but it could also become the major center for recoverable uranium resources as well. I2M has set out to follow the leads and will be attempting to confirm this potential over the coming years. As history has shown, economics play a pivotal role in developing uranium recovery projects.

An I2M Executive Committee Meeting in Early 2025

The companies who take on such projects will need to raise more than $50 million to get into production, most of the costs involve budgeting for processing plants and for drilling and installation of injection and recovery (pumping) wells.

The latter make up about 66% of the operating costs. The threat of a uranium price collapse is possible and hence the companies are taking large risks on behalf of their stockholders or owners and royalty and surface owners. Today, I2M management has also concluded, however, that uranium prices are more than likely to rise past $100/pound of yellowcake soon and stay elevated for at least 15 years.[39]

In years past, Campbell and Wise,[40] supported by other members of the Uranium Committee of the Energy Minerals Division[41] of the American Association of Petroleum Geologists (AAPG),[42] have been investigating for decades the economic and geological issues surrounding uranium projects in the

U.S., and elsewhere,[43] with a more recent emphasis now on Texas.

Campbell said:

> "The I2M team has generated a large database of more than 14,000 records (as of early 2025) of reports, technical papers, and technical news items mostly on matters relating to nuclear power, uranium geoscience and development, and other mineral commodities in a searchable format of a website called the I2M Web Portal.[44] This provides I2M personnel, and the general public, with sources of information to keep abreast of the developing geosciences, and uranium company activities, and looking out for the common myths involving uranium recovery projects and nuclear power that are often spread by some of the media that need to be countered with the facts."

Here are a few of them:

Myths and Facts

- **Myth:** Surface uranium mining can pose significant risks to human health and the environment, as noted in many Internet reports….?

- **Fact:** There are many reports on the Internet that uranium activities are focused on out-of-date or exaggerated information relating to old open-pit (surface) mines and their associated wastes. Many other reports are not relevant to in-situ uranium recovery remediation, which leaves a negligible footprint. There has never been a report of contamination of drinking water aquifers in Texas or elsewhere in the U.S. by in-situ uranium projects.[45]

- **Myth:** Neither the TCEQ nor the TRC (Texas Railroad Commission) provide sufficient regulation and oversight of in-situ recovery (ISR) operations in Texas….?

- **Fact:** The TCEQ imposes stringent permitting requirements and operational oversight for ISR projects. The TRC regulates surface-mining activities and exploration drilling but not uranium recovery operations. MSHA (the federal Mine Safety and Health Administration) oversees surface-mining operations but does not regulate mining operations in Texas. The federal EPA is involved on a case-by-case basis when requested by the state.

- **Myth:** Human health and wildlife exposures are significant in uranium operations.

- **Fact:** Human and wildlife exposures to uranium and by-products are very minor in Texas ISR projects. Uranium concentration in produced fluids exhibits very low radioactivity. The entire in-situ process, including producing yellowcake, involves very minor radioactivity.

- **Myth:** People who work in processing plants can be exposed to harmful radioactivity.

- **Fact:** Plant personnel are required to wear personal protective equipment via federal and state regulations to mitigate an occasionally dusty environment, but there is zero risk of landowners being exposed to harmful radioactivity.

- **Myth:** Any radioactivity should be avoided as a potential health risk.

- **Fact:** Fear of exposure to radioactivity has been wildly exaggerated by anti-mining and anti-nuclear power groups. Low-level radiation has always been present in our everyday lives from radiation from our sun, from x-ray examinations, during high-altitude air travel, in fertilizers, and even from radioactive potassium in bananas and Brazil nuts,[46] and [47].

- **Myth:** The risk of potential damage to the surface and shallow water-table wells where ISR operations are conducted is unavoidable.

- **Fact:** There has never been a specific project case where these risks have been realized!

* **Myth:** Disposal of waste groundwater constitutes another opportunity for contamination of drinking water.

* **Fact:** Only about 1% (by volume) of the recycled groundwater is disposed of in a very deep, highly regulated disposal well. Oil and gas producers also dispose of their excess fluids (brines) in similar deep disposal wells. These disposal wells inject produced brine water into very deep sands containing highly saline groundwater and are also regulated.

---

* **Myth:** Uranium companies have left the land with significant surface contamination….?

* **Fact:** The TCEQ requires all uranium companies to provide financial assurance in the form of insurance or bonds for any required future cleanups. The old days of mining companies abandoning surface mining projects are no longer permitted by the State.

---

* **Myth:** Property values are going to be adversely affected by the presence of a former In-situ Recovery operation….?

* **Fact:** Any surface contamination and radioactivity exposure, as discussed above, would be minimal. Regarding property values, the selected properties already contain uranium in the subsurface over a wide area and hence any assessment of its real-estate value would include a disclosure of uranium-mineralized groundwater in the deep subsurface.

---

* **Myth:** If a uranium company goes bankrupt, there will be no funds to pay for remediation of affected property….?

* **Fact:** Most leases allow for significant funds to be paid to the surface owners for the temporary use of their lands and a commitment that the leased lands

would be remediated to at least pre-ISR conditions, with funds guaranteed by a TCEQ-mandated bond.

- **Myth:** It is not the time or place for more In-Situ Uranium Recovery projects….?

- **Fact:** Texas citizens are blessed with significant oil and gas reserves and properties containing economic uranium deposits are no exception. Some areas are also fortunate to have deep, economic uranium sands on their flanks. All In-Situ Recovery operations have stringent state and federal safety protocols, environmental controls, remediation oversight, and financial requirements for regulatory compliance. The time is right for developing new uranium projects in Texas because uranium prices have risen 233% in the last 5 years and millions of dollars would be spent during such projects, which would have long-term beneficial effects on local economies.

- **2nd Fact:** Uranium-recovery production is more related to oil & gas production than to uranium "mining" of near surface uranium ore. Both produce fluids, the former consisting of hydrocarbons, and the latter as dissolved uranium in fluids of very low radioactivity.

- **Myth:** ISR projects would have a negative impact on the quality of life in such areas….?

- **Fact:** Millions of dollars would be spent on such projects. The quality of life could be improved considerably in the project areas based on the new jobs, local spending for supplies, increased revenues of shops in the general area, taxes paid, royalties distributed, surface-owner payments, and contributions made by the company in support of local charities, etc., all while supporting an energy source that is mitigating the effects of climate change on the environment, human health, and local quality of life.

- **Myth:** ISR operations would disrupt livestock and other agricultural operations in the area….?

- **Fact:** Agricultural operations in the area can be managed with little interference. Surface payments as discussed in many surface leases would address any potentially serious interference or loss of income. Temporary fences would define withdrawal areas until remediation is complete and approved by the TCEQ.

- **Myth:** Noise and air pollution will become problematic in the operations area….?

- **Fact:** Drilling rigs and trucks would access the site with as little interference as reasonably possible to reduce traffic and exhaust fumes. The operational areas would be confined to fenced, withdrawn areas of the production wellfields, which would be off limits to the general public as in any industrial operation. There would also be prolonged periods of little or no traffic during periods of intermittent production activities along the mineralized trends.

- **Assumption:** Uranium is considered a fuel mineral according to the U.S. Geological Survey, not a critical mineral …
- **On the other hand:** Uranium should be considered a critical mineral and should qualify for funding from the federal government for encouraging development of uranium projects in the U.S. to contribute to the needs of expanding nuclear power in the U.S.

Additional Myth-Fact discussions are found in Campbell and Wise (2010),[48] see pp. 31-40, and the myths were known then and remain in discussions in 2018[45] and even today, but many are fading away.

For additional information on nuclear power, see the search results from the *I2M Web Portal*[49] and on uranium (prices, projects, and geoscience thereof)[50]

References

Authors: 1, 2, 3, and 4: https://i2mconsulting.com/president-ceo-of-the-i2m-corporation-announces-board-of-directors/

5. Baddour, D., 2024, "Uranium Mining Revival Portends Nuclear Renaissance in Texas and Beyond," in *Inside Climate News*. December, URL: https://eedition.houstonchronicle.com/infinity/article_popover_share.aspx?guid=9261ab3b-e82d-47c7-adc5-12438899db60&share=true

6. Slav, I., 2025, "Nuclear Renaissance Sparks Uranium Rush," in *Oilprice.com*, January 6, URL: https://oilprice.com/Alternative-Energy/Nuclear-Power/Nuclear-Renaissance-Sparks-Uranium-Rush.amp.html

7. Campbell, M. D., et al., 2020, "Beyond Hydrocarbons? … The Rest of the Story," AAPG Energy Minerals Division Uranium (Nuclear & REE) Committee Report Update, September-October, URL: https://i2massociates.com/downloads/BEYONDHYDROCARBONS-2020ExpandedIIRev.pdf

8. The Southern Company, 2025, "Nuclear Energy for a Bright Future: Plant Vogtle is the Largest Generator of Clean Energy in the United States," URL: https://www.southerncompany.com/innovation/vogtle-3-and-4.html

9. Texas Nuclear Alliance, 2024, "Inaugural Texas Nuclear Summit Unites Industry and Government Leaders in Shared Goal: It's Time to Build More Nuclear Power Plants in Texas," Austin, TX, November, URL: https://texasnuclearalliance.org/2024/11/19/inaugural-texas-nuclear-summit-unites-industry-and-government-leaders-in-shared-goal-its-time-to-build-more-nuclear-in-texas/

10. Texas Nuclear Alliance, 2025, "Nuclear is … Providing Safe, Clean and Reliable Energy, Growing Food Security, Treating our Patients, and Power Us to the Next Frontier," URL: https://texasnuclearalliance.org/

11. State of Texas, State of Utah, and Last Energy, Inc.. vs. U.S. Nuclear Regulatory Commission: Complaint for Declaratory Relief and Vacatur Under The Administrative Procedure Act, in Support of Small Modular Reactors (SMRs), URL: https://storage.courtlistener.com/recap/gov.uscourts.txed.235070/gov.uscourts.txed.235070.1.0.pdf

12. Conley, et al, 2025, "Let My Nuclear Reactors Go: Texas, Utah and Last Energy, Inc. Challenge the NRC," *Haynes Boone News and Insights*, January 17, URL: https://www.haynesboone.com/news/alerts/let-my-nuclear-reactors-go

13. Ambrose, W. A., 2007, "Depositional Systems of Uranium in South Texas," AAPG Basin Analysis and Play Characterization, October 23, URL: https://www.mdcampbell.com/AMBROSEGCAGS07.pdf

14. Campbell, M. D., 2008, A NI-43-101 Report re: Mesteña Uranium LLC Alta Mesa and Mesteña Grande Projects, South Texas, for: Mesteña Uranium, LLC Corpus Christi, Texas, November 19, URL: https://mdcampbell.com/MestenaUranium43-101Draft111908C.pdf

15. EnCore Energy, 2025, "South Texas ISR Uranium Central Processing Plants & Wellfields," URL: https://encoreuranium.com/projects/south-texas-operations/

16. Uranium Energy Corp., 2025, "Projects in Texas, Wyoming, Arizona, New Mexico, and Canada," URL: https://www.uraniumenergy.com/projects/

17. I2M Organizational Chart as of April 2025: URL: https://www.i2massociates.com/downloads/I2MCorp-BoardoDirectorsJan2025.pdf

18. WWC Engineering, 2024, Review of Uranium Energy Corporation's Texas Hub and Spoke ISR Project, Including Burke Hollow, Goliad, Palangana, and Salvo Projects, URL: https://www.uraniumenergy.com/_resources/reports/S-K-1300-Inital-Assessment-Texas-Hub-and-Spoke-ISR-Project-June-2024.pdf?v=010306%3Fv%3D1723844124

19. Campbell, M. D., et al., 2018, "Confronting Media and other Bias against Uranium Exploration and Mining, Nuclear Power, and Associated Environmental Issues," *Journ. Geology and Geoscience*, Vol. 2, No. 1, 4 p. URL: https://i2massociates.com/downloads/ConfrontingBias.pdf

20. Warner, D. L., and J. H. Lehr, (and M. D. Campbell), 1977, An Introduction to the Technology of Subsurface Wastewater Injection, Environmental Protection Technology Series, EPA-600/2/77-240, 350 p. URL: https://www.ela-iet.com/EPAWarner77.pdf

21. Galloway, W. E., and Kaiser, W. R., 1980, Catahoula Formation of the Texas Coastal Plain: Origin, Geochemical Evolution, and Characteristics of Uranium Deposit: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 100, 81 p., URL: https://www.beg.utexas.edu/publications/catahoula-formation-texas-coastal-plain-origin-geochemical-evolution-and

22. Campbell, M. D., et al., 2007, "Uranium In-Situ Leach (Recovery) Development and Associated Environmental Issues," *in* Proc. Gulf Coast Geological Societies Convention, October 21-23, Corpus Christi, Texas, 18 p., URL: https://i2massociates.com/downloads/CampbellWiseRackleyGCAGS2007.pdf

23. Rubin, B., 1970, "Uranium Roll Front Zonation in the Southern Powder River Basin, Wyoming," *in* Wyoming Geological Association Bull., December, pp. 5-12., URL: https://mdcampbell.com/RubinWGA70.pdf

24. Sibray, S., D. Hallum, and M. D. Campbell, 2020, "Recognizing Uranium Source Rocks in the Sedimentary Environments of Nebraska, North & South Dakotas," *in* Proc. The First AAPG-Energy Minerals Division Virtual Conference, September 28 to October 2., URL: https://i2massociates.com/downloads/AAPGUranium2020SSRevised.pdf

25. Rackley, R. I., 1976, "Origin of Western-States Type Uranium Mineralization," *in* Handbook of Strata-Bound and Stratiform Ore Deposits, II Regional Studies and Specific Deposits, K.H. Wolf (Editor), Vol 7, Chapter 3, pp. 89-156., URL: https://www.i2massociates.com/downloads/Rackley1976.pdf

26. Dickinson, K. A. and J. S. Duval, 1977, "South-Texas Uranium: Geologic Controls, Exploration Techniques, and Potential," *in Geology of Alternate Energy Resources, (Editor: M.D. Campbell), Chapter 2,* published by the Houston Geological Society, November, 364 p., URLs:
https://www.i2massociates.com/downloads/outcroppingrollffront.pdf
https://www.mdcampbell.com/DickDuvl77.pdf
https://i2mconsulting.com/geology-and-environmental-considerations-alternate-energy-resources/

27. Walton-Day, K., et al., 2022, "Geoenvironmental Model for Roll-Type Uranium Deposits in the Texas Gulf Coast," *in Journal: Minerals*, vol. 12, p. 780., URL: https://www.i2massociates.com/downloads/Geoenvironmental_Model_for_Roll-Type_Uranium_Depos.pdf

28. Boice, J. D., et al., 2003, "Cancer Mortality in a Texas County with Prior Surface Uranium Mining and Milling Activities, 1950–2001," in *J. Radiol. Prot*., Vol. 23, pp. 247–262., URL: https://www.i2massociates.com/downloads/TexasCancerUranium.pdf

29. Texas A&M University-Kingsville, Frank H. Dotterweich College of Engineering and the College of Business, 2024, "Uranium Resources in the State of Texas - A Comprehensive Review- Final Report" *for:* Texas Commission on Environmental Quality, Contract 582-24-50558, Work Order 1 (PCR) 582-24-50589 Publication No. SFR-131/24, November 15, 111 p., URL: https://www.i2massociates.com/downloads/uranium-resources-in-the-state-of-texas.pdf

30. A Bill to be entitled An Act relating to a prohibition on the authorization by the Texas Commission on Environmental Quality of the use of a Class V injection well for certain aquifer storage and recovery projects. Be it enacted by the 2025 legislature of the State of Texas: H.B. No. 1523 as introduced by Mr. Gerdes: URL: https://capitol.texas.gov/tlodocs/89R/billtext/pdf/HB01523I.pdf#navpanes%3D0

31. A Bill to be entitled An Act relating to procedural requirements for uranium mining production area authorizations. Be it enacted by the 2025 legislature of the State of Texas: H.B. 279 as introduced by Mr. Guillen: URL: https://capitol.texas.gov/tlodocs/89R/billtext/pdf/HB00279I.pdf#navpanes%3D0

32. A Joint Resolution proposing a constitutional amendment protecting the right to engage in the exploration for and production and export of oil, gas, and other minerals. Be it approved by the 2025 legislature of the State of Texas: H.J.R. No. 107 as introduced by Mr. Landgraf: URL: https://legiscan.com/TX/text/HJR107/2025

33. Campbell, M. D., 2021,"The U.S. Uranium and REE Supply Chains: A Brief Discussion," AAPG Webinar Pivoting 2021: Energy Industry Supply Chains, April 14, 2021, Susan Nash, Ph.D. Moderator, URL: https://i2massociates.com/downloads/U-REESupplyChains2021.pdf

34. Schoffstall, S., 2024, "Nuclear Revival: A Resurgence for Uranium Miners," *Sprott April (2024) Uranium Report*. URL:**a**) https://sprott.com/insights/nuclear-revival-a-resurgence-for-uranium-miners/
Update: 2025, White J., 2025, "Uranium Regains Momentum," *Sprott May (2025) Uranium Report*. URL:**b**) https://sprott.com/insights/uranium-regains-momentum/

35. Venditti, B., 2025, "Where the U.S. Gets Its Enriched Uranium," *Visual Capitalist*, January 2, URL: https://www.visualcapitalist.com/where-the-u-s-gets-its-enriched-uranium/

36. U.S. Department of Energy, 2024, "Westinghouse Produces First Batch of Higher Enriched Fuel Pellets," for the U.S. Office of Nuclear Energy, URL: https://www.energy.gov/ne/articles/westinghouse-produces-first-batch-higher-enriched-fuel-pellets

37. Introducing the Texas Nuclear Caucus, 2024, "…to position Texas as the leader in all aspects of the peaceful and productive uses of nuclear technology." URL: https://texasnuclearcaucus.org/

38. Flanakin, D., 2025,"Texas Takes Giant Steps Toward Nuclear Energy Dominance," in *RealClear Energy*, February 11, URL: https://www.realclearenergy.org/articles/2025/02/11/texas_takes_giant_steps_toward_nuclear_energy_dominance_1090774.html

39. Capital.com, 2025, "Why Uranium Prices Just Broke a Decade Long Resistance," April, URL: https://www.youtube.com/watch?v=QzCpWbwjWxs

40. Campbell, M. D., 2020, "Uranium & Nuclear Power are on the Move … Again !" in Proc. AAPG ACE Convention On-Line., URL: https://i2massociates.com/downloads/UCOM-Issues2020ShortSlides.pdf

41. AAPG's Energy Minerals Division's Uranium Committee Reports:
URL: https://www.aapg.org/about/aapg/overview/committees/emd/articleid/26353/committee-emd-uranium#141872236-activity--reports

42. AAPG (Advancing the World of Petroleum Geosciences),URL: https://www.aapg.org/

43. World Nuclear News (WNN), 2020, "U.S. Uranium Miners Ready to Support Nuclear Power, says Uranium Committee," December 24, URL: https://www.world-nuclear-news.org/articles/us-uranium-miners-ready-to-support-nuclear-power,

44. I2M Web Portal, 2025, sponsored by the I2M Consulting group, Division of the I2M Corporation, Katy, Texas. URL: https://i2mconsulting.com/web-portal/

45. Campbell, M. D., et al., 2018, "Confronting Media and other Bias against Uranium Exploration and Mining, Nuclear Power, and Associated Environmental Issues," in *Journ. Geology and Geoscience*, Vol. 2, No.1, January, URL: https://www.i2massociates.com/downloads/JGG-1-012.pdf

46. Conca, J. L., 2021, "Opinion: Value and ethics of LNT, in Nuclear News, June, pp. 88-91, URL: https://www.i2massociates.com/downloads/June2021ValueofLife.pdf

47. Conca, J. L., 2024 "The Geopolitics of Energy: What Happened to our Nuclear Waste Disposal Program? AIPG Webinar November, 2024., URL: https://aipg-tx.org/aipg-tx-section-webinar-geopolitics-of-energy-part-2-achieving-a-just-and-sustainable-energy-mix-by-2040/

48. Campbell, M. D. and H. M. Wise, 2010, "Uranium Recovery Realities in the U.S. – A Review," Another Report by the AAPG EMD Uranium Committee, Presented at Environmental & Engineering Dinner Meeting of Houston Geological Society, May 18., URL: https://i2massociates.com/downloads/HGSUraniumRecoveryRealitiesV1.9.pdf

49. I2M Web Portal Search Results for Uranium and Nuclear Power: URL: https://web.i2massociates.com/search_resource.php?search_value=nuclear+power&sort=date#page=1

50. I2M Web Portal Search Results for Uranium: URL: https://web.i2massociates.com/search_resource.php?search_value=uranium&sort=date&page=1#page=1

xxx