16

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Michael Abrameit

Mailing Address: 6884 E FM 1961

Physical Address (if different):

City/State: Goliad **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: abrameitm@gmail.com

Phone Number: 361 645 4840

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☒ No

  If yes, which one?

☒ **Please add me to the mailing list.**

☒ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☒ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

submit on line

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Thursday, August 15, 2024 2:52 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RMD
Subject: FW: EXEC 49611
Attachments: EXEC 49611 Constituent Callie Albrecht.pdf

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: Laurie Gharis <Laurie.Gharis@tceq.texas.gov>
Sent: Thursday, August 15, 2024 11:47 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: FW: EXEC 49611

Laurie Gharis
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-1835
Cell Phone: 737-263-9116

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: Dennise Braeutigam <Dennise.Braeutigam@tceq.texas.gov>
Sent: Thursday, August 15, 2024 11:27 AM
To: Deornette Monteleone <Deornette.Monteleone@tceq.texas.gov>; Laurie Gharis <Laurie.Gharis@tceq.texas.gov>
Subject: EXEC 49611

Good afternoon,
I had sent this to OOW but they feel it is better for OCC to send their formal response. Will you please handle the response and send me a copy once completed to close out in malta and OOG.
Thank you,
Dennise

Dennise Braeutigam
Office Manager for Executive Office
Texas Commission on Environmental Quality
512-239-0598

From: Office of the Texas Governor
To: EXECDIR
Subject: Action as Deemed Necessary
Date: Monday, August 12, 2024 9:40:43 AM

Enclosed is a copy of correspondence that was sent to the Office of the Governor. I am forwarding it to you for review and action as deemed necessary.

Callie C Albrecht, Aug 9, 2024, 3:36 PM
Prefix: Ms.
FirstName: Callie
Middle:
LastName: Albrecht
Suffix:
Address1: 699 Groll Ln
City: Victoria
State: TX
ZipCode: 77905
EmailAddress: calbrecht03@AOL.COM
Phone: 3615500145
Name: Last Name
Value: Albrecht
Name: IP Address
Value: 204.80.194.3
Issue: Environment
Comments: There is a permit for a uranium mine in northern Goliad County which needs to be opposed. This is not the first time they have tried to push this through, but they are trying again. This area has a lot of cattle ranches and contaminating the ground water in this area would have devasting consequences. There is no way we could continue with our way of life. This is an unnecessary health hazard, and we would appreciate your opposition for the permit.
Subject: I need assistance with Environment
Type: General Case Request

17

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Catherine Alstrom

Mailing Address: 1305 N. Moody St

Physical Address (if different): ______

City/State: Victoria TX **Zip:** 77901

This information is *subject to public disclosure under the Texas Public Information Act*

Email: ialstrom1020@gmail.com

Phone Number: 361-433-8784

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☒ No

  If yes, which one? ______

☐ **Please add me to the mailing list.**

☒ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)

Please give this form to the person at the information table. Thank you.

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Cara Alstrom

Mailing Address: 1305 N Moody, Victoria, TX

Physical Address (if different):

City/State: Victoria, TX **Zip:** 77901

****This information is *subject to public disclosure under the Texas Public Information Act*****

Email: maestra543210@gmail.com

Phone Number: 214-783-3972

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☑ No

  If yes, which one?

☑ **Please add me to the mailing list.**

☐ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☑ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

* Please share the exact website where we can see the exact map of TCEQ's permitted land. *

RECEIVED
AUG 0 5 2024
AT PUBLIC MEETING

Per the National Library of Medicine (www.ncbi.nlm.nih.gov/books/NBK201052), Significant potential environmental risks are associated with extreme natural events and failures in management practices. Extreme natural events (e.g. hurricanes, earthquakes, intense rainfall events, drought) have the potential to lead to the release of contaminants if facilities are not designed and constructed to to withstand such events, or fail to perform as designed. The disturbance of the land surface by mining, the temporary storage of ores and mining and processing wastes on-site, de-watering of mines workings/pits, and a variety of reclamation activities all have the potential to significantly affect the concentrations and loads of dissolved and suspended in surface water off-site.

① With all this potential for significant environmental damage, and Uranium having a ~~half~~ half-life much, much longer than 100 yrs, ~~other than the 100 yr flood~~ what assurances can be given that the aforementioned risks will not come to pass? ② Will there be acidic mine drainage? ③ What does the reclamation process entail? ④ How effective is the reclamation process? ⑤ After the reclamation process is complete, for how many years are levels monitored? In Northern territory, Australia, water was still contaminated 2 decades after reclamation.

Marielle Bascon

From: PUBCOMMENT-OCC
Sent: Monday, July 24, 2023 10:46 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public Comment on Area Permit No. UR03075
Attachments: Mining permit No. UR03075

PM

From: Georgia Carroll-Warren <Georgia.Carroll-Warren@tceq.texas.gov>
Sent: Thursday, July 20, 2023 4:58 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: FW: Public Comment on Area Permit No. UR03075

From: Tamara Young <Tamara.Young@tceq.texas.gov>
Sent: Thursday, July 20, 2023 4:21 PM
To: Georgia Carroll-Warren <Georgia.Carroll-Warren@tceq.texas.gov>
Cc: Dan Hannah <Dan.Hannah@Tceq.Texas.Gov>; Bryan Smith <bryan.smith@tceq.texas.gov>; Jan Bates <jan.bates@tceq.texas.gov>
Subject: Public Comment on Area Permit No. UR03075

Good afternoon Georgia,

This public comment was received by a general TCEQ mailbox and then forwarded to the UIC Permits Section proxy box.

Thank you,
Tamara Young
Program Coordinator
Radioactive Materials Division
Underground Injection Control Permits Section

Marielle Bascon

From: Aldon Bade <brendabade@icloud.com>
Sent: Monday, July 17, 2023 10:05 PM
To: Info
Subject: Mining permit No. UR03075

July 18, 2023
Texas Commission on Environmental quality Commenting on UEC permit No. UR03075 Dear Sirs, I Aldon Bade and wife Brenda live approximately 3,000 feet from UEC production area, We get our water from well #22 on Goliad County Ground Water map. During the previous activity performed by UEC our water became brown and our water filter was coated over, believed to be from high iron content from the aquifer being distributed.
At the present time we have good clean clear water.

The production activities would impact the value of our land as well as impacting livestock and wildlife.

The production activities would affect public health and welfare.

The production could adversely affect our drinking water as well as our local church in Ander where we have an average attendance of 60 parishioners. We are also building a new pavilion that will be used by the congregation as well as a community gathering place.

We feel the residents of our area where UEC is proposing mining should be informed in a public meeting which should take place in Goliad County and be guaranteed that our drinking water would not be affected by their production of uranium.

Thanks for your consideration,
Aldon Bade
147 FM 1961
Yorktown, texas 78164
aldonbade@gmail.com
,
Sent from my iPad

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Wednesday, August 28, 2024 12:17 PM
To:	PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject:	FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: breathless911@gmail.com <breathless911@gmail.com>
Sent: Tuesday, August 27, 2024 6:53 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: DR. Dave Barnett

EMAIL: breathless911@gmail.com

COMPANY:

ADDRESS: 463 ARNOLD RD
GOLIAD TX 77963-3386

PHONE: 6199727942

FAX:

COMMENTS: I am NOT in favor of renewal of the UEC permit UR03075. The large area served by this aquifer means many tens, if not hundreds, of thousands of people might not be able to use their wells for potable water for themselves, their livestock or even their wildlife in the event of contamination by heavy metals or radioactive material. The fact that the original permit allowed UEC to take their own water samples is absurd. There is virtally NO monitoring of any of their wells by a neutral party. Contamination would be virtually permanent and not repairable and if such contamination could be reversed, it would be very expensive causing this company to declare bankruptcy and disappearing leaving all of us holding the bag. There is no national emergency requiring us all to risk our clean water that would justify this risk. Indeed, much of the uranium production in the US is shipped overseas. No amount of profiteering could justify this risk. Incredibly, no one with either the company or TECQ brought up the nightmare but increasing likelihood of fracking causing earthquakes here as it has in numerous states including the Permian Basin. There is no way to stop these and they will undoubtedly cause additional faults and enlargement of known faults in the area of the permit which would markedly increase the risk of groundwater contamination. There is absolutely no way this permit should be approved. It is a public nightmare waiting to happen.

April 28, 2024

Reviewed By GCW
MAY 0 2 2024 PM

CHIEF CLERKS OFFICE
2024 MAY -2 PM 3:09
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Claire Barnhart

Address: PO Box 626 Berclair 78107

Phone: 361-542-0348

Email (if available): clairebarnhart@yahoo.com

Thank you for your attention to this matter.

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 3 L

RECEIVED

MAY 02 2024

TCEQ MAIL CENTER
DA

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 MAY -2 PM 3:05

CHIEF CLERKS OFFICE

Office of the Chiet Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

April 28, 2024

Reviewed By GCW

MAY 0 2 2024 pm

CHIEF CLERKS OFFICE
2024 MAY -1 PM 2:46
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Jim S. Bluntzer, PhD.

Address: 1260 Bluntzer Rd

Phone: 361 935 6840

Email (if available): jnbl@gvec.net

Thank you for your attention to this matter.

Bluntzer's have depended on quality water since 1843 in this area

we would like the 6th, 7th, and 8th generations to have the same good water!!!

Marlene Wasselner

I represent Mary K Gray, Otto Bluntzer, Margaret Rutherford, Olivia McDonald

Jim S. Bluntzer
1260 Bluntzer Rd.
Goliad, Tx 77963

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 MAY -1 PM 2:45

CHIEF CLERKS OFFICE

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 2 L

RECEIVED

MAY 01 2024

TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

April 28, 2024

Reviewed By GCW

MAY 0 2 2024 PM

CHIEF CLERKS OFFICE

2024 MAY -1 PM 2:42

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: HARVEY AND KAREN BREWER

Address: 1885 FOX ROAD GOLIAD, TX 77963

Phone: 361-571-3039

Email (if available): hbrewer1952@gmail.com

Thank you for your attention to this matter.

It is important we have public meetings and get all information for us that may be affected to see.
Thank you

Harvey Brewer

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 2 L

RECEIVED
MAY 01 2024
TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-190200

QUALITY
2024 MAY -1 PM 2:41
CHIEF CLERKS OFFICE

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Tuesday, August 27, 2024 12:11 PM
To:	PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject:	FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: creeksntrees@gmail.com <creeksntrees@gmail.com>
Sent: Monday, August 26, 2024 10:49 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Kirsten Brueggerhoff

EMAIL: creeksntrees@gmail.com

COMPANY:

ADDRESS: 2387 HORSESHOE BND
GOLIAD TX 77963-4135

PHONE: 8328825432

FAX:

COMMENTS: I am a resident of Goliad County and dependent on well water for my drinking and household use water. I read the letter submitted by the GCGCD to the TCEQ dated 4/11/23. I am appalled that you are even considering renewing this permit. It is clear to me that we are all being set up to have our aquifer contaminated and mitigation is not a good option. I don't want to take any risks on contaminating the water in our area. It is my human right to have clean water. Please do not renew this permit. Sincerely - Kirsten Brueggerhoff, 2387 Horseshoe Bend, Goliad, TX 77963 - RESIDENT

August 5, 2024

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Reviewed By GW

AUG 15 2024

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

2024 AUG 15 PM 2:29

CHIEF CLERKS OFFICE

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

What route do trucks travel from Goliad Co to Karnes Co?

Do they go state highway 119?

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Bev Bruns

Address: 47 YKT SLICKFIELD RD

Phone: YORKTOWN, TX 78164

Email (if available): bcbruns47@gmail.com

Thank you for your attention to this matter.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Monday, August 5, 2024 5:01 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: patjbulla@gmail.com <patjbulla@gmail.com>
Sent: Monday, August 5, 2024 3:47 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: MS Pat Bulla

EMAIL: patjbulla@gmail.com

COMPANY:

ADDRESS: 7202 FOXTREE CV
AUSTIN TX 78750-7932

PHONE: 5123459528

FAX:

COMMENTS: Re: PERMIT NO. UR03075 (Public meeting at 7:00 PM Monday night in Goliad)) Uranium Energy Corp., located at 500 North Shoreline Boulevard, Suite 800 N, Corpus Christi, Texas, proposes an in-situ uranium mining business. They have applied to the Texas Commission on Environmental Quality (TCEQ) for a permit renewal to authorize in-situ uranium mining. In the past there has been radioactive contamination in the region from uranium mining. I am very concerned about uranium leaching into waterways and wells which could contaminate soil and also air. We don't need to risk the health and safety of people living near in-situ wells! I agree with issues brought to light by the Goliad County Groundwater Conservation District. Please do not approve this application. We don't need more risky uranium mining and should not allow this mining in Texas. I would like to be added to the mailing list for this permit application. Thank you. Sincerely, Pat Bulla

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TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Lon Burnam

Mailing Address: 1600 Texas St #2503

Physical Address (if different): ______

City/State: FtW TX **Zip:** 76102

This information is *subject to public disclosure under the Texas Public Information Act*

Email: Lonburnam@gmail.com

Phone Number: 817-721-5846

- Are you here today representing a municipality, legislator, agency, or group? ☑ Yes ☐ No

  If yes, which one? Lone Star Chapter Sierra Club

☑ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)

Please give this form to the person at the information table. Thank you.

Renee Lyle

From: PUBCOMMENT-OCC
Sent: Wednesday, January 3, 2024 4:39 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

PM

From: pajarocattlecompany@gmail.com <pajarocattlecompany@gmail.com>
Sent: Friday, December 29, 2023 1:00 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: DR. David Arthur Byrd

EMAIL: pajarocattlecompany@gmail.com

COMPANY: Pájaro Cattle Company

ADDRESS: 4020 FM 1351
GOLIAD TX 77963-3738

PHONE: 9792552140

FAX:

COMMENTS: I am very concerned about the influence this permit will have on the quality of water in Goliad County and the devaluation of land as a result. I am requesting a public meeting before this permit is renewed.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Thursday, August 22, 2024 2:51 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: Ccardosa@4wardls.com <Ccardosa@4wardls.com>
Sent: Wednesday, August 21, 2024 9:19 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Chad Cardosa

EMAIL: Ccardosa@4wardls.com

COMPANY:

ADDRESS: 2930 GRAND OAKS LOOP APT 1602
CEDAR PARK TX 78613-4377

PHONE: 5129407641

FAX:

COMMENTS: We strongly oppose uranium mining in Goliad County! Our heritage ranch is less than 3 miles from this site. UEC has great risk of creating a toxic environment effecting ground water and air quality to some of the oldest working homestead ranches in Texas history. Stop the wasteland!

August 5, 2024

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Reviewed Gaw
AUG 20 2024

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

I Do Not Want Uranium Mining in Goliad County

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Brad Carson Brad Carson

Address: 2380 Danforth Rd. Goliad, TX 77963

Phone: (361) 275-4503

Email (if available):

Thank you for your attention to this matter.

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
16 AUG 2024 PM 3 L

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 AUG 20 PM 2: 29

CHIEF CLERKS OFFICE

RECEIVED

AUG 20 2023

TCEQ MAIL CENTER
AJ

Office of Chief Clerk
TCEQ
PO Box 13087
12100 Park 35 Circle Bldg F
Austin TX 78753

78753-180800

Pamela J. Christopher
5300 Old Goliad Road
Goliad, TX 77963

CHIEF CLERKS OFFICE
2024 AUG 12 AM 10: 30

August 8, 2024

Office of the Chief Clerk, TECQ
Mail code MC-105
P.O. Box 13087
Austin, TX 78711-3087

Reviewed By GCW
AUG 13 2024

RE: Permit No. UR030575

Dear Sir or Madam:

Our homestead consists of lands that have been passed down from mother to daughter for nearly 150 years. I am the 5th generation owner, and our daughter is now the 6th. It is our greatest desire for this tradition to continue for our grandchildren. Consequently, we have a vested interest in not only protecting the land, but also the groundwater.

I believe the TCEQ board and employees are going down the same road as many other governmental agencies, both federal and state, who are more inclined to allow the individuals who are affected by their actions or lack of to be considered as "collateral damage."

Will the current TCEQ members and or their heirs and assigns be held accountable and or responsible for those who have suffered "damages" from their lack of action in protecting the public from loss of natural resources, floral and fauna on their land and last but certainly not least, health issues which impair the quality of life and maybe shorten one's lifespan. This was one of the major concerns brought up at the meeting held in Goliad Monday, August 5th, and was finally answered by an emphatic "NO!"

If not to us as individuals, then to whom is the TECQ and its directors and employees held accountable? It was noted that the majority of funding for the TCEQ comes from permits, such as the ones from UEC. Therefore, where do we as landowners turn to try and obtain restitution for damages? While we will evidently not have earthly satisfaction, we can rest assured there will, in the final judgment, be a time of reckoning before God Almighty.

Sincerely,
Pamela J Christopher
Pamela J. Christopher
Concerned Citizen, Landowner and VOTER

Pamela J. Christopher
5300 Old Goliad Road
Goliad, TX 77963

ON ENVIRONMENTAL

2024 AUG 12 9:47

CHIEF CLERKS OFFICE

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
9 AUG 2024 PM 4 L

RECEIVED

AUG 12 2024

TCEQ MAIL CENTER
DA

Office of the Chief Clerk, TECQ
Mail code MC-105
P.O. Box 13087
Austin, TX 78711-3087

78711-308787

April 28, 2024

Reviewed By

MAY 02 2024 pm

CHIEF CLERKS OFFICE

2024 MAY -1 PM 2:47

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Pamela Christopher

Address: 5300 Old Goliad Road, Goliad, Tx 77963

Phone: 361 281-0386

Email (if available): ritbchristopher@gmail.com

Thank you for your attention to this matter.

Pamela Christopher

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 2 L

RECEIVED

MAY 01 2024

TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 MAY -1 PM 2: 47

CHIEF CLERKS OFFICE

Vincent Redondo

From: PUBCOMMENT-OCC
Sent: Monday, November 4, 2024 8:44 AM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075
Attachments: ED.GCGCD1.RFP.3.010. seismic lne CGG 101.pdf

From: hcclark@rice.edu <hcclark@rice.edu>
Sent: Friday, November 1, 2024 7:02 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: DR. H.C. Clark

EMAIL: hcclark@rice.edu

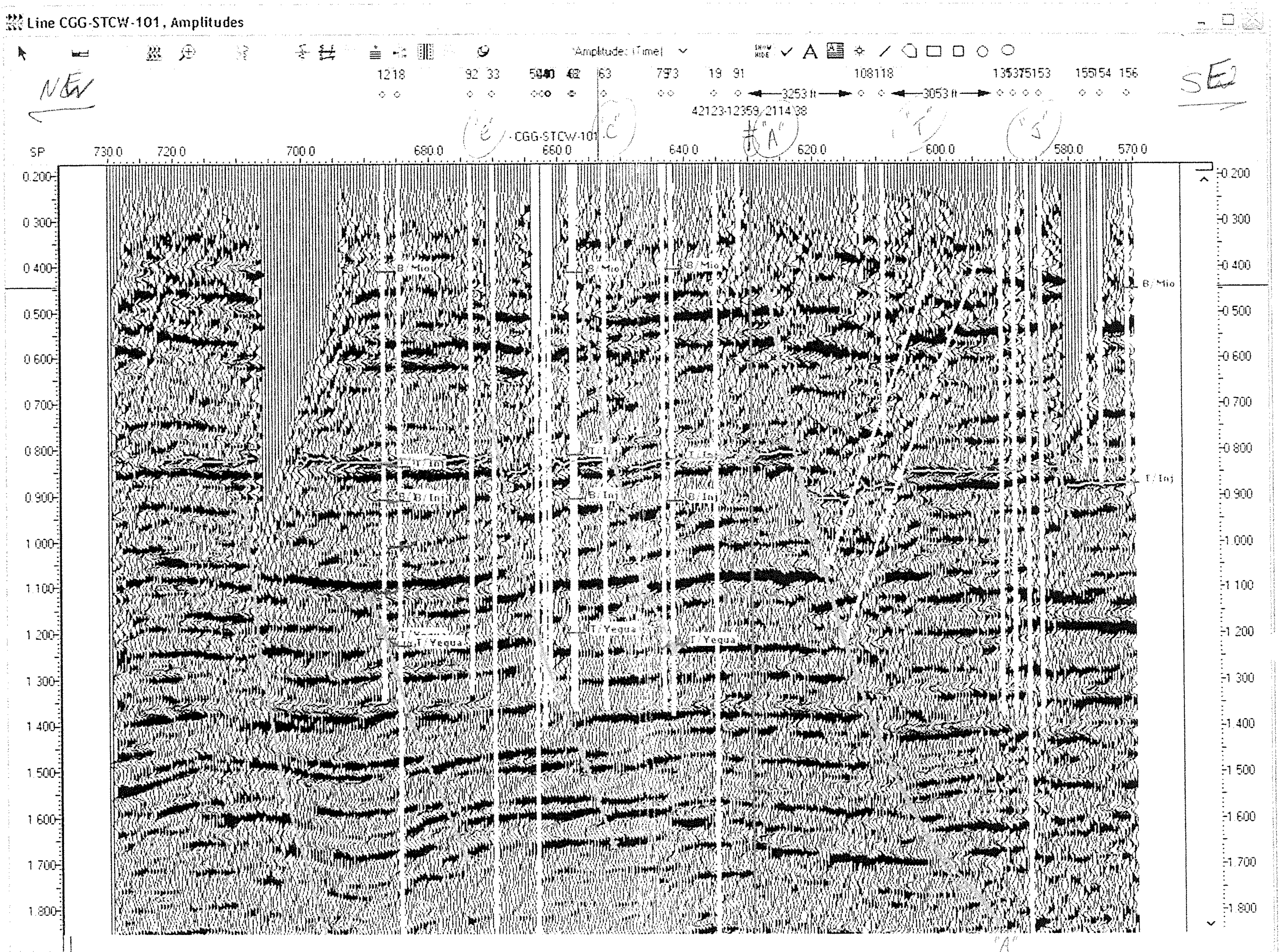
COMPANY:

ADDRESS: 2300 BOLSOVER ST
HOUSTON TX 77005-2612

PHONE: 2816601974

FAX:

COMMENTS: I was an expert in geology, hydrology, and geophysics for Goliad County in the initial mining permit hearing. There, a principal focus was the presence of faults and the role they played as conduits for the uranium-bearing water that created the present ore bodies along the Northwest Fault. At the hearing, the TCEQ agreed with us that a UEC pump test demonstrated groundwater communication within and across the Northwest Fault and the A, C, and D ore bodies (the ore bodies and the fault are one, and groundwater can move from one level to the next). At the time of the initial mining application, UEC was concerned with the difficulty of citing a sufficient number of monitor wells around these ore bodies and the Northwest Fault to meet the monitoring requirements. The protestants felt that the whole geologic framework was far more complex than the simple graben (the Northwest Fault down to the east and the Southeast Fault down to the west) UEC proposed, and that groundwater pathways offered by the communicating faults and sands would make monitoring the uranium mining project very difficult, if not impossible. We lost. Recently, I learned that seismic sections across the Northwest Fault zone and graben system are available (there are 3, but we are limited to 1 attachment and I have chosen a representative seismic section) and my review of these seismic sections clearly confirms the presence of a number of faults, several interacting with the shallow groundwater system and jeopardizing the groundwater monitoring system as presently proposed for both the ore bodies involved with the Northwest Fault and the intra-graben ore body B. Moreover, these seismic sections, and indeed a comprehensive fault interpretation (attached), were apparently in UEC's possession at the time of the original mining hearing. I recall that at the time of the mining hearing, we asked for all geologic information available to UEC and received very little, mostly older maps related to geophysical logs developed for oil and gas exploration decades before. To the very best of my recollection, we did not receive these seismic sections at the time of document production for the original hearing—if I am wrong, I certainly apologize—if not, this should be an issue to be considered at the mining permit renewal hearing, if not before. If this seismic information had been available to us at the original hearing, it would have helped us, the TCEQ, and the EPA to fully realize the involvement of not two (2), but up to eleven (11) faults (UEC's own interpretation--comments are limited to one attachment and I have used that—Please ask the groundwater district for this map) interacting with the uranium geology and present groundwater hydrology across the uranium mining permit renewal area. Please consider these issues as the UEC Goliad Uranium mining permit renewal application goes through the review, and likely the hearing process. Thank you. I have pretty much retired to the cattle business these days and won't be involved further, but I wish you well as you consider the UEC application. ONE SEISMIC LINE ATTACHED.



Line CGG-STCW-101, Amplitudes
Amplitude: (Time)
NW
SE
1218
92 33
63
19 91
108118
155154 156
3253 ft
3053 ft
42123-12359-2114 38
CGG-STCW-101
SP
730.0
720.0
700.0
680.0
660.0
640.0
620.0
600.0
580.0
570.0
B/Mio
T/Inj
B/Inj
T/Yegua
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0.300
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1.800

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

2024 MAY 17 AM 9: 47

CHIEF CLERKS OFFICE

Reviewed By GCW

MAY 2 0 2024 PM PML

GINGER COOK
3933 KILGORE RD
GOLIAD – TX 77963
(361) 676-6119

May 14, 2024

Texas Commission on Environmental Quality
Laurie Gharis - Office of the Chief Clerk MC-105
PO Box 13087
Austin, Tx 78711-3087

RE: UR03075 Permit Renewal – In-situ Uranium Mining

Subjects: Public Meeting Request
Request to be placed on TCEQ's mailing list for Goliad County

I am requesting a public meeting to be held in Goliad, Texas on the above referenced in-situ uranium mining permit renewal for Uranium Energy Corporation.

I live down dip of the proposed in-situ mining zone(s) and the Class I injection wells. Of particular concern are the nine (9) additional faults revealed during the recent contested case hearing. The additional faults, which were omitted by UEC in the original and renewal permits, changes the dynamics of the proposed mining and injection well areas. The additional identified faults may provide a vertical conduit for hazardous materials to flow up or down, contaminating drinking water resources.

The aquifer in Goliad is the sole source of drinking water for the entire county and should be protected and preserved now and for future generations.

I am also requesting to be placed on TCEQ's mailing list for Goliad County, Tx.
My mailing address is as follows:
Ginger Cook – 3933 Kilgore Rd., Goliad TX 77963

Thank you.
Ginger Cook
Ginger Cook

GC

Ms. Ginger (
3933 Kilgo
Goliad, TX

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 MAY 17 AM 9:46

CHIEF CLERKS OFFICE

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
15 MAY 2024 PM 3 L

Texas Commission on Environmental Quality
Laurie Gharis, Office of the Chief Clerk
PO Box 13087
Austin, TX 78711-3087

RECEIVED
MAY [illegible] 2024 05

TCEQ MAIL CENTER
WT

78711-308787

Renee Lyle

From: PUBCOMMENT-OCC
Sent: Wednesday, January 17, 2024 11:20 AM
To: PUBCOMMENT-RAD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: acowley@sbcglobal.net <acowley@sbcglobal.net>
Sent: Tuesday, January 16, 2024 3:23 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Alicia Cowley

EMAIL: acowley@sbcglobal.net

COMPANY:

ADDRESS: 4020 FM 1351
GOLIAD TX 77963-3738

PHONE: 3613623860

FAX:

COMMENTS: I am worried about our aquifer's safety with uranium injection. Science shows real dangers for our County.

Renee Lyle

From: PUBCOMMENT-OCC
Sent: Friday, January 19, 2024 9:02 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

From: garycowley@sbcglobal.net <garycowley@sbcglobal.net>
Sent: Thursday, January 18, 2024 2:59 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Gary Cowley

EMAIL: garycowley@sbcglobal.net

COMPANY:

ADDRESS: 4020 FM 1351
GOLIAD TX 77963-3738

PHONE: 3613629024

FAX:

COMMENTS: Worried about uranium contamination in goliad's ground water and aquifer

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Monday, August 5, 2024 5:02 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

Comment for UR03075
ML for WDW 423 and WDW 424

From: cbcroom@sbcglobal.net <cbcroom@sbcglobal.net>
Sent: Monday, August 5, 2024 2:15 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: MS Carolyn Croom

EMAIL: cbcroom@sbcglobal.net

COMPANY:

ADDRESS: 2502 ALBATA AVE
AUSTIN TX 78757-2103

PHONE: 5124598063

FAX:

COMMENTS: I strongly oppose the application for a permit renewal (permit UR03075), by Uranium Energy Corp. of Corpus Christi, Texas, for in-situ uranium mining in Goliad County. The newest fault data clearly shows the likelihood for area drinking water contamination from both the proposed in-situ mining process, which would disturb the uranium deposits, and from the waste water from the deeper injection disposal wells. In his professional report, Dr. Richard J. Abitz, environmental consultant on environmental issues with ha dous and radioactive elements in aq ers, states that "the groundwater resource in Goliad County is far more valuable to the people and the State because the extracted uranium from the Goliad Formation is a vanishingly small fraction of the world uranium production." He further states, "Extraction of the uranium from the aquifer sands at the proposed Goliad site would result in the loss of over 30 billion gallons of groundwater and contaminate private wells that are adjacent to the proposed permit boundary. Based on radon measurements in groundwater samples collected from private wells, there is compelling evidence that groundwater flow paths exist between the ore bodies and the private wells. The ore bodies are not a threat to the water quality of the private wells while natural reducing conditions are present in the aquifer. If ISR operations are permited, the oxidation of the uranium ore zones would contaminate the aquifer and radon and uranium would be transported along complex flow paths to the private wells. Monitoring well rings cannot ensure the detection of contamination, especially in the complex subsurface geology at the Goliad site. Therefore, the TCEQ should protect human health and the environment and honor the request of the GCGCD [Goliad County Groundwater Conservation District] to deny the renewal of UEC permit UR03075." Please safeguard our precious groundwater for present and future generations. Please do not approve this application. Please add me to your mailing list for this permit application, UR03075, and also permit applications WDW 423 and WDW 424. Sincerely, Carolyn Croom

5

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: ART DOHMANN

Mailing Address: P.O. BOX 117 WEESATCHE TX 77993

Physical Address (if different): 4679 ST HWY 119

City/State: GOLIAD TX **Zip:** 77963

****This information is *subject to public disclosure under the Texas Public Information Act*****

Email: ARTDOHMANN@GMAIL.COM

Phone Number: 361-491-0292

- Are you here today representing a municipality, legislator, agency, or group? ☒ Yes ☐ No

  If yes, which one? GCGCD

☒ **Please add me to the mailing list.**

☒ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☒ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

St. Peter's Lutheran Church of Ander

1545 East FM 1961 • Goliad, Texas, 77963-3414
Phone: 361-645-2922 www.stetersander.com
stpetersander@gmail.com

Anne J. Kolmeier, Pastor

September 2, 2024

Reviewed By GCW

SEP 10 2024

CHIEF CLERKS OFFICE

2024 SEP 10 AM 9:39

ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk, MC105
TCEQ
P. O. Box 13087
Austin, Texas 78711-3087

As outlined in State guidelines, the primary responsibility of the TCEQ is to ***protect our environment***. Specifically, in this case, the likely potential contamination of our community's water supply by in-situ mining for uranium is without question, not in "God's Plan".

St. Peter's Lutheran Church congregation is about to celebrate 150 years of existence as a stronghold for spiritual guidance in this community and Goliad County. As years have passed the "footprint" of this congregation has grown to share resources in many areas of need: locally, statewide, nationally, and internationally. This effort would be seriously damaged by an insufficient supply of quality water at our location. Our location is in Ander, Texas; a very short distance from the UEC mining target.

Our Church Council has requested that I share our congregation's explicit request to deny renewal of permit number UR03075. This congregation, with a membership of 150 is unanimously supportive of the denial of this permit request.

Please consider this strongly in reaching the non-renewal decision. If additional information would be helpful, please reach out and we will willingly comply.

Billy L. Dornburg

Billy L. Dornburg, St. Peter's Congregational Vice-President
13613 North US HWY 183
Goliad, Texas 77963
713-823-0629
bdornburg@gvec.net

CC: St. Peter's Lutheran Church
State Representative, Geanie W. Morrison, District 30
GCWCD
State Governor, Greg Abott
State Senator, Lois W. Kolkhorst

St. Peter's Lutheran Church of Ander

1545 East FM 1961 • Goliad, Texas, 77963-3414
Phone: 361-645-2922 www.stetersander.com
stpetersander@gmail.com

Anne J. Kolmeier, Pastor

September 2, 2024

Reviewed By GW

SEP 10 2024

2024 SEP 10 AM 9:39

CHIEF CLERKS OFFICE

Office of the Chief Clerk, MC105
TCEQ
P. O. Box 13087
Austin, Texas 78711-3087

As outlined in State guidelines, the primary responsibility of the TCEQ is to ***protect our environment***. Specifically, in this case, the likely potential contamination of our community's water supply by in-situ mining for uranium is without question, not in "God's Plan".

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Please consider this strongly in reaching the non-renewal decision. If additional information would be helpful, please reach out and we will willingly comply.

Billy L. Dornburg

Billy L. Dornburg, St. Peter's Congregational Vice-President
13613 North US HWY 183
Goliad, Texas 77963
713-823-0629
bdornburg@gvec.net

CC: St. Peter's Lutheran Church
State Representative, Geanie W. Morrison,
GCWCD
State Governor, Greg Abott
State Senator, Lois W. Kolkhorst

ST. PETER'S LUTHERAN CHURCH
1545 E. FM 1961
Goliad, TX 77963-3414
Phone: 361-645-2922
Email: stpetersander@gmail.com
www.stpetersander.org
Rev. Anne Kolmeier, Pastor

St. Peter's Lutheran Church of Ander
1545 East FM 1961
Goliad, Texas 77963-3414

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
5 SEP 2024 PM 2 L

RECEIVED

SEP 10 2024

TCEQ MAIL CENTER
WT

Office of the Chief Clerk, MC105
TCEQ
P. O. Box 13087
Austin, Texas 78711-3087

78711-308787

RKS OFFICE

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Wednesday, August 7, 2024 3:06 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: stu55@sbcglobal.net <stu55@sbcglobal.net>
Sent: Tuesday, August 6, 2024 10:07 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Stuart Dornburg

EMAIL: stu55@sbcglobal.net

COMPANY:

ADDRESS: PO BOX 218 1180 Weise Road
WEESATCHE TX 77993-0218

PHONE: 9794822400

FAX:

COMMENTS: I attended the meeting last night in Goliad and not one point was made on the "Benefits" for Goliad County to have this mining operation. My understanding is that there are no county tax dollars generated for this operation, like oil/gas drilling. I feel strongly, as everyone that attended last night, that this operation is being shoved down our throats by the State, if approved. Please listen to the constituents of Goliad County!!! WE DO NOT WANT THIS OPERATION IN OUR COUNTY!!!!

12

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: JED EAST

Mailing Address:

Physical Address (if different):

City/State: GOLIAD **Zip:**

This information is *subject to public disclosure under the Texas Public Information Act*

Email: jke051513@gmail.com

Phone Number:

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☑ No

  If yes, which one?

☑ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Bldg F
Austin, TX 78753

REVIEWED
JUL 20 2023
By GCW

July 17, 2023

Reference: UR03075

Dear TCEQ:

Zoom Videoconference on Monday, July 17th was held at Goliad County Groundwater Conservation District, and we protest the right for permits to be issued for the UR03075. We do not need the possibility of our ground water to be ruined for our land, house, or cattle. Please reconsider processing permits.

See page 2 for partial picture of 44 acres of land owned by:
Darren & Renee Franke
1464 W FM 1961
Yorktown, TX 78164

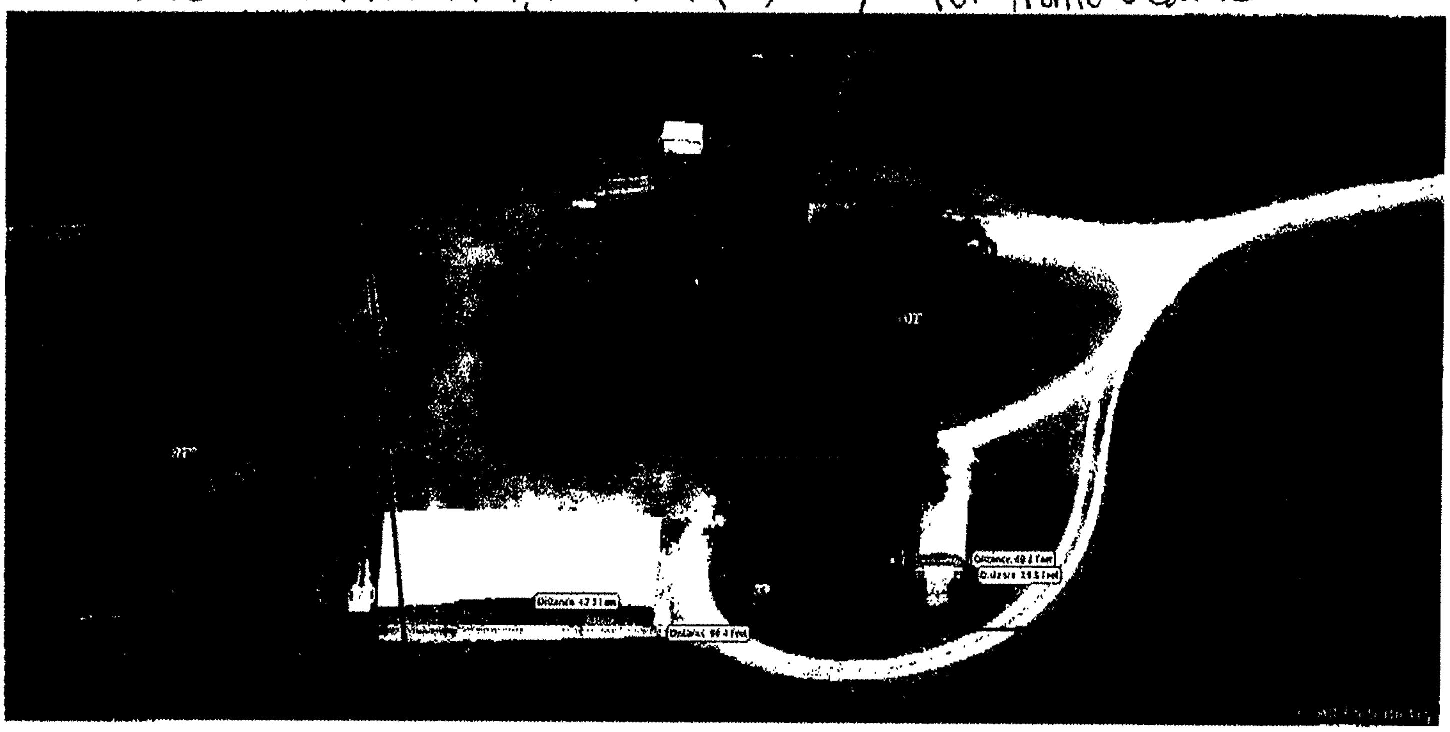
Sincerely,
Darren & Renee Franke

Renee Franke
361-649-3153

D FRANKE

78164
1464 W FM 1961, Yorktown, TX

Water Well
↑ for Home & Cattle



44 Total Acres at this land
for Darren & Renee Franke

07/11/2020

Aakefa Khan

From:	eFax Corporate <message@inbound.efax.com>
Sent:	Wednesday, July 19, 2023 7:58 AM
To:	Fax3311
Subject:	Corporate eFax message from "unknown" - 2 page(s)
Attachments:	FAX_20230719_1689771500_164.pdf

Login

Service Notification

You have received a 2 page fax at 2023-07-19 07:58:20 CDT.

* The reference number for this fax is use1b.prod.afc_did1-1689771444-15122335236-164. Please click here if you have any questions regarding this message or your service. You may also contact Corporate Support:

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Email: corporatesupport@mail.efax.com
Phone: 1 (323) 817-3202 or 1 (800) 810-2641

EU
Email: corporatesupporteu@mail.efax.com
Phones:
+44 2030055252
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+35 314380713

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Email:

corporatesupport@mail.efax.com

Phone:

1(323) 817-3202
1(800) 810-2641 (toll-free)

Renee Lyle

From:	PUBCOMMENT-OCC
Sent:	Wednesday, January 17, 2024 11:17 AM
To:	PUBCOMMENT-RAD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject:	FW: Public comment on Permit Number UR03075

PM

From: sdgloor082@gmail.com <sdgloor082@gmail.com>
Sent: Wednesday, January 17, 2024 7:37 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: MR Garland R. Gloor

EMAIL: sdgloor082@gmail.com

COMPANY:

ADDRESS: 2484 FM 622 2484 FM 622
GOLIAD TX 77963-3745

PHONE: 3615713505

FAX:

COMMENTS: I am very concerned about the influence this permit will have on the quality of water in Goliad County and the devaluation of land as a result. I am requesting a public meeting before this permit is renewed. I am also concerned about the changes to geology and faulting made by the Applicant over time. I am concerned that the Applicant fully understands the geology of the area they are proposing to mine uranium in. Once groundwater is contaminated, it will be difficult, costly, or impossible to decontaminate.

RECEIVED

AUG 0 5 2024

AT PUBLIC MEETING

Public Statement to Texas Commission on Environmental Quality
Permit Number UR03075
Application to Obtain a Class III Injection Well Area Permit Renewal in Goliad, Texas
Monday, August 5, 2024

My name is Susybelle Gosslee and I had planned to come from Dallas to attend this hearing tonight but due to the severe ozone levels in Dallas I had a serious asthma attack and am unable to travel.

Environmental stewardship has a short- and long-term timeline. The early settlers of Goliad will long be respected and honored for planting the beautiful trees around the courthouse square which provide shade and lower temperatures. The people who preserved the natural surroundings are still appreciated today.

The proposed Permit Number UR03075 will allow Uranium Energy Corporation to mine uranium creating a short and long-term threat to the people and the environment for generations to come. Uranium mining is a short- and long-term polluter of the Goliad area and does not preserve the good land and water. If approved, the company's in-situ mining could impact the deer that will drink the contaminated water and eat contaminated food, which eventually poisons the general population of people, fish, and foul. The uranium should be left in the ground where it belongs and does not harm people or the environment. The International Atomic Energy Agency states that there are plenty of uranium resources to sustain the growth of nuclear power, so this mining is not needed.

Radioactive contamination can move around, transported by rainwater and surface water, contaminating streams and rivers where people fish, canoe, and enjoy family gatherings. Surface and groundwater contamination can happen even when every attempt is made to reduce pollution.

Some people erroneously believe that more uranium is needed to produce nuclear power, but more affordable options exist. According to Wall Street Journal analysis, nuclear energy costs more to produce per kilowatt-hour than the production of electricity using clean, non-polluting renewable energy sources.

In-situ uranium mine sites could potentially be impacted by wildfires resulting from Texas' drought, and increasingly powerful hurricanes, increasing dangers to local people and the environment.

I urge TCEQ to deny the permit to Uranium Energy Corporation. Please think in the short- and long-term in protecting the people and the environment in and around Goliad.

Susybelle L. Gosslee
9511 Faircrest Drive
Dallas, Texas 75238

214-732-8610
sgosslee@airmail.net

Renee Lyle

From: PUBCOMMENT-OCC
Sent: Monday, January 8, 2024 4:26 PM
To: PUBCOMMENT-RAD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

PM

From: pgraham031@gmail.com <pgraham031@gmail.com>
Sent: Sunday, January 7, 2024 9:41 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Patrica Lux Graham

EMAIL: pgraham031@gmail.com

COMPANY:

ADDRESS: 18645 STATE HIGHWAY 239 W
KENEDY TX 78119-4739

PHONE: 3614439031

FAX:

COMMENTS: I am very concerned about the influence this permit will have on the quality of water in Goliad County and the devaluation of land as a result. I am requesting a public meeting before this permit is renewed. I am also concerned about the changes to geology and faulting made by the Applicant over time. I am concerned that the Applicant fully understands the geology of the area they a proposing to mine uranium in. Once groundwater is contaminated, it will be difficult, costly, or impossible to decontaminate.

Renee Lyle

From:	PUBCOMMENT-OCC
Sent:	Monday, January 8, 2024 4:25 PM
To:	PUBCOMMENT-RAD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject:	FW: Public comment on Permit Number UR03075

PM

From: tgraham192@gmail.com <tgraham192@gmail.com>
Sent: Sunday, January 7, 2024 8:52 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Terrell Graham

EMAIL: tgraham192@gmail.com

COMPANY:

ADDRESS: 18645 STATE HIGHWAY 239 W
KENEDY TX 78119-4739

PHONE: 3614438971

FAX:

COMMENTS: I am very concerned about the influence this permit will have on the quality of water in Goliad County and the devaluation of land as a result. I am requesting a public meeting before this permit is renewed. I am also concerned about the changed to geology and faulting made by the Applicant over time. I am concerned that the Applicant fully understands the geology of the area they a proposing to mine for uranium in. Once groundwater is contaminated. It will be hard or impossible to put the genie back in the bottle.

14

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Eric Grahmann

Mailing Address: 3749 Irby Rd. Goliad TX 77963

Physical Address (if different): " "

City/State: Goliad TX **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: eric.grahmann83@gmail.com

Phone Number: 361-522-7408

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☒ No

  If yes, which one? ____________

☑ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)

Please give this form to the person at the information table. Thank you.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Monday, August 12, 2024 3:53 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: fred.nelson@hotmail.com <fred.nelson@hotmail.com>
Sent: Sunday, August 11, 2024 8:48 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Fred Grieder

EMAIL: fred.nelson@hotmail.com

COMPANY: Grieder Ranch LLC

ADDRESS: PO BOX 1058
GOLIAD TX 77963-1058

PHONE: 3612198097

FAX:

COMMENTS: Please DO NOT allow permit ur-03075 to be ratified. I attended the recent meeting in Goliad with an open mind, but after researching and thinking became opposed to this mining and disposal well. This is a classic example of likely reward for a few (with no personal risk) vs high risk for many (who have no reward). The applicants gave no information on the process, offered no information about environmental safety, indicated THEY wouldn't drink water for nearby neighbor's wells, and basically only said they had filled out the application properly. The TCEQ attendants did the same, and added that they personally were exempt from all liability if any negative consequences occurred in the future. Their main comments were that the company had filled out the application ok. The data supporting the application is 17 years old. There are more faults in the area that could give disposal water (contaminated) access to drinking water aquafers. There is nearby fracking, potentially causing more fracturs. There are many deep oil wells (some working and some abandoned) whose bores have the potential to conduct waste water up into drinking water well aquafers. No answers about what would be done to clean-up any toxic plumes or groundwater contamination. The list goes on and on! I URGE YOU TO NOT ALLOW URANIUM MINING IN THIS VICINITY. THE RISK/REWARD RATIO IS TOO GREAT. Thank you- Fred N. Grieder

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Monday, August 12, 2024 3:53 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: fred.nelson@hotmail.com <fred.nelson@hotmail.com>
Sent: Sunday, August 11, 2024 8:48 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Fred Grieder

EMAIL: fred.nelson@hotmail.com

COMPANY: Grieder Ranch LLC

ADDRESS: PO BOX 1058
GOLIAD TX 77963-1058

PHONE: 3612198097

FAX:

COMMENTS: Please DO NOT allow permit ur-03075 to be ratified. I attended the recent meeting in Goliad with an open mind, but after researching and thinking became opposed to this mining and disposal well. This is a classic example of likely reward for a few (with no personal risk) vs high risk for many (who have no reward). The applicants gave no information on the process, offered no information about environmental safety, indicated THEY wouldn't drink water for nearby neighbor's wells, and basically only said they had filled out the application properly. The TCEQ attendants did the same, and added that they personally were exempt from all liability if any negative consequences occurred in the future. Their main comments were that the company had filled out the application ok. The data supporting the application is 17 years old. There are more faults in the area that could give disposal water (contaminated) access to drinking water aquafers. There is nearby fracking, potentially causing more fracturs. There are many deep oil wells (some working and some abandoned) whose bores have the potential to conduct waste water up into drinking water well aquafers. No answers about what would be done to clean-up any toxic plumes or groundwater contamination. The list goes on and on! I URGE YOU TO NOT ALLOW URANIUM MINING IN THIS VICINITY. THE RISK/REWARD RATIO IS TOO GREAT. Thank you- Fred N. Grieder

4

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: FRED GRIEDER

Mailing Address: P.O. BOX 1058 GOLIAD TX 77963

Physical Address (if different): 1531 BECK RD GOLIAD

City/State: TX **Zip:** 77963

****This information is *subject to public disclosure under the Texas Public Information Act*****

Email:

Phone Number:

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☒ No

  If yes, which one?

☒ **Please add me to the mailing list.**

☒ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Wednesday, August 28, 2024 12:17 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: Gerald.A.Griffith@gmail.com <Gerald.A.Griffith@gmail.com>
Sent: Tuesday, August 27, 2024 9:56 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Gerald A Griffith

EMAIL: Gerald.A.Griffith@gmail.com

COMPANY:

ADDRESS: 4335 DANFORTH RD
GOLIAD TX 77963-3408

PHONE: 3615507629

FAX:

COMMENTS: The role of the TCEQ is to protect our environment.The current permit is up for renewal for in-situ mining in the Northern portion of Goliad county.This area is where my home and ranch are located. The TCEQ issued a permit to do this type of mining in the Georgewest Three Rivers area. Due to this type of mining in that area the ground water has been contaminated with heavy metals and arsenic. Not suitable to drink . This contamination is non reversible . Please do not make this mistake again and ruin the lives of many citizens along with myself.The TCEQ was at a public meeting recently held in Goliad in which over 150 citizens attended expressing their concern over damanging our water supply which most wells are at the depth that the mining will occur. PLEASE DO YOUR JOB TO PROTECT OUR WATER SUPPLY. The people who make this decision don't have to suffer the consequences , We do here in Goliad. We are depending on you to protect us. Respectfully, Gerald Griffith Goliad resident

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TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: GERALD GRIFFITH

Mailing Address: 4335 DANFORTH RD

Physical Address (if different): ______

City/State: GOLIAD **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: gerald.a.griffith@gmail.com

Phone Number: 361-550-7629

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☐ No

  If yes, which one? ______

☐ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Monday, August 5, 2024 4:56 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: karendhadden@gmail.com <karendhadden@gmail.com>
Sent: Monday, August 5, 2024 8:30 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Karen Hadden

EMAIL: karendhadden@gmail.com

COMPANY: SEED Coalition

ADDRESS: 605 CARISMATIC LN
AUSTIN TX 78748-2923

PHONE: 5127978481

FAX:

COMMENTS: Re: PERMIT NO. UR03075 Uranium Energy Corp., located at 500 North Shoreline Boulevard, Suite 800 N, Corpus Christi, Texas, proposes an in-situ uranium mining business. They have applied to the Texas Commission on Environmental Quality (TCEQ) for a permit renewal to authorize in-situ uranium mining. The facility is located at 14869 North United States Highway 183, Yorktown, Texas 78164 in Goliad County, Texas. I am writing with concerns about this application. Historically, there has been radioactive contamination in the region from uranium mining. While this application is for in-situ uranium mining, there is still the possibility of uranium leaching into waterways and wells and potentially contaminating soils and air as well. Exposure to this radiation could impact the health and safety of people living near the in-situ wells. Important issues have been raised by the Goliad County Groundwater Conservation District, with which I concur. Please do not approve this application. Furthermore, I write these comments 79 years to the day after the bombing of Hiroshima, Japan. Hundreds of thousands of people were killed, many of them civilians, in the first use of a nuclear weapon in an armed conflict. Hopefully the world will never see another nuclear weapon used during warfare. Uranium mining and the problems of radioactive contamination could should become a thing of the past. Nuclear power has a small percentage of electric generation in the Texas grid, and renewable energy is safer, cleaner, faster and more affordable than nuclear power. We don't need more risky uranium mining and should not allow this mining in Texas. Please add me to the mailing list for this permit application. Sincerely, Karen Hadden

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Monday, August 5, 2024 5:03 PM
To:	PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject:	FW: Public comment on Permit Number UR03075

From: beki.halpin@gmail.com <beki.halpin@gmail.com>
Sent: Monday, August 5, 2024 1:38 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Beki Halpin

EMAIL: beki.halpin@gmail.com

COMPANY:

ADDRESS: 302 S 7TH ST
PFLUGERVILLE TX 78660-3909

PHONE: 5126582599

FAX:

COMMENTS: Uranium Energy Corp., located at 500 North Shoreline Boulevard, Suite 800 N, Corpus Christi, Texas, proposes an in-situ uranium mining business. They have applied to the Texas Commission on Environmental Quality (TCEQ) for a permit renewal to authorize in-situ uranium mining. The facility is located at 14869 North United States Highway 183, Yorktown, Texas 78164 in Goliad County, Texas. I am very concerned about the pollution of the wells, water,earth and air near this project if it is permitted and begins mining operations. Environmental pollution from In Situ Mining is inevitable. The primary problem with In situ mining is ground water pollution. Although in situ mining permits require complete restoration of groundwater conditions after mining operations, some of the "baseline parameters" have proved to be unachievable by mining companies. While the uranium mining industry insists that In Situ mining methods are environmentally safe, numerous fines and violations by regulatory agencies have shown just how problematic in situ operations can be. The increase in in situ mining's environmental violations in recent years has led many states to relax environmental standards rather than impose stricter regulations against the mining companies. The area around Goliad has been previously polluted by uranium mining. There is no way residents living near this mining operation can know if they have their water, air or earth polluted with deadly radiation until it is too late and they are sick. There is insufficient monitoring of this project and once an aquifer or well is polluted with radioactivity, it is impossible to reclaim it. Sufficient testing to see if the injected water and waste water used in this mining process will not migrate through faults, fractures and underground connections to local wells and aquifers has not been accomplished. Wells throughout Texas are currently leaking and spewing methane, oil, fracking waste water and other pollutants with absolutely no ability for Texas to deal with all this waste. Allowing this mining process will add another potential leaker to the vast list of hazardous waste leakers, only this one will be radioactive. We don't need it. This is no way to treat our Texas neighbors. It is not the way you would want to be treated if you lived nearby. Please deny this permit.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Friday, August 9, 2024 3:32 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: donnaleehoffman@gmail.com <donnaleehoffman@gmail.com>
Sent: Friday, August 9, 2024 12:37 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Donna L Hoffman

EMAIL: donnaleehoffman@gmail.com

COMPANY:

ADDRESS: 1500 GREGORY ST N/A
AUSTIN TX 78702-2732

PHONE: 5122995776

FAX:

COMMENTS: I'm deeply concerned about this application for in situ leech uranium mining in Goliad County's drinking water aquifer. In situ mining releases toxic chemicals from the roll front of the rocks in to the water. Also known as in-situ recovery (ISR), in-situ leach uranium mining, can leave behind toxic heavy metals and radioactive materials in the water. These contaminants can include: uranium, vanadium, selenium, molybdenum, radium, arsenic, cadmium, and nickel. The leaching liquid used in ISR can also contain high concentrations of other chemicals, such as sulfuric acid, nitric acid, hydrochloric acid, sodium bicarbonate, and hydrogen peroxide. For example, in Königstein, Germany, the leaching liquid contained concentrations of cadmium, arsenic, and nickel that were hundreds of times higher than drinking water standards.Even after "restoration", water at ISR mines has never returned to the original condition and the "restoration" process used large amounts of water - water we can't afford to wash away, especially not full of chemicals. Exposure to these contaminants can have health effects, such as lung cancer from inhaling radioactive particles, and bone cancer and kidney impairment from drinking water contaminated with radionuclides. Closer to home, an elder resident who lived adjacent to the URAC mining area in Riviera, Texas received her water from a well located across the street from her home. She developed cancer and died. Residents in the town were deeply alarmed when toxic chemicals from the mining were found in the elementary school water faucets endangering the children and the next generations of the town's community. This company is trying to profit at a moment in time when uranium may be higher on the stock market due to international tensions and threats of use of nuclear weapons. This is not reason to allow a company to inflame those tensions, ruin the drinking water in Goliad, and contribute to global instability and potential anihilation of masses of human communities should the end product they want to contribute to be used. Please protect the health of the Goliad communities and wildlife by denying this permit. Thank you.

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Friday, August 9, 2024 3:32 PM
To:	PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject:	FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: donnaleehoffman@gmail.com <donnaleehoffman@gmail.com>
Sent: Friday, August 9, 2024 1:02 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Donna L Hoffman

EMAIL: donnaleehoffman@gmail.com

COMPANY:

ADDRESS: 1500 GREGORY ST N/A
AUSTIN TX 78702-2732

PHONE: 5122995776

FAX:

COMMENTS: TCEQ permit readers: I'm concerned about this application by Uranium Energy Corporation UR03075 for in situ leech uranium mining in Goliad County's drinking water aquifer. I request TCEQ to deny the above-referenced permit. In situ mining releases toxic chemicals from the roll front of the rocks into the drinking water. This activity endangers humans, wildlife, and the environment and should not be permitted. Exposure to these contaminants can have morbidity health effects, such as lung cancer from inhaling radioactive particles, and bone cancer and kidney impairment from drinking water contaminated with radionuclides. This same company operated in situ leech uranium mining under a different name - same people - in the drinking water aquifer of another south Texas community, Riviera in Kleberg County south of Kingsville. An elder resident who lived adjacent to the URAC mining area in Riviera received her water from a well located across the street from her home. The Senora developed cancer and died. Residents in the town were further alarmed when toxic chemicals from the in situ leech uranium mining were found in the elementary school water faucets endangering the children and the next generations of the town's community. Also known as in-situ recovery (ISR), in-situ leach uranium mining, can leave behind toxic heavy metals and radioactive materials in the water. These contaminants can include: uranium, vanadium, selenium, molybdenum, radium, arsenic, cadmium, and nickel. The leaching liquid used in ISR can also contain high concentrations of other chemicals, such as sulfuric acid, nitric acid, hydrochloric acid, sodium bicarbonate, and hydrogen peroxide. For another example, in Königstein, Germany, leaching liquid from in situ leech uranium mining contained concentrations of cadmium, arsenic, and nickel that were hundreds of times higher than drinking water standards. Even after "restoration", water at ISR mines has never been returned to its original condition. The "restoration" process would use large amounts of water - water we can't afford to wash away, especially not full of chemicals. This company is trying to profit at a moment in time when uranium may be higher on the stock market due to international tensions and threats of the use of nuclear weapons. This is not a good reason to allow a company to inflame those tensions, to ruin the drinking water in Goliad, nor to contribute to global instability and potential annihilation of masses of human communities should the end product they want to contribute to, nuclear weapons be used. I urge you to please protect the water, soil, air, and health of the Goliad communities and wildlife and please contribute to global stability and peace by denying this activity. Thank you.

18

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Vivian Howard

Mailing Address: 110 Winnipeg

Physical Address (if different): ______

City/State: Victoria, TX **Zip:** 77905

This information is *subject to public disclosure under the Texas Public Information Act*

Email: ______

Phone Number: ______

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☑ No

  If yes, which one? ______

☐ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)

Please give this form to the person at the information table. Thank you.

August 5, 2024

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Reviewed By Gue

AUG 20 2024

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

I do not want uranium mining in Goliad County.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Wayne R Jacobs
Address: 2664 Danforth Rd
Phone: Goliad, TX 77963
Email (if available):

Thank you for your attention to this matter.

CHIEF CLERKS OFFICE
2024 AUG 20 PM 2:30
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Thomas Lee

From: PUBCOMMENT-OCC
Sent: Wednesday, July 5, 2023 9:28 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

From: pridenprejudice05@gmail.com <pridenprejudice05@gmail.com>
Sent: Saturday, July 1, 2023 8:23 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: MS Heike Jenkins

EMAIL: pridenprejudice05@gmail.com

COMPANY:

ADDRESS: 14870 S US HIGHWAY 183
YORKTOWN TX 78164-5426

PHONE: 2106638821

FAX:

COMMENTS: I live within the boundaries of the proposed permit and have a well that was previously listed as #33. I am concerned with the possibility of contamination into my drinking water. I would like to know about testing the groundwater within the area of the Uranium mining and how often it will be checked for water quality.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Friday, August 23, 2024 12:38 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

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www.tceq.texas.gov/customersurvey

From: Ikimbrow@yahoo.com <Ikimbrow@yahoo.com>
Sent: Friday, August 23, 2024 5:44 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Isaac Kimbrough

EMAIL: Ikimbrow@yahoo.com

COMPANY:

ADDRESS: 10147 FM 622
GOLIAD TX 77963-3766

PHONE: 3612129247

FAX:

COMMENTS: Do not allow this permit to pass!

15

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Wilfred Korth

Mailing Address: POB 626,

Physical Address (if different): 8212 FM 883

City/State: Berclair, TX **Zip:** 78107

This information is *subject to public disclosure under the Texas Public Information Act*

Email: naturetour12@gmail.com

Phone Number:

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☒ No

  If yes, which one?

☒ **Please add me to the mailing list.**

☒ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Wednesday, August 7, 2024 3:08 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: angielantz.lcr@gmail.com <angielantz.lcr@gmail.com>
Sent: Tuesday, August 6, 2024 12:38 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Angela Lantz

EMAIL: angielantz.lcr@gmail.com

COMPANY:

ADDRESS: 6900 US HIGHWAY 59 S
GOLIAD TX 77963-3276

PHONE: 3614051995

FAX:

COMMENTS: As a resident of Goliad County, I strongly oppose renewing the uranium mining permit for the following reasons: 1. Uranium mining risks contaminating our water and damaging our local ecosystem, which is vital for our agriculture and daily living. 2. Exposure to radioactive materials and toxic chemicals from mining poses serious health threats, including cancer and respiratory issues. 3. Long-term environmental damage can devalue property, harm local businesses, and deter tourism, outweighing any short-term economic benefits. 4. Mining requires significant water resources, which we cannot afford to deplete or contaminate in our already water-scarce region. There is strong local opposition to mining. Our community's voice should be respected in decisions impacting our future. Please prioritize the health, safety, and well-being of Goliad County residents by denying the permit renewal.

TCEQ Public Meeting Form
August 5, 2024

10

RECEIVED
AUG 05 2024
AT PUBLIC MEETING

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Ted Long

Mailing Address: 358 E FM 1961

Physical Address (if different):

City/State: Goliad Texas **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: tmlong4@gmail.com

Phone Number: 361 550 9023

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☐ No

  If yes, which one?

☒ **Please add me to the mailing list.**

☒ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☒ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

I am a Retired County Commissioner - We fought This Pollution of our Water 10 yrs Ago, and w

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

STILL DONOT WANT IT!!!

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Wednesday, September 25, 2024 12:20 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: achaie@yahoo.com <achaie@yahoo.com>
Sent: Wednesday, September 25, 2024 10:02 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Anna Lund

EMAIL: achaie@yahoo.com

COMPANY:

ADDRESS: 3744 IRBY RD
GOLIAD TX 77963-4416

PHONE: 3617389294

FAX:

COMMENTS: As a resident of Goliad who relies solely on groundwater daily for drinking, cooking, for our pets/cattle and garden, it concerns me to know that uranium could be mined in our area. Increased uranium concentration in water threatens human health because of its chemical toxicity, which is six orders of magnitude greater than its radionuclide toxicity (Cui et al., 2019). Long-term exposure to high uranium concentrations can lead to kidney failure and bone damage (Päivi et al., 2002; Zamora Maria et al., 2009). Uranium can also affect xenobiotic metabolisms, the brain, reproductive system, antioxidant system, and intestinal inflammatory pathways (Souidi et al., 2016; Legendre et al., 2016). Additionally, EPA states, "Radionuclides are radioactive forms of elements such as uranium and radium. They are harmful to humans and can be released into the environment from uranium mining. Radionuclides can contaminate private wells through groundwater flow, waste water seepage and flooding. Drinking water with radionuclides can cause toxic kidney effects and increase the risk of cancer." How will the Uranium Energy Corp. protect our groundwater? This company cannot guarantee that their mining will not lead to groundwater contamination, and they are not the ones who will have to live here and depend on our groundwater, once they are done mining. And how will the TCEQ protect our groundwater? Please do not issue this permit.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Wednesday, October 9, 2024 3:15 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: amanda_jo33@hotmail.com <amanda_jo33@hotmail.com>
Sent: Wednesday, October 9, 2024 1:27 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: MRS Amanda Jo Mamerow

EMAIL: amanda_jo33@hotmail.com

COMPANY:

ADDRESS: 57 DIEBEL RD
YORKTOWN TX 78164-5140

PHONE: 3615541086

FAX:

COMMENTS: I believe that the 22 points the Goliad County Groundwater Conversation District has outlined in a letter to the Texas Commission on Enviromental Quality need to be addressed before any further action is taken.

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Jesse Manciaz

Mailing Address: 81 Ramirez Rd

Physical Address (if different):

City/State: Goliad TX **Zip:**

This information is *subject to public disclosure under the Texas Public Information Act*

Email: Jessemanciaz@Gmail.Com

Phone Number: 915-261-9769

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☑ No

  If yes, which one?

☑ **Please add me to the mailing list.**

☐ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☑ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)

Please give this form to the person at the information table. Thank you.

RECEIVED
AUG 0 5 2024
AT PUBLIC MEETING

TCEQ Comments

As a Carrizo Comecrudo Indian and land owner in Goliad county, a decorated Vietnam Veteran, I oppose the mining of uranium. It doesn't matter how much lipstick is put on the pig, it's still a pig. Simply said, when you inject poison into mother earth, you poison the water, the earth, the animals that live on this land. Stop now

Jesse Mancias
Xam'le Kuig

August 5, 2024

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Reviewed By GW

AUG 20 2024

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

Do NOT renew the permit
We oppose uranium mining in the county

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Delbert McCullough

Address: 3256 Danforth Road

Phone:

Email (if available):

Thank you for your attention to this matter.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
2024 AUG 20 PM 2: 30
CHIEF CLERKS OFFICE

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Monday, August 12, 2024 4:04 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: austinkradtke@gmail.com <austinkradtke@gmail.com>
Sent: Friday, August 9, 2024 7:05 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: MRS Karen Migura Radtke

EMAIL: austinkradtke@gmail.com

COMPANY:

ADDRESS: 2930 GRAND OAKS LOOP
CEDAR PARK TX 78613-4363

PHONE: 5127861555

FAX:

COMMENTS: Our heritage ranch, where we spend every wknd, has been in our family since 1851. It is less than 5 miles from this proposed uranium mine site. We strongly oppose issuance of this permit and will fight it accordingly. We cannot afford to risk polluting this already environmentally sensitive area. We already lack water resources for our livestock. Why would you allow this type of plant in such a beautiful and historic area!

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Monday, August 12, 2024 3:46 PM
To:	PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject:	FW: Public comment on Permit Number UR03075

From: mmmigura@gmail.com <mmmigura@gmail.com>
Sent: Monday, August 12, 2024 2:30 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Malcolm Migura

EMAIL: mmmigura@gmail.com

COMPANY:

ADDRESS: 133 COLONY DR
VICTORIA TX 77905-3255

PHONE: 3616493704

FAX:

COMMENTS: No vote for this application permit-our DeWitt County ranch borders Goliad County via 15 mile coleto creek. Our ranch well is 250'deep with 50' water sand sampled periodically by Pecan Valley Groundwater Conservation District-no contamination of any kind! Water is for human and cattle consumption. This heritage site is less than 2 miles from Hy 183 near Meyersville which is too close for injection wells or uranium mining PERMIT DENIED!!!!!!

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Monday, August 12, 2024 3:49 PM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: mmmigura@gmail.com <mmmigura@gmail.com>
Sent: Monday, August 12, 2024 11:54 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Rosalie Migura

EMAIL: mmmigura@gmail.com

COMPANY:

ADDRESS: 133 COLONY DR
VICTORIA TX 77905-3255

PHONE: 3616493703

FAX:

COMMENTS: I strongly oppose this Goliad Project. We are in a drought prone area, so our livestock rely heavily on groundwater. We also have to drink the well water. Don't approve this permit.

August 5, 2024

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Reviewed By GCW

AUG 15 2024

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

2024 AUG 15 PM 2:29

CHIEF CLERKS OFFICE

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

against the mining

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Amy moreland

Address: 3840 E Fm1961

Phone:

Email (if available): Amy.Wheeler08@yahoo.com

Thank you for your attention to this matter.

August 5, 2024

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Reviewed By GAW

AUG 15 2024

CHIEF CLERKS OFFICE
2024 AUG 15 PM 2:29
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

Against

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Gene Moreland

Address: 3840 E Fm 1961

Phone: 210-413-8314

Email (if available): __________

Thank you for your attention to this matter.

Goliad County Groundwater Conservation District
Post Office Box 562
Goliad, Texas 77963

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
13 AUG 2024 PM 2 L

RECEIVED
AUG 14 2024
TCEQ MAIL CENTER
DA

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 AUG 15 PM 2: 29

CHIEF CLERKS OFFICE

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

August 5, 2024

Reviewed By GAW

AUG 15 2024

CHIEF CLERKS OFFICE

2024 AUG 15 PM 2: 29

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

Against the mining

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Elaine Noland

Address: PO BOX 423 245 N. Mt. Auburn St.

Phone: (361)571-3637

Email (if available): ______

Thank you for your attention to this matter.

Reviewed By ________ PM

MAY 02 2024

April 28, 2024

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

2024 MAY -1 PM 2:43

CHIEF CLERKS OFFICE

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Misty Ortega

Address: 1938 Fox Road

Phone: 361-935-7148

Email (if available): mistyortega2021@gmail.com

Thank you for your attention to this matter.

Think About How this would Affect your Family!! You Wouldn't Approve!!

Do What IS Correct & Right For the People of this community!

April 28, 2024

Reviewed By Gcw

MAY 0 2 2024 PM

CHIEF CLERKS OFFICE

2024 MAY -2 PM 3:08

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: JOANNA PACKARD

Address: 1938 FO4 ~~Road~~ Road

Phone: 585-929 361 935 7148

Email (if available): Mi54ORTEGA2021 @gmail.com

Thank you for your attention to this matter.

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 3 L

RECEIVED
MAY 02 2024
TCEQ MAIL CENTER
DA

ON ENVIRONMENTAL
QUALITY
2024 MAY -2 PM 3:05
CHIEF CLERKS OFFICE

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

7

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: ROD PACKARD

Mailing Address: 1938 Fox Rd

Physical Address (if different): same

City/State: Goliad Tx **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: PACKARD@YAHOO.COM

Phone Number: 361 537 9633

- Are you here today representing a municipality, legislator, agency, or group? ☑ Yes ☐ No

  If yes, which one? ______

☑ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☑ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)

Please give this form to the person at the information table. Thank you.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

2024 MAY -1 PM 2:46

CHIEF CLERKS OFFICE

April 28, 2024

Reviewed By GCW

MAY 02 2024 PM

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: ROP PACKARD

Address: 1938 FOX Rd

Phone: 361 5379633

Email (if available): ~~[illegible]@YAHOO.COM~~ ~~OR~~ misty ortega2024a gmail.co

Thank you for your attention to this matter.

Some put money over what's right now days.
What's right is easy too see.
Any open wells from years ago? Has the land been
returned to the way it was before they started?
Just do whats right for all !!!

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 MAY -1 PM 2:46

CHIEF CLERKS OFFICE

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 2 L

RECEIVED

MAY 01 2024

TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Thursday, August 8, 2024 2:32 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: lperdue2525@gmail.com <lperdue2525@gmail.com>
Sent: Thursday, August 8, 2024 1:11 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Leslie Perdue

EMAIL: lperdue2525@gmail.com

COMPANY:

ADDRESS: 2932 N US HIGHWAY 183
GOLIAD TX 77963-3633

PHONE: 3615500610

FAX:

COMMENTS: NO to this permit application

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Wednesday, August 21, 2024 2:29 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: radtkegreyson@gmail.com <radtkegreyson@gmail.com>
Sent: Tuesday, August 20, 2024 8:54 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Greyson Radtke

EMAIL: radtkegreyson@gmail.com

COMPANY:

ADDRESS: 941 H. Migura Ln
Yorktown TX 78614

PHONE: 5125071169

FAX:

COMMENTS: I strongly oppose a uranium mining permit in Goliad County. We are a drought prevalent region and do not want the risk of contaminating our water wells, much less radon in our air! Stop this process!

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Thursday, August 22, 2024 2:51 PM
To:	PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject:	FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: lance.radtke15@gmail.com <lance.radtke15@gmail.com>
Sent: Wednesday, August 21, 2024 9:24 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Lance Radtke

EMAIL: lance.radtke15@gmail.com

COMPANY:

ADDRESS: 941 H. Migura Ln
Yorktown TX 78164

PHONE: 5127888199

FAX:

COMMENTS: I strongly oppose the uranium mining permit in this area. It is a drought prone region with already low water tables. We do not want radioactive waste, radon gas, and heavy metals polluting this area that we live and breath in since 1851.

August 5, 2024

Reviewed By GW

AUG 15 2024

CHIEF CLERKS OFFICE
2024 AUG 15 PM 2:29
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

I Say No to Drilling for Uranium

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Margie Reed

Address: 1878 Scenic Loop

Phone: Goliad TX.

Hwy 1726

Email (if available): __________

Thank you for your attention to this matter.

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Monday, August 5, 2024 5:00 PM
To:	PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject:	FW: Public comment on Permit Number UR03075

From: tschley@live.com <tschley@live.com>
Sent: Monday, August 5, 2024 4:41 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Travis Schley

EMAIL: tschley@live.com

COMPANY:

ADDRESS: 240 E FM 1961
GOLIAD TX 77963-3363

PHONE: 3615502196

FAX:

COMMENTS: Please do not renew UEC's permit to mine uranium in Goliad county or any other county as far as that goes. Where they are mining right now is next door to my place. I constantly have dirty water. Had to put in a filter to try to catch as much dirt as possible. We need it to stop before they ruin our drinking water. Because when they do ruin it tceq and uec will have one hell of a law suit against them. Thanks you.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Tuesday, August 6, 2024 7:37 AM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: bribartosch@yahoo.com <bribartosch@yahoo.com>
Sent: Monday, August 5, 2024 5:19 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Brianna Schrade

EMAIL: bribartosch@yahoo.com

COMPANY:

ADDRESS: 9563 FM 622
GOLIAD TX 77963-3764

PHONE: 3619609794

FAX:

COMMENTS: I do not want uranium mining in Goliad County, for the fear of my groundwater being contaminated. I rely on my water well to not only supply my household and small business but to also supply water for livestock, pets, a pond stocked with fish that supplies a water source to the wildlife on and around my property, and more. Please do not allow uranium mining to happen in our county. Our quality of life and ability to be resourceful with use of our own fresh, uncontaminated groundwater matters more than profits you ʲpe to find in the mining of uranium ir ɹr county. NO TO URANIUM MINING IN GOLID COUNTY.

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Tuesday, August 6, 2024 7:37 AM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: kalynniemeyer@gmail.com <kalynniemeyer@gmail.com>
Sent: Monday, August 5, 2024 5:34 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Kalyn Schulte

EMAIL: kalynniemeyer@gmail.com

COMPANY:

ADDRESS: 16 FAITH DR
GOLIAD TX 77963-3328

PHONE: 3616450166

FAX:

COMMENTS: No to uranium mining in Goliad county

Reviewed By GC

MAY 0 2 2024 PM

CHIEF CLERKS OFFICE

2024 MAY -2 PM 3:08

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

April 28, 2024

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Cordy Shearman

Address: 9116 Fm 743 Kenedy Tx. 78119

Phone: 361-542-8762

Email (if available): CordyShearman@Yahoo.Com

Thank you for your attention to this matter.

Shearman
9116 Fm 743
Kenedy Tx 78119

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 MAY -2 PM 3:05

CHIEF CLERKS OFFICE

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 3 L

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MAY 02 2024

TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-190200

April 28, 2024

Reviewed By GCW

MAY 0 2 2024 PM

CHIEF CLERKS OFFICE

2024 MAY -1 PM 2:48

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Tina Shearman

Address: 9116 Fm 743, Kenedy, TX 78119

Phone: 830-534-4297

Email (if available): evangelineaquifer@gmail.com

Thank you for your attention to this matter.

Tina Shearman
N.A.D.A.

Tina Shearman
9116 Fm 743
Kenedy Tx 78119

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
2024 MAY -1 PM 2:48
CHIEF CLERKS OFFICE

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 3 L

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MAY 01 2024
TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

GOLIAD COUNTY GROUNDWATER CONSERVATION DISTRICT

118 S. Market St., P.O. Box 562, Goliad, Texas 77963-0562
Telephone: (361) 645-1716
website: www.goliadcogcd.org | email: gcgcd@goliadgcd.org

August 27, 2024

Office of the Chief Clerk, MC 105
TCEQ
Post Office Box 13087
Austin, Texas 78711-3087

Re: UR03075, WDW423, WDW424 Permit Renewals

I am writing to inform you about a recent resolution passed and attached by the Goliad County Commissioners Court which underscores the commitment between Goliad County and Goliad County Groundwater Conservation District (GCGCD) to a collaborative partnership and addresses our shared concerns.

The resolution, adopted on August 12, 2024, highlights several key areas where our joint efforts will be focused:

- **Groundwater Importance:** Essential for Goliad County, primarily sourced from the Gulf Coast Aquifer.
- **Ecosystem and Economy:** Groundwater-surface water interaction supports the ecosystem; eco-tourism, ranching, and hunting drive the economy.
- **Economic Dependence:** Future economic health relies on sustainable groundwater management.
- **Uranium Mining Risks:** Concerns about contamination and water quality from in-situ uranium mining.

This resolution is a testament to our dedication to working together for the betterment of our community. We believe that through this partnership, we can achieve greater efficiency and effectiveness in addressing the needs and concerns of our constituents.

We look forward to your continued support and collaboration as we move forward with these initiatives. Should you have any questions or require further information, please do not hesitate to contact me.

Thank you for your attention to this important matter.

Sincerely,

Michelle Shelton
GCGCD General Manager

cc: file

May we be responsible stewards of or natural resources

County of Goliad

Reviewed By

AUG 29 2024

CHIEF CLERKS OFFICE

2024 AUG 29 AM 10: 01

ON ENVIRONMENTAL QUALITY

STATE OF TEXAS §
COUNTY of Goliad §

RESOLUTION OPPOSING URANIUM MINING IN GOLIAD COUNTY

WHEREAS Goliad County, Texas has a land area of approximately 859 square miles surrounded by Victoria County in the east, Refugio County in the south, Bee County in the west, and Dewitt County in the north; and

WHEREAS groundwater is precious commodity in Goliad County; and

WHEREAS the primary source of drinking water in Goliad County is the Gulf Coast Aquifer; and

WHEREAS the role of groundwater and surface water interaction in sustaining the fragile ecosystem within Goliad County is important; and

WHEREAS it is generally recognized that eco-tourism, spring water for ranching and hunting are seen as major drivers of the economy; and

WHEREAS the future economic health of Goliad County is highly dependent on upon a reliable source of groundwater; and

WHEREAS groundwater must be managed on a "sustainable" basis; and

WHEREAS uranium intrusion, uranium contamination and lowered water quality are a risk from in-situ uranium mining; and

WHEREAS the residents and property owners of Goliad County have expressed valid concerns regarding in-situ uranium mining in Goliad County.

THEREFORE, BE IT RESOLVED That Goliad County Commissioners Court herby resolve and express its firm and absolute opposition to in-situ uranium mining in Goliad County. Goliad County Commissioners Court supports the Goliad County Groundwater Conservation Districts mission and goal in protecting the ground water resource in Goliad County, Texas.

Passed and approved by Goliad County Commissioners Court in Goliad, Texas on this the 12th day of August 2024.

R.M. Bennett
County Judge

K.Edwards, Precinct 1

D.Young, Precinct 2

K.Brumby, Precinct 3

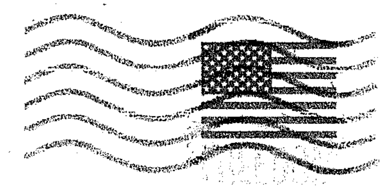
K.Fagg, Precinct 4

ATTEST: County Clerk

UR03075

Goliad County Groundwater Conservation District
Post Office Box 562
Goliad, Texas 77963

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
27 AUG 2024 PM 3 L



COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 AUG 29 AM 10: 02

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TCEQ MAIL CENTER
DA

Office of the Chief Clerk, MC 105
TCEQ
Post Office Box 13087
Austin, Texas 78711-3087

78711-308787

GOLIAD COUNTY GROUNDWATER CONSERVATION DISTRICT
118 S. Market St., P.O. Box 562, Goliad, Texas 77963-0562
Telephone: (361) 645-1716
website: www.goliadcogcd.org | email: gcgcd@goliadgcd.org

Reviewed By GCW
APR 29 2024 PM

April 28, 2024

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Find attached a Professional Statement in Support of GCGCD's request to TCEQ to deny the renewal of UEC's ISR Permit as referenced above to be included as another request for Public Meeting to discuss negative impacts on the residents of Goliad County.

Thank you for your attention to this matter.

Sincerely,

Michelle Shelton
GCGCD General Manager

cc: file

CHIEF CLERKS OFFICE
2024 APR 29 PM 3:05
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

May we be responsible stewards of our natural resources

Professional Statement in Support of the Goliad County Groundwater Conservation District Request to the Texas Commission on Environmental Quality to Deny the Renewal of UEC's ISR Permit (UR03075)

April 2, 2024

Professional Qualifications

My name is Richard J. Abitz. I have a Doctor of Philosophy in geology (emphasis in geochemistry) from the University of New Mexico and over 35 years of experience as an environmental consultant dealing with problems associated with the solubility and mobility of hazardous and radioactive elements in the sediment/water environment of major aquifers.

I presently serve as the director of the Environmental Restoration (ER) Group for the Idaho Closure Project contract at the Department of Energy's (DOE) Idaho National Laboratory Site. The ER Group is an organization of 20 scientists, engineers, and technicians who are responsible for executing groundwater and soil remedial actions to protect human health and the environment, as established in the Record of Decisions under the Comprehensive Environmental Response, Compensation, and Liability Act (42 USC § 9601 et. seq.). The primary actions are to 1) remediate and monitor groundwater contaminated by hazardous solvents and radioactive isotopes, 2) inspect and maintain established environmental controls at legacy sites were remedial actions removed contamination, and 3) prepare annual reports on the progress of remedial actions.

My experience also includes decades of work with uranium contamination in the surface environment and groundwater at the DOE Portsmouth and Fernald Sites. At the Portsmouth Site, which produced low enriched uranium for commercial power plants and highly enriched uranium for weapon components and Navy ship reactors, I served as the senior scientist responsible for dose calculations to assess the risk to human health associated with exposure to uranium and other radionuclide isotopes under present conditions and a future condition where all contamination was buried in an on-site disposal facility. At the Fernald Site, which processed uranium ores and yellow cake for over 30 years (1952 to 1985) to produce uranium metal for plutonium production reactors at the Hanford and Savannah River Sites, I managed the Environmental Services Division for the Fernald Closure Project. Our division was responsible for 1) installation and development of monitoring, extraction, and injection wells, 2) air, water and soil sampling activities, 3) analytical facilities for the measurement of radionuclides, metals, and organic compounds in soil and water samples, 4) *in situ* measurements of ^{226}Ra, ^{232}Th, and ^{238}U activities in soil using sodium-iodide and high-purity germanium detectors, 5) data verification, validation, and reporting, and 6) data analysis, modeling, and reporting.

In addition to my work at DOE sites, I have served as a subcontractor to the Environmental Protection Agency (EPA) in support of groundwater remediation at the Homestake uranium tailings site north of Milan, NM. For the Navajo Nation (New Mexico), Sioux Nation (Nebraska), Goliad County Groundwater Conservation District (Texas), and National Resources Defense Council, I served as a technical expert and witness to evaluate the impact of proposed *in situ* uranium leach mining on community groundwater supplies. I have also provided technical input to the Wyoming Powder River Basin Resource Council's comment responses to EPA's proposed Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40 CFR 192).

Based on my geology education and environmental work experience, I have extensive theoretical, laboratory, and field knowledge on 1) the solid forms of uranium in aquifer sediments; 2) the chemical reactions that are responsible for the mobilization and/or adsorption/precipitation of uranium from groundwater systems; and 3) well fields and ion-exchange operations associated with recovering groundwater that is contaminated with uranium. Therefore, I am qualified to provide scientific arguments in support of GCGCD's request to TCEQ to deny the renewal of UEC's Permit (UR03075) for in situ recovery (ISR) of uranium at the proposed Goliad ISR site.

Stratigraphy and Faulting in the South Texas Coastal Plain

The uranium deposits of South Texas occur in sediments deposited in complex fluvial-shallow marine depositional environments, which differ from the stratigraphically simpler classic roll-front deposits observed in Wyoming and other western uranium districts (Adams & Smith 1980). In addition to the complex lateral and vertical variation in the fluvial stratigraphy, hundreds of growth faults cutting the Pleistocene and Holocene sediments exposed in the coastal plain have been mapped (Verbeek 1979, Yeager et al 2019). The growth faults juxtapose older stratigraphic formations against the younger units, such as the Goliad sandstone units identified by UEC for ISR uranium mining. Researchers have also established that uranium deposits in the permeable fluvial sandstone beds are commonly associated with disseminated pyrite that formed from the upward transport of hydrogen sulfide (from deeper evaporite beds) along the growth faults (Adams & Smith 1980, and references therein).

A combination of fluvial stratigraphy cut by growth faults creates a complex three-dimensional subsurface where downgradient flow pathways along or across fault boundaries and through tilted and fractured lithologic units become impossible to predict over the area of the proposed Goliad ISR mining operation. Complex subsurface flow models developed for the Edwards aquifer, located in a geological environment in south-central Texas similar with the proposed Goliad mining site, required extensive data from drill holes and rock core, mapped faults and other geologic structures, aerial photography, and seismic and electromagnetic surveys; and the resultant model was marginally successful at predicting groundwater flow paths (Pantea et al 2008). UEC groundwater flow models are far simpler than the complex model developed by Pantea and others (2008), and there should be no confidence placed in the UEC model projections of contaminant transport beyond the injection/recovery well clusters.

In summary, the complex subsurface geology at the proposed Goliad ISR mining site precludes *in situ* leaching operations at this location because the lixiviant injected into the ore zone cannot be isolated within the monitor well ring. The migration of mining fluids outside the monitor well ring (i.e., excursions) is a common occurrence at ISR sites with simple subsurface geology (Staub et al 1986). If the UEC permit is renewed by TCEQ, excursions at the proposed Goliad site will occur and impact private wells, as has been observed for other Texas ISR operations at Rosita and Kingsville Dome.

Groundwater Quality at the Proposed Goliad ISR Mining Site

Uranium and radon concentrations in groundwater will be the focus of this discussion because they are the most mobile contaminants released by ISR mining. Uranium because the ISR process is designed to mobilize uranium for recovery as uranyl carbonate ions [$UO_2(CO_3)_2^{-2}$ and $UO_2(CO_3)_3^{-4}$] and radon because it is an inert gas (i.e., no chemical interactions with the solids in the aquifer) that migrates at the same or greater rate than the groundwater.

Figure 1 shows the location of nine private wells, two UEC injection wells, and the proposed UEC permit boundary. Except for the Abrameit and Mooreland wells, seven of the wells are located 500 to 1,700 feet from the permit boundary. The Abrameit well is within the proposed permit area and the Mooreland well is about 1.5 miles to the southeast of the permit boundary.

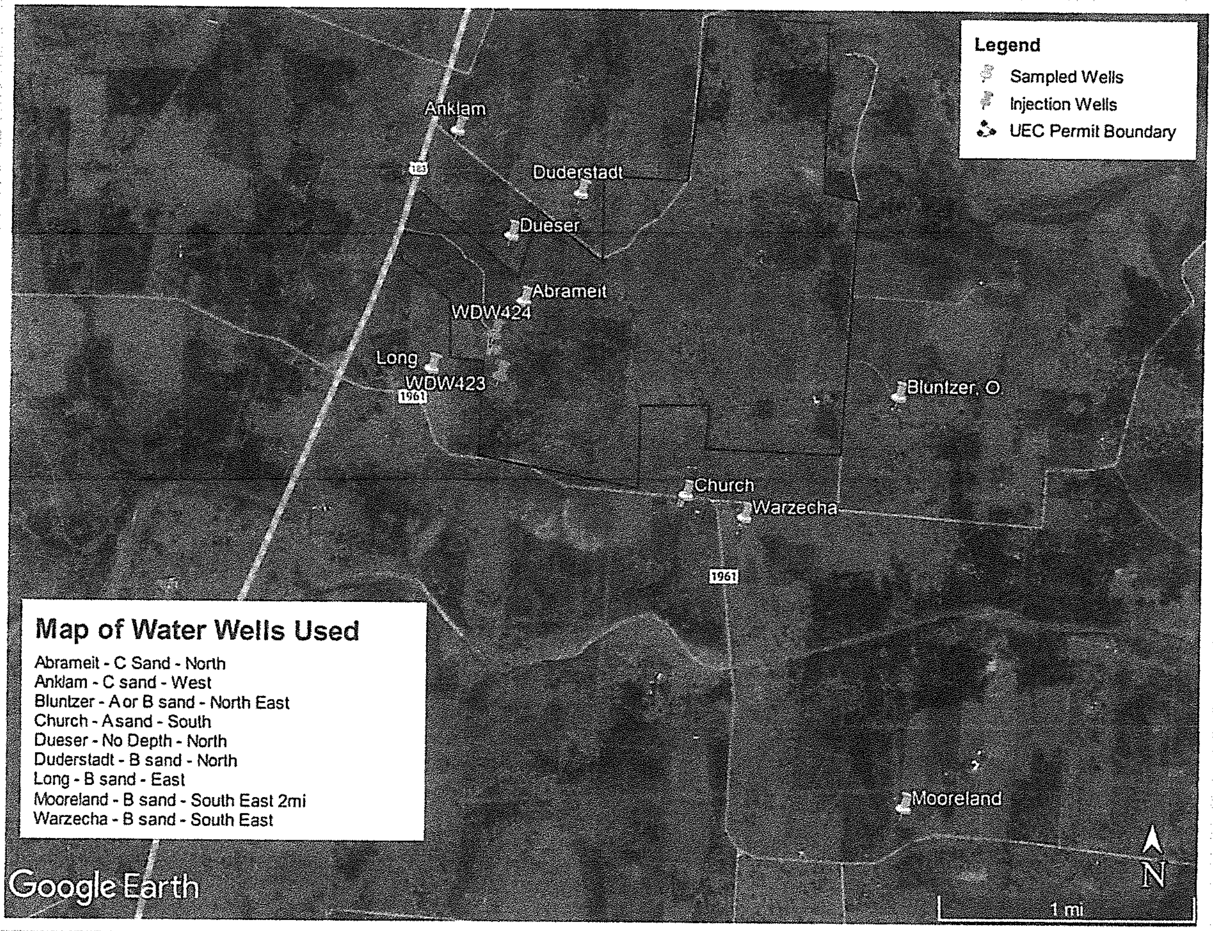

FIGURE 1. Private wells adjacent to the proposed UEC ISR permit boundary.

Figure 2 plots the trends for uranium concentrations for private wells adjacent to the proposed UEC permit area and UEC uranium results for production zone wells (not shown on Figure 1). Many of the private wells have been collecting groundwater quality data for over 16 years, which provides an excellent temporal record for the variation in uranium concentrations for groundwater undisturbed by ISR mining operations. Results for the private wells show very little temporal variation in uranium concentrations (Figure 2), that is there is very little change in the measured concentration of uranium over the past 16-plus years.

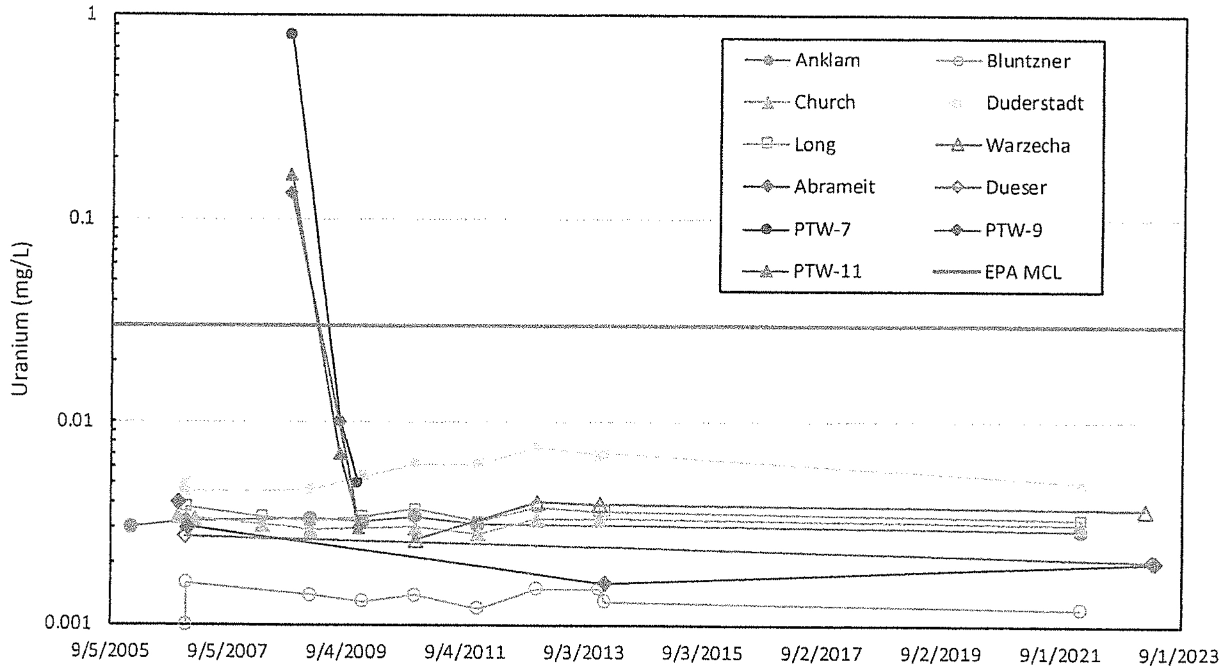

FIGURE 2. Temporal variation of uranium in private wells and ore-zone wells.

In contrast to the private wells, the sample dates for each ore-zone well (PTW-7, PTW-9, PTW-11) show large differences in uranium concentrations (Figure 2), due to the initial samples being collected after drilling the wells in 2008. Well drilling uses water that contains higher levels of oxygen, relative to the reduced aquifer water, and drilling also grinds the ore into finer particles that have a higher surface area for oxidation reactions. The result is oxidation of the uranium ore particles and higher uranium concentrations. Because the drilling is a transient process, the low levels of oxygen introduced into the aquifer are consumed and, without injection of oxidizing lixiviant (i.e., active mining), reducing conditions return and uranium concentrations drop back to baseline levels. Note that the baseline levels for uranium in the reduced ore zone (2009 dates) are nearly identical to those in the private wells. That is, they all are about an order of magnitude lower than the EPA established maximum contaminant level (MCL) for uranium (0.03 mg/L). It is also noteworthy to point out that UEC, and the ISR industry, are allowed to use the higher values induced by drilling (2008 values from ore-zone wells) as 'baseline' for the ore zone, which biases restoration values to high concentrations far above the true baseline for uranium. Additionally, when submitting their request to TCEQ for renewal of their permit, UEC made no effort to revise their biased 'baseline' submitted with the original permit with the 2009 values. Figure 2 clearly illustrates that the true baseline values for uranium in the ore zone (2009 results) and private wells are well below the EPA MCL for uranium.

Radon values for the private wells (Figure 3) show a large range of measured concentrations over the 16-plus years of monitoring. The Long and Blutzner wells show a sharp increase in radon values around 2011, a peak concentration in 2012, and a sharp decline thereafter. Although not as evident, this trend is also observed in the Anklam and Warzecha wells. All wells, except Abrameit, show a decline in radon values after 2013. The high values for the Abrameit well probably reflect its location within the proposed permit area (Figure 1) and proximity to ore deposits in the subsurface.

UEC drilled over 700 boreholes/wells in the proposed permit area between May 2006 and September 2008 to establish ore locations and a 'baseline' groundwater quality in the ore zone and surrounding aquifer. As noted above for uranium results, true baseline values for the groundwater were not established by UEC. It is highly probable that the observed radon peak concentrations in 2012 reflect the transport of radon from the large disturbance in the ore zone during the drilling of over 700 boreholes/wells. As radon moves with the groundwater along fault zones, fractured sandstone, and permeable channel sandstones, the peak radon concentrations indicate groundwater flow paths connect the ore zone to the private wells. The initial indication of a significant increase in radon values occurred in 2011, which implies high levels of radon can reach private wells within three to five years of disturbing the ore zone (borehole drilling began in 2006 and well drilling ended in 2008).

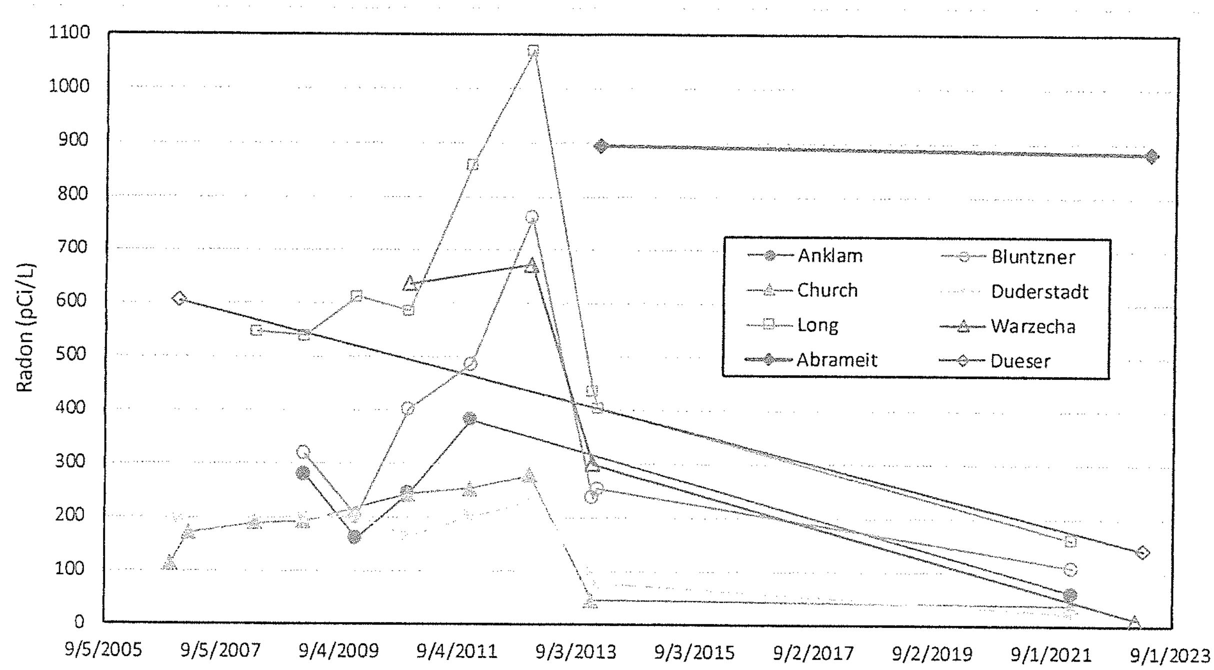

FIGURE 3. Temporal variation of radon in private wells.

Although EPA does not regulate radon levels in groundwater, they are proposing to regulate state water systems to achieve less than 4,000 pCi/L in groundwater provided by community water systems. Radon in the water is released as radon gas when used in the home, and this limit for domestic water systems is estimated to generate a radon air concentration in the home of no greater than 0.4 pCi/L (this is one-tenth of the EPA recommended level of less than 4 pCi/L for radon in indoor air). The proposed value of 4,000 pCi/L for radon in domestic water systems would be lowered to 300 pCi/L if the state does not have an EPA-approved program for enhancing lower indoor radon levels. As shown on Figure 3, all private wells (except Abrameit) have radon concentrations that are presently below the proposed EPA limit of 300 pCi/L.

Depletion of Groundwater Resources

The National Research Council (NAS 2002) indicated that future development of uranium mining and other oil and mineral extraction activities should consider the tradeoffs between extracting oil and mineral deposits and the need to preserve the diminishing western groundwater resources for domestic, livestock, and agriculture use. ISR operations are especially egregious with respect to the consumption of groundwater resources due to consumption of the groundwater during mining and restoration and the large volume of contaminated groundwater that remains in the aquifer after mining. Gallegos and others (2022) report that the Texas Department of Health estimated that 12 ISR companies operating in 1980 were using about two billion gallons per company per year, or a total annual volume of 24 billion gallons of uranium-mining fluids in the injection and recovery process. As present ISR groundwater operations are similar with those 40 years ago, allowing UEC to renew their permit for ISR operations will result in the loss of billions of gallons of groundwater that could have been used for domestic, livestock, and agriculture needs.

Water consumption during ISR operations occurs during mining and restoration, with consumption during restoration generally higher. For five Texas ISR operations in the Goliad Formation, an estimated 500 gallons of groundwater is consumed per pound of mined U3O8 (Gallegos et al 2002). The five Texas ISR operations recovered between 2 and 4 million pounds of U3O8 (Gallegos et al 2002), which equates to the consumption of 1 to 2 billion gallons removed from the aquifer. However, the greatest volume of groundwater that is lost due to ISR operations is the contaminated pore volume that remains after restoration is deemed complete. Pore volumes for the five Texas ISR operations varied from around 10 to 300 billion gallons (Gallegos et al 2002).

For the Goliad Formation sands at the UEC Goliad site, the exempted aquifer pore volume is estimated to be about 32 billion gallons (as noted in previously adjudicated issues during the initial UEC permit hearing). Most of the pore volume in the exempted aquifer volume is lost to contamination because it is well documented that no ISR operation in Wyoming, New Mexico, and Texas has ever restored groundwater to initial pre-mining values (Deutsch, 1984; Staub, 1986; Hall, 2009). Therefore, the renewal of the UEC permit for ISR operations at the Goliad site should be denied by TCEQ to avoid the loss of over 30 billion gallons of groundwater that should be conserved for domestic, livestock, and agriculture use.

Furthermore, the groundwater resource in Goliad County is far more valuable to the people and the State because the extracted uranium from the Goliad Formation is a vanishingly small fraction of the world uranium production. The United States produces less than 0.15% of the worlds uranium (about 75 tons per year relative to a total global production of 49,355 tons per year Uranium Production | Uranium Output - World Nuclear Association (world-nuclear.org)), and the production from the Goliad site would be a tiny fraction of the 0.15% the United States produces annually. Clearly, there is no demand for the uranium that is presently immobile in the aquifer sands at the proposed Goliad site.

Summary

Extraction of the uranium from the aquifer sands at the proposed Goliad site would result in the loss of over 30 billion gallons of groundwater and contaminate private wells that are adjacent to the proposed permit boundary. Based on radon measurements in groundwater samples collected from private wells, there is compelling evidence that groundwater flow paths exist between the ore bodies and the private wells. The ore bodies are not a threat to the water quality of the private wells while natural reducing conditions are present in the aquifer. If ISR operations are permitted, the oxidation of the uranium ore zones would contaminate the aquifer and radon and uranium would be transported along complex flow paths to the private wells. Monitoring well rings cannot ensure the detection of contamination, especially in the complex subsurface geology at the Goliad site. Therefore, the TCEQ should protect human health and the environment and honor the request of the GCGCD to deny the renewal of UEC permit UR03075.

References

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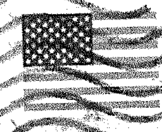
Goliad County Groundwater Conservation District
Post Office Box 562
Goliad, Texas 77963

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
26 APR 2024 PM 2 L



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Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-190200

Renee Lyle

From: PUBCOMMENT-OCC
Sent: Thursday, January 25, 2024 3:59 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

PM

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: mshelton@goliadcogcd.org <mshelton@goliadcogcd.org>
Sent: Thursday, January 25, 2024 2:18 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Michelle Shelton

EMAIL: mshelton@goliadcogcd.org

COMPANY:

ADDRESS: PO BOX 562
GOLIAD TX 77963-0562

PHONE: 3616482687

FAX:

COMMENTS: I am concerned about the amount of water that this mining permit will be required to utilize. I am concerned about the possibility of spillage or groundwater contamination from the injection of the mining fluids into the formation. I am concerned about the level of oversight and/or monitoring that will or will not occur with this mining. I am concerned about the quality of water that will be left for my children, grandchildren and generations to come in this area. I am concerned about the faulting that has been identified in this area and the effect of injection mining fluids into a geology that has clearly been identified with multiple faults. For these, and many more reasons, I am requesting a Public Meeting so that these concerns and others could be addressed to the population of Goliad County.

2024/08/26

Permit # - UR03075

2024 AUG 27 PM 2:10

CHIEF CLERKS OFFICE

To whom this may concern,

Last week, I sent in objections to the UEC Goliad Aquifer Permit # - UR03075. I have corrected the original objections and this is my updated comments. Please throw out the earlier objections.

Thank you

Reviewed By

AUG 29 2024

Jeff Sibley
512-497-7413
jsib75@icloud

08/26/2024

Response to UEC's Goliad IN-SITU Hearing
Permit Number - UR03075

I am writing this letter to the TCEQ expressing my concerns about UEC's testimony during the hearing. The IN-SITU has a long history of environmental damage. UEC and its predecessor, URI, have been involved in some of the worst IN-SITU disasters in Texas history. By licensing this mine, TCEQ is setting up a long-term nightmare that it is ill-prepared to deal with.

Engineers, like UEC, only understand uranium based on their need to find the lowest cost solutions that can provide them the highest profit. Nature is much more than a chemical reaction or a profit centre. It is important to understand that new research is showing how the Goliad aquifer is a living ecosystem. Over eons, nature has created this delicately balanced system and it has protected us for millions of years. IN-SITU mining will remove the reduced environment that keep the anaerobic bacteria alive. Once destroyed, it is unknown if the delicate balance that Mother Nature has created can be returned.

Because my questions and responses were limited to 3 minutes during the hearing, I was not able to ask enough questions or express my full concerns about the site or explain the destructive history of this company. The 3 minute limit is a disservice to the public and this makes your agency look like it is trying to push through the hearing so that the company can get a license.

During the short time that I had to ask questions during the hearing, UEC "experts" seemed unaware of many important geological aspects of IN-SITU and considerable ignorance about the health effects of radioactivity. UEC demonstrated that they had little knowledge of the existence of the bacterial ecosystem that exist in the aquifer.

I have enclosed two reports including a copy of the Texas Energy Alliance report "Uranium Mining In Texas" which gives a short history of uranium mining and documents many of the failed IN-SITU sites in Texas. I have also included is the Texas Energy Alliance, "Analysis of IN-SITU Uranium Mines".

— Uranium Formation Process—

This is a simple description that explains where uranium in South Texas comes from:

a) Uranium in the aquifer comes from volcanoes that exploded in Mexico eons ago. Molten rock that contained uranium bearing minerals was blown into the atmosphere. This fly ash was carried into South Texas by the trade winds where it settled on the ground several feet thick. Over time, rain washed the fly ash into the ground and carried it down into the earth until it hit the first aquifer where the uranium was then washed out to sea.

b) The remaining uranium in the aquifer is found in stagnant areas that contain a reduced oxygen environment. These zero flow areas are created by obstructions that force the aquifer to flow around the barrier. The reduced atmosphere is caused by gases from coal, deep oil, natural gas or hydrogen sulphide that have replaced the oxygen in these areas. These low oxygen areas are called "Redox Zones". At the Goliad formation, methane (natural gas) is seeping up fault zone cracks, replacing the oxygen.

c) These areas of reduced oxygen are where uranium precipitates out of the aquifer. The industry believes that precipitated uranium is locked up and made immobile by physical means, forming a coating on the existing sand grains.

d) New science has revealed that the reduced environment allows anaerobic bacteria to establish. These studies show that the precipitated uranium is primarily trapped via biological reduction in roll-front deposits not by physical means. Biological reduction changes the uranium from the $U_{(VI)}$ form of uranium to the $U_{(IV)}$ form.

e) Over the centuries the uranium has been held by the tenuous grip of bacteria. As long as the bacteria remains undisturbed, the uranium ore will stay immobile.

— Site Geology —

1) The Bureau of Economic Geology geologic map of Texas describes the Goliad Formation as clays, sandstones, marls, caliches, limestones and conglomerates with a thickness of 100 ft to 500 ft.

2) There is an assumption in the industry that there are impermeable layers above and below the aquifer and they prevent the migration of contaminates out of the aquifer. I did not get the opportunity to ask UEC what the confining strata was.

It is important to understand that South Texas has an unusually complex geology that is shaped by eons of volcanoes, earthquakes, fault zones and dead seas. <u>It is the very nature of uranium formations that they must be located in fractured, porous zones.</u> According UEC's website, there are 2 fault zones in the ore zone. Reducing gases use these cracks as a direct routes into the aquifer.

The Goliad area is also full of oil wells both operating and abandoned with unplugged holes. Because of fracking, earthquakes are becoming more common in South Texas. In February 2024, areas around Falls City recorded 27 earthquakes, the largest up to 4.7 magnitude. On May 2nd there was a 3.4 magnitude earthquake and on March 12 there were 3 more earthquakes. These quakes were felt as far away as Round Rock (Austin). These earthquakes have created new fault zones and enlarged old ones, providing new pathways for contaminates to travel.

3) During questioning at the Goliad hearing, UEC was not aware if there were fault zones in ore body. The UEC website states that "the Goliad structures include two faults that intersect and offset the mineralized units." I have attached a map of the UEC Goliad uranium ore body (see, "uec_goliad_project_map").

4) UEC talked about an "anomaly" in the aquifer that was creating methane gas that was replacing the oxygen in the aquifer and allowing the uranium to precipitate out in the reduced atmosphere, forming the ore body. But they did not know what this anomaly was or where the methane was coming from.

Methane is another word for natural gas. UEC's experts did not seem to understand that the current reduced environment is the result of methane leaking up the cracks in the on-site fault zone from deeper oil formations.

5) I ask the question, what is keeping the reducing gas from being flushed out to sea? The UEC experts did not know, they called it the "anomaly".

Some form of physical barrier is needed to create an area of stagnate flow, so that the methane atmosphere does not get flushed away, taking the uranium with it. This barrier can be clay formations, mudstone, claystone, siltstone or calcite concrete formations in the aquifer. In a some aquifers, the fault zone is perpendicular to the flow and can act as a dam.

6) During the hearing, I asked UEC about the bacteria present in the ore body. UEC appeared to be unaware of importance of bacteria in the ore body but they stated that they had heard about some theoretical studies about bacteria.

According to the 2017 study, "Biogenic non-crystalline U(IV) revealed as major component in uranium ore deposits", (https://www.nature.com/articles/s43247-023-00767-9), the authors state that the industry has historically believed that uranium is locked-up in uranium roll fronts by physical means. But this study shows that bacteria is actually the most common way that uranium is locked-up, "biogenic processes are more important to uranium ore genesis than previously understood" and "biological reduction maybe a dominant process in those systems".

The study says that "Pseudomonas, Geobacter and Clostridium species are capable of reducing U(VI) enzymatically to form non-crystalline U(IV). Our field data are in agreement with recent laboratory-based studies showing that biofilms of Geobacter sulfurreducens were able to immobilize and reductively precipitate U(VI) into non-crystalline U(IV) phase via bonding to carbon ligands." "While abiotically produced uraninite and coffinite were thought to be the major components of uranium ores, and are the basis for estimations of economically recoverable uranium from ores, this study shows that U maybe trapped primarily via biological reduction in roll-front deposits, resulting in high fractions of non-crystalline U(IV) bound to C either from organic functional groups or inorganic carbonate. Thus, non-crystalline U(IV) formed by direct enzymatic U reduction in ore formation maybe more important than previously thought."

Historically, the IN-SITU miners have believed that uranium was held in the roll front by abiotic (non-biological) reduction caused by aeration state, pH, organic matter, carbonates and phosphates. UEC's website says, "The formation of roll-front deposits is largely a groundwater process that occurs when uranium-rich, oxygenated groundwater interacts with a reducing environment in the subsurface and precipitates uranium". But new research shows that uranium is mostly trapped by biological processes (active bacterial uranium detoxification mechanisms including uranium reduction, phosphatases, membrane proteins, efflux and regulatory systems).

The solubility and mobility of U(VI) are significantly higher than those of U(IV) that makes it more environmentally harmful, particularly if it accumulates in the food chain. Biological reduction changes the uranium from U(VI) to the U(IV) form of uranium.

7) A quick search on-line shows there are many studies that demonstrate how microorganisms influence the mobility and toxicity of uranium through processes like biosorption, bioreduction, biomineralization, and bioaccumulation.

Biological remediation is considered to be the most promising method, as it is cost-effective and free of secondary pollution (Selvakumar et al., 2018; Lopez-Fernandez et al., 2021), which is mainly implemented through surface adsorption, internal accumulation, mineralization, and reduction (Newsome et al., 2014; Shukla et al., 2017). Of these, biological reduction has attracted increasing attention in the last 30 years due to the advantages of generating concentrated solid U(IV) since its first adoption to prevent the migration of uranium into soil and groundwater (Lovley et al., 1991).

There are many studies showing how bacteria can be used to clean up an aquifer. This website from Michigan State University shows how geobacter traps uranium. It has a video explaining what geobacter does it and how it can be used to cleanup uranium:

a) "These bacteria clean up radioactive waste I MSUToday I Michigan State University": https://msutoday.msu.edu/news/2021/bacteria-clean-up-radioactive-waste.

8) Studies of the inflow and outflow of undisturbed ore bodies showed that the radiation levels of the water leaving the bacterial zone was lower than the water entering the zone. This illustrates that bacteria not only traps radioactive contaminates but also acts as an on-going natural containment filter in the environment. The bacterial process is similar to what a home reverse osmosis water filter does but it uses a different ion exchange method.

This natural filter has protected the environment for millions of years because it is a living being that is capable of reproducing itself. And it will continue to do so as long as it remain undisturbed.

9) During the hearing, UEC appeared to be unaware of the importance of bacteria in the ore zone. Once IN-SITU destroys the anaerobic bacteria by oxidising the aquifer, it is uncertain that the bacterial ecosystem can be returned because the people who are doing the restoration are unaware or don't care about the existence of the living system and because there is no long-term monitoring allowed by the agencies (see "Monitoring" section below).

— Aquifer Extraction —

10) During mining, oxidising agents are injected into the aquifer in order to remove the reduced atmosphere. This makes the uranium ore mobile so that the "production" wells can suck out the oxidized uranium for processing on the surface.

The extraction process can create unbalanced pressures in the ore body and can force contaminates to migrate offsite. To remedy this, a "bleed stream" is used to increased suction of the production wells. This is suppose to create a "cone of depression" that theoretically pulls in any migrating ore back into the production wells before it can flow offsite. But this demonstrates a simplistic understanding of aquifer geology. The miners seem to believe that everything in the aquifer is like "beach sand" with homogenous porosity.

The miners believe that the distance between the injection and suction wells are close enough to form circulating loops that can confine the injected fluids to area between injection/suction well heads. But in a river floodplain environment, changes in the depositional conditions of sands can cause hydraulic conductivity to vary by a factor of 10 to 100. Since the injection/production wells are laid out in a precise, evenly spaced grid, the circulating loops between well heads do not always form because the well heads are not always located in areas with the greatest porosity. Pressures from the injected fluids will force fluids to always find the areas with the greatest permeability, bypassing the suction wells.

The miners try to control these errant flows with increased bleed stream suction but the agency incident files still show incursions even with increased bleed stream.

11) To stop migration offsite, a "bleed stream" is required to pull more water out of the aquifer than they are pumping in. The higher the bleed stream flow, the higher the amount of fresh aquifer water that has to be disposed of in the deep disposal well. Basically, they have to suck out enough water to create a cone of depression that covers the entire mine area including the monitor well ring. This essentially drains the local aquifer in the vicinity of the ore zone. This the same dumb and dangerous technique used by every strip mine and IN-SITU site ever built in Texas.

   a) The early strip-mines removed several hundred feet of overburden so they could mine in the aquifer and then they had to drain the aquifer so they could work the mine. The aquifer water was then dumped into the nearest river.
   b) IN-SITU sucks the uranium rich water out of the aquifer, strips out the uranium U_3O_8 and dumps the water into a deep injection well. The bleed

stream has resulted in millions of gallons of water wasted per mine.

12) The life of the mine is determined by the market price for uranium. If the market prices are low, then the company will process less of the ore. Profits determine the cutoff point for closing the mine. Generally on closing, 70% of the ore body will have been transferred to the surface, leaving behind 30% of the ore remaining in the aquifer.

Mining is only interested in the uranium U3O8 which is less than 2% of the total radioactivity that exist in the ore body. 98% of the radioactivity and all of the remaining heavy metals and contaminates remain are dumped down the deep disposal well.

This means at closure, 2 aquifers will be contaminated with highly mobile contaminates.

13) Because of the oil industry, Texas is the birthplace of deep well disposal. The oil industry wanted a cheap way to dispose of excess saltwater from oil well operations but it is important to understand that using deep wells to inject saltwater is not the same as injecting radioactive waste. Texas now has the highest number of deep wells in the world. In 2008, Texas had over 32,000 deep well injection sites.

Most states have outlawed deep well injection because it is dangerous. Because of industry lobbying, the Texas agencies do not allow monitoring of deep well injection sites so we have no idea what is going on.

14) Since the deep aquifers are under high pressure, anything liquid will continuously seek a path to lower pressures, like toothpaste being squeezed out the tube. It is the nature of uranium ore bodies to be formed in areas with faults zones. Local fault zones are an immediate escape route. As an illustration, when the Bruni mine first started injecting into the aquifer, hundreds of fountains appeared immediately because of unplugged exploratory wells. This shows how easy it is for high pressure fluids to travel once a path is available.

— Plant Processing —

15) The miners oxidise the aquifer to make the ore body mobile so they can suck it out of the aquifer and process it above ground. On the surface, the uranium is extracted by using an ion exchange unit. The ion exchange process is very similar to a home "Culligan" water softener. It removes hardness or calcium from the water by replacing it with sodium, using ion exchange resins. IN-SITU uses an ion exchange resin, which is comprised of little polymer beads that are charged particles having an affinity for uranium anions.

When the resin becomes saturated with uranium, they strip out the uranium from the beads making a slurry that is then squeeze out and dried to make U3O8 yellow cake.

16) During the ion exchange process, only the uranium oxide, U3O8, yellow cake is removed. U3O8 equals only 2% of the radioactivity in the ore. The other 98% of the radioactive and heavy metal toxic waste is left behind. This exposes the surface to radiation.

Environmental Assessments completed at several sites sites before mining started, showed surface background radiation levels were lower than the national average. Some of these sites had levels that were 2 times lower than national average. This suggest that it is safer to live on top of an undisturbed uranium ore body than other parts of America.

The holding tanks at the processing plant must be vented to atmosphere so that the tanks can be filled. They are a large source of radon gas to workers and anyone in the downwind direction. Radon is considered 2.5 million times more radioactive than it's parent, uranium. At U.S. Steel, leaching fluids contained an average radon content of 167,000 pCi/l (pico Curries per litter).

The In-Situ processing plant produce large amounts of solid radioactive sludge, filters, resins, plumbing parts and equipment that must be disposed in a nuclear dump. They are stored onsite until a large quantity can be assembled for shipment to a nuclear dump. Disposal cost are high and the companies frequently allow the waste to pile up to dangerous levels requiring the agencies to force the removal.

This waste used to be disposed of in the tailings ponds at Conquista and Panna Maria but they are now closed. I expect they are currently dumping the waste in West Texas at the low-level dump in Andrews county.

17) UEC permit covers a lease area of 636 acres, this is equal to one square mile in size. This area will be covered with miles of PVC piping that connect the processing plant to the leaching fields. Oxidized water is pumped to injection wells via PVC pipe and the uranium rich ore solution is sucked out of the aquifer and pumped to the processing plant via PVC pipe.

Because the leases are so big, it can take some time before a leak is discovered. And because the flow to and from the wells is so high, leaks can contaminate large areas before they are discovered. PVC breaks are a common occurrence.

The attached "History of Uranium Mining in Texas" and "Analysis of IN-SITU" reports document some of the worst incidents of spills that have occurred in Texas. At the US Steel IN-SITU mine outside of George West, the state agency records show that their pipes were particularly bad at breaking. US Steel did not report most spills, only the worst incidents were reported. 22 major spills were reported at the U. S. Steel showing a total of 1,200,000 gallons of radioactive spilled.

On 6/19/81, the largest surface spill ever recorded by the regulatory agencies, occurred at the US Steel's site when a fiberglass pipe ruptured spilling

850,000 gallons of leaching fluid. U. S. Steel reported to the agencies that only 100,000 gallons of fluid had spilled. It flowed from 4:00 a.m. to 8:00 a.m. before workers noticed it. It spilled out onto highway 59, forming a shallow lake. The ranchers that owned the land were shocked to read about it in the newspapers. Neither the company nor the agencies had notified them.

A 90,000-gallon spill of leaching fluid occurred at US Steel on 7/0l/80. <u>Gamma readings of the area pegged the Geiger counter needle, making reading impossible.</u>

– Monitoring –

18) The state law requires ongoing air and aquifer monitoring while the mines are operating but the agencies do not have the funds to provide full time monitoring, so they require the mining companies to do most of the monitoring themselves and then report the data to the agencies. This is obviously a big problem and the agency know it because their incident files contain hundreds of reports of lost data, falsified samples, altered records, covered-up spills, unreported excursions, illegal dumping, worker overexposure, and so on.

19) IN-SITU blindly depends on monitor wells to reveal what is happening in the very complex underground environment.
   i) The 6" bore hole of the monitor wells can only detect the small area in it's immediate vicinity.
   ii) The porous screening of the monitor wells are only 10' to 20' long but the ore bodies are 20' to 50' deep and the aquifer is much deeper.
   iii) The monitor wells are located 400' from each other and 400' from the ore body.

   <u>These monitors wells were designed to detect contamination in broad flow "beach sand" environments. Trying to detect contamination that is flowing in narrow paths is not something these wells were designed to do. **This means that most of the mine environment is unmonitored**.</u>

20) The IN-SITU "cone of depression" technology is flawed because it cannot be monitored. The complex nature of the aquifer geology makes it impossible to predict what is going to happen underground.

   During questioning at the hearing, I ask UEC if the geology in the aquifer was a river floodplain or a braided river environment. They said that it was a floodplain environment. A floodplain river environments contain coarse grained deposits of sands and gravels, but are typically dominated by fine grained silty or clay deposits. They are characterised by lower down-dip slopes and smaller flow velocities. This complex environment allows channels to form that are highly variable and very difficult to characterise with borehole data. These channels have higher porosities that allow faster flow rates.

   The industry acts like the aquifer is composed of uniform "beach sand" where all the material is all the same size and porosity. The natural flow rate of the

Goliad aquifer in the ore zone is only 8' a year. This defines the aquifer as a very, very slow moving river. Using the "beach sand" analogy, any contaminates should take 50 years to reach the monitor wells that are located 400' away from the ore body. But the fact that the agency's monitor well incident files show that contamination is detected much faster and more frequently than expected. Changes in the depositional conditions of aquifer sands can cause hydraulic conductivity to vary by a factor of 10 to 100. The river floodplain environment is a difficult a difficult environment to monitor.

— Mine Closure —

21) Closure of an IN-SITU mine is based on profits. Overtime, the concentration of uranium in the ore becomes less making it more costly to process. At some point it is not profitable to continue, so the mine will shut down and restoration begins.

22) A 2009 USGS study "Groundwater Restoration at Uranium IN-SITU Recovery Mines, South Texas Coastal Plain," came to the conclusion that none of the IN-SITU mines that ever operated in the United States were able to return their aquifers to their background levels.

It is also interesting to note that the study says that out of 77 IN-SITU mines that had operated in the US during this period, only 22 "final value" records could be found. What happened to the other 55 mine records???

23) Restoration of the mine is supposed to return the aquifer to the original baseline levels as required by the mining permit.

A 2014 study by UEC's Harry Anthony and Craig Holmes, "Groundwater Restoration at In Situ Uranium Recovery Operations (ISR) in Texas: A Regulatory Perspective on its Success", reviewed the baseline and restoration contaminates of 22 Texas uranium mines.

They claim that their reverse osmosis process can clean-up the aquifer to levels that are cleaner than the baseline levels that existed before mining begin. They make this claim without explaining that <u>most of the contaminates had been removed from the aquifer before restoration began because IN-SITU mining transfers approximately 70% of the ore (with it's contaminates) to the surface for processing.</u>

Even with only 30% of the ore remaining in the aquifer, the study showed that reverse osmosis could not clean-up uranium. <u>The average baseline for uranium levels before mining was an average level of .521ppm and after restoration, the reverse osmosis process could only return the uranium levels to .857ppm.</u>

<u>Considering that the earth's crust contains an average of **3 ppm** uranium, it is amazing that the environment around the uranium ore bodies was only **0.521ppm**. The Anthony study illustrates that the aquifer's living ecosystem is **1.6** times better at keeping the aquifer clean than what man can create. And the</u>

ecosystem is a free and permanent solution.

Their Anthony study showed that reverse osmosis lowered radon levels below baseline but this needs more explaining. Radon is a gas that comes from radioactive source materials like uranium. Treatment with reverse osmosis will lower the radon gas but it will quickly return because 30% of the uranium source material still remains in the aquifer. Reverse osmosis is a temporary fix that does not clean-up the radon.

The study also showed that reverse osmosis can restore arsenic, TDS, selenium, chloride, silica and potassium below the EPA Drinking Water Standards. This reflects the monitor well ring that is 400' from the ore body. Arsenic is a poison and must be monitored but selenium, chloride, silica and potassium are minerals used for nutritional supplementation, they may cause problems at high levels. High mineral salts can cause clay soils to lock-up if used for irrigation purposes.

Comparing the baseline water levels to the EPA Drinking Water Standards makes no since because 30% of the ore body remains in the aquifer after mining. The aquifer can never be used as a source of drinking water. It is more important to determine how mobile the remaining ore is because the down-dip environment may be facing the increased threat of migration. This requires long-term monitoring but the agencies require all the monitor wells to be plugged at closure.

24) At the hearing, I did not get a chance to ask the TCEQ about the closure requirements. The "Uranium mining In Texas" report was written in 2008 and at that time, the permit allowed the mines to close their site if the monitor wells did not show any increase in contamination over a 3-months period (this period could have changed by now). Once the "no contamination" is met, the restoration can be stopped, the monitor wells will be plugged and the site closed.

This raises some serious questions about the short "3-month, no contamination" window:

a) The average Goliad aquifer flow rate is 8' a year. This means that most of the aquifer as a very, very slow moving river. If you use the "beach sand" analogy that her industry believes in, it would take 50 years for contaminates to reach the monitor wells that are located 400' away from the ore body. In this slow moving river, how is a "3-month" window supposed to detect any contaminates during the short period.

b) The river floodplain environment is mostly a very slow moving river but it also contains narrow, fast moving channels. The monitor wells are designed to monitor broad flow environments, not narrow channel flows. With this monitoring setup, the "3-month" window is probably not going to show any narrow channel increases in contaminates since the miner is required to shut down injection in problem areas of the mine in order to stop offsite migration.

c) During restoration, if there is any migration of contamination detected in the monitor wells, the miner is required to stop the offsite migration. The only way to do this is to reduce or stop injecting fluids into the problem areas. This means that the porous, fast moving channels of the mine can be shut down at will. Since the miner is responsible for monitoring and reporting the monitor well data to the agencies, it is possible to "adjust" the injection rates so that it appears that the "3-month, no contamination" closure requirement is met. Once the mine is closed, the low porosity channels are free to flow once again but since the monitor wells will be plugged and we will never know what is happening.

d) The fact that the agency incidence files show contamination of the monitor wells is more frequent than expected, indicates that these narrow channels are common and infers that there is a lot more contamination that is not being detected.

24) UEC believes that replacing the reduced environment in the aquifer is enough to lock-up the ore long-term but we will never know because all the monitoring wells will be plugged.

The new studies show that aerobic bacteria is the main force holding the ore body in place, not the reduced environment. Since oxidation kills off the anaerobic bacteria, there is no evidence that the necessary anaerobic bacteria will return after mining and the lack of long-term monitoring wells means that we will never know.

To protect the groundwater and the surface environment, we must leave the aquifer alone.

25) I seems that the UEC's closure plan is a sham to cover up the fact they expect the ore to migrate.

a) In the river floodplain environment, contamination can travel at faster in the lower porosity channels. Since there is no long-term monitoring, any offsite contamination can be argued to be the result of naturally occurring sources and not leakage from the mine. The lack of long-term monitoring will guarantee that there will be no data available to prove liability.

b) If it takes longer for any contaminates to be detected offsite, the owners of the mine will have made their money and be long gone.

We need long-term monitoring at these sites to insure public safety and to hold the industry accountable for any damage occurring now and in the future. Without long-term monitoring it is impossible to protect our environment and health.

— Health Effects —

27) Uranium mining is only interested in removing U3O8 from the ore and that amounts to less than 2% of the total radioactivity that exist in the ore body. <u>98% of the radioactivity and heavy metals remain after mining is finished.</u> This includes thorium-232, potassium-40, and thorium 230, radium, radon, arsenic and other toxic and radioactive substances. These elements have very long half-lives, meaning that after one half-life has passed, only half of the radiation will be gone. Thorium 230 is has a half-life of 78,000 years, meaning that after 78,000 years,

only one half of the radiation will be left.

28) UEC told the people at the meeting that it was ok to drink the water from their wells that are located in the vicinity of the ore body. They even suggested that it was ok to drink the water in the uranium ore body area???

This is absolutely irresponsible, all wells water should be tested before they are considered safe to drink. A uranium ore body is absolutely not an acceptable source for agricultural or human use.

How can we trust these people to protect us when they don't know what it is that they are suppose to be protecting us from???

a) We are continuously exposed to small levels of radiation from our environment. On page 9 of my "Uranium mining In Texas" report, I explain the health effects of low level radiation exposure.

<u>The earth's crust contains an average of **3 ppm** uranium and seawater contains approximately 3 ppb. According to the Anthony study mentioned above, the average baseline uranium level of water surrounding an undisturbed ore body averages **0.521ppm.** The aquifer living bacterial ecosystem keeps the uranium flowing out of the ore body much lower than exist in the earths crust.</u>

Natural background radiation exposure measures about 0.2 mrem (millirem per hour) of gamma radiation. Radon is the second leading cause of lung cancer after smoking, causing approximately 21,000 lung cancer deaths annually in the US, with risks increasing with radon levels and exposure duration. The EPA recommends keeping exposure to less than 4 pCi/L. The Anthony study mentioned above, shows that baseline levels of radon levels tested on the perimeter of 22 undisturbed uranium ore bodies in Texas ranged from 19 to 274 pCi/L but since these ore bodies are 200' below the surface, no exposure is likely unless you are are using it as drinking source. Flatonia, Texas, has the highest radon levels in their water supply, as high as 9,000 pCi/l. The city water department treats the high radon levels by simply airing out the water. The radioactive source material that emits the radon, remains below ground and is not a threat.

It is important to understand that there is no safe level of exposure to radiation. Even at background levels, the EPA estimates that 10,000 to 30,000 people will die each year. <u>Radon is considered 2.5 million times more radioactive than it's parent, uranium</u>. Because radiation is invisible, it is necessary to remain aware of the danger in order to insure good health.

In the past, the government attempted to cover up and prevent radiation health studies in the interest of national security. According to many experts, the Federal bomb priority has probably resulted in the killing of more people than all the world wars.

b) The undisturbed ore is usually buried more than 200' below the ground. The tons of earth that cover the ore form a perfect radiation shield. Environmental Assessments completed at several sites sites before mining began, showed surface background radiation levels are lower than the national average. At some sites the levels were 2 times lower than national average. Living on top of an undisturbed ore body in South Texas can be safer than living elsewhere in the U.S in terms of exposure to surface levels of gamma radiation.

c) The migration of radioactive product in the aquifer in an undisturbed ore body can be very low. Assessments completed at mine sites before mining began show that the aquifer surrounding the ore is generally free of the high contamination levels that exist inside the ore deposit. During mining the uranium and contaminates are highly mobile and the state agency incident files shows that the migration of offsite contamination is common.

d) Today, the most serious threat to radiation exposure is not from naturally undisturbed ore bodies but from IN-SITU mining itself. Tightly bound up uranium ore bodies do little harm as long as the public is aware of their location and does not drink directly from the ore body.

During mining, the ore is brought to the surface where it becomes available for direct exposure to the public by wind, water and food. After mining, the ore that remains in the aquifer and can migrate causing a serious long-term invisible threat that is not easy to monitor or repair.

— Agency Problems —

29) The agencies have a history of simply increasing the contamination levels allowed by the permit whenever a company can not meet the permit requirements.

An examination of 32 permits from closed Texas In-Situ mines showed that in each case, companies were permitted to leave behind higher levels of contaminants in the groundwater than were allowed in the permit (Corpus Christi Caller-Times, Nov. 5, 2006). In some cases, companies were able to meet the restoration target for one mineral but reported 10- and 20-fold increases in others.

Early on, the agencies understood that reverse osmosis process used in IN-SITU processing and restoration would require enormous amounts of clean water to do so. So the agencies came to the conclusion that it was better to "relax" the closure standards instead of draining precious aquifer resources.

But this continual "relaxing" of the requirements has allowed higher contaminate levels to remain in the aquifer.

30) The state's regulatory agencies do not consider themselves researchers and they are not receptive to outside advice. In contrast, the agencies are totally accepting (and dependent) on industry-sponsored studies that only show how safe mining is. The uranium industry has existed for 70 years and as far as I know, the agencies have never denied a permit.

31) The agencies have never released any information to the public about the serious problems this industry has created because they don't feel that this is their job. They are in-charge of regulating the industry and they know what is best what is needed. Experience tells them that if they do inform the public, they become

alarmed because they do not understand radiation. They need the public to feel safe because an alarmed public will demand accountable.

The director of the Bureau of Radiation Control was quoted on the San Antonio TV news saying, "The public does not understand radioactivity, they just get excited when you talk about it. It's best not to say anything". Because of this, the public is unaware of the damage that this industry has created. This has kept the public pacified and the state legislators uninformed.

32) The uranium industry has always been a secretive industry, publicity is their enemy. They cannot continue making money if the true cost to the public is made public. Public health has been harmed and aquifers have been destroyed but the public remains unaware. Because of this, the miners have never been held accountable for their actions and have never had to pay the true cost of clean-up.

32) The agency boards are filled with political appointees that are pro-business and anti-public service. The agency personal are trying to do their job but are overruled by industry boosters on the boards.

The state government is run by pro-business politicians that don't understand that all business is not good business. They continue to fill the boards with industry personnel that are supposed to be protecting the public but are only looking out for themselves.

33) The current regulatory oversight for IN-SITU projects falls under the jurisdiction of the RRC and TCEQ, which regulates mining operations and the extraction of minerals and provides mine permits and radioactive material licenses. In the past, other agencies had regulatory authority over the uranium industry. The Bureau of Radiation Control and The Low Level Waste Authority have been closed down by the Texas Legislature after review showed poor performance and lack of public oversight. The current political party of Texas has done a miserable job of protecting the public but this will change when the public gets tired of the politicians self-serving attitude.

— Other Concerns —

34) Oxygen is a very reactive element and UEC is mixing it with methane in the aquifer? Has anyone considered that oxygen and methane are used as rocket fuel and this combination would make an excellent bomb.

— UEC History and Current Projects —

UEC is a Canadian corporation The company was formed in 2003. It was formerly known as Carlin Gold, Inc. and changed its name to Uranium Energy Corp in 2005 and traded as an over the counter stock in the US (TSX:URE). It has offices in Vancouver, BC; Corpus Christi, TX and Casper, Wyoming. UEC and URI are the same company.

The first IN-SITU mine in the world was built by the Utah Construction and Mining Company in 1963 in Shirley Basin, Wyoming. The second and third mines were the Palangana and the Bruni mines in Texas. The Palangana and Bruni were disasters from the very beginning (see the attached "Uranium mining In Texas" and the "Analysis of IN-SITU Uranium Mines").

A 2006 article, "Reversing Mother Nature", by Stock / Interview.com, showed that Harry Anthony was the Chief Operating Officer and Director of UEC (I was told by UEC during the hearing that he now retired). Mr Anthony was a mechanical engineer involved in designing a majority of IN-SITU technologies worldwide. This 2006 article also states that Mr Anthony was involved with the Palangana (starting in 1976), Bruni, Benavides, Kingsville Dome and Rosita IN-SITU projects in Texas. Anthony's consulting work has taken him to IN-SITU projects in Kazakhstan, Uzbekistan and the Czech Republic. He has also been involved in these URI sites: Tenneco West Cole, Conoco Trevino, Caithness Minerals, Cameco's Crow Butte ISL, and the Alta Mesa.

a) The Palangana, Bruni and Kingsville Dome sites had their groundwater restoration permits "relaxed", allowing higher levels of contaminates that could be left in the aquifer so the mines could be closed.
b) The following 2009 interview with Roland Burrow, a former Kingsville Dome well field operator about the problems with the site, "https://www.youtube.com/watch?v=p7BcnzLOFCQ"
c) In 2018, the Supreme Court of Texas ruled in complete favour of URI and denied Kleberg County any further relief. Kleberg County was attempting to get URI to return the aquifer back to the lowest possible levels as shown by the baseline wells.
d) The Wise Uranium Project website list the history of IN-SITU mines in Texas including all the UEC / URI mines and their on-going problems, "https://www.wise-uranium.org/umopusa.html" and "http://www.wise-uranium.org/udusail.html".

The UEC website currently list one operating processing plant and 4 mine sites that are awaiting permitting:

e) The Goliad site exploration was started by Coastal Uranium in 1979 and then it *was bought by Moore Energy in 1980. UEC bought the site in 2006.* The Goliad project leases comprised of 636 acres. The area is about 14 miles north of the town of Goliad.
f) Palangana was originally started as a conventional underground mine by Pittsburgh Plate Glass Corp in 1952 but shut down because of on-going issues with hydrogen sulphide gas. Union Carbide Corporation bought the site in 1958, converting it to a test facility for the new method of IN-SITU leaching. UEC's Harry Anthony started working at Palangana in 1976. The site was shut down in 1979 after mining only 314,000 lbs of uranium because of on-going problems with the IN-SITU technology.

   Chevron bought the site in 1981 and in 1991, Chevron transferred ownership of all their mining properties to General Atomics. General Atomics was in the business of providing the "service" of removing the liability of "deep pockets" corporations (see "Uranium Mining in Texas" report).

The site was allowed to close by the regulatory agencies in 1999 after a long and unsuccessful attempt to restore the aquifer back to the permit requirements. This practice of "relaxing" of the permit requirements started with this mine and is an on-going issue with the state agencies.

In 2009 UEC bought the site. According to the UEC website, the Palangana produced 563,600 lbs U3O8 from 2010 to 2016. It is unclear if UEC had a license to mine this ore or if this was part of a clean-up process.

Palangana is comprised of 6,987 acres and is located in Duval County, Texas, 25 miles west of the town of Alice and 5 miles north of the town of Benavides.

g) Burke Hollow was originally built by Mobil Corporation in 1982. Total Minerals bought the site in 1993. Total is a French company, 38% owned by the French government. Then by UEC bought the site in 2011. The site consists of a 19,336 acre lease area. The project area is about 18 miles southeast of the town of Beeville.

h) The Salvo site was owned by Mobil Corporation until 1983 when they sold it to Uranium Resources Inc. (URI), a joint venture with Saaberg Interplan Uran Gmbh. The site was sold to R.B. Smith & Associates Inc. in 2005 and then UEC bought it in 2010. Salvo mineral lease is 800 acres. The Salvo project area is about 10 miles south of the city of Beeville. Salvo is located in an area of Texas that has extensive farming activity and has a high level of crop cultivation.

i) Hobson CPP was constructed in 1978 when the site was IN-SITU mined. In 2008, the plant was refurbished. The Hobson CPP has previously processing uranium from the Palangana and UEC plans to also process uranium from the Burke Hollow, Goliad and Salvo facilities in the near future

— Closing Remarks —

The history of uranium mining in Texas is a gold rush story of an industry cobbled together by prospectors, speculators and wildcat oilmen. Although some have richly benefited from this industry, it has left the local populations poorer and sicker. Uranium mining is a boom and bust industry that provides few jobs and leaves behind enormous long-term problems.

Most of the ore mined in Texas is shipped to foreign countries for their nuclear programs. UEC is a Canadian company. The French company, Total Inc., mined uranium ore in Texas for years. This company is a front company for the Electrical Company of France and because France is a socialist country, these companies are 38% owned by the country of France. The French continually claims that nuclear power is clean and safe. While France gets to have "clean" nuclear power, we are stuck with their waste.

It has been suggested that nuclear power is the answer to our energy problems and global warming. It must be understood that nuclear power is not a renewable resource. It is believed that there is only 30 to 60 years of uranium ore left in the ground. To exchange 60 years of nuclear power for hundreds of centuries of environmental contamination makes no sense, especially when other, cleaner alternative energies are available. The hidden cost of mining far exceeds any perceived benefits.

The agencies are caught between serving the public or the industry. I believe the agency and its personal are trying to do their job but they are being influenced and overruled by industry boosters on the boards and one-sided information from the industry. The industry only care about profits and they are only looking out for themselves. How does society advance if everyone is only looking out for themselves.

The TCEQ must be take responsibility and shut down this dangerous industry.

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URANIUM MINING IN TEXAS

Overview of Mining in Texas

Texas Energy Alliance
2008

In 1954, a San Antonio oil company was using an airplane to prospect for minerals over the mesquite and cactus terrain of south Texas. During one of the flyovers, the onboard radiometric instruments detected an unusual radiation spike. Once on the ground they were able to narrow the location to a small, brushy patch of farm land just west of Falls City, Texas. To their surprise, the Geiger counter buzzed with activity. On further testing, they discovered that commercial ore-grade uranium existed just a few feet below the surface. This shallow location was unusual because uranium ore is usually found deep underground, not on the surface. Apparently the soils in this area had eroded away over time and exposed the ore.

This site became the Susquehanna mine, the first uranium mine in Texas. Although it was the only place in Texas where uranium was found on the surface, the discovery created a wild "gold rush" fever over the possibility of uranium so plentiful that it could simply be picked off the ground. Lone prospectors, wildcat oilmen, and large energy corporations began frenzied exploration in an effort to stake their claim. They hastily cobbled together makeshift mining operations with little understanding the dangers posed by uranium mining. This era has become known as Texas' second "Spindletop" boom but because of the secret nature of the uranium industry, the public heard little of this activity.

Uranium Mining Sites in Texas.

During the early days of the nuclear age, little was known about the dangers of radioactivity. This was the "cold war" era and the fear over national security was very real. The government retained ownership of uranium in the US and controlled its mining by setting the ore's price. In order to insure the atomic bomb program, the Federal government strictly enforced the National Security Act. This Act stifled public information and limited research on radiation health effects. A special branch of the Federal government actively worked to defeat public lawsuits over nuclear issues. With direct help from the government the mines prospered in secrecy for the first 26 years. Free from public scrutiny and

government regulations, approximately 19 uranium strip mines operated in the state during this time. Very little is known about these early companies or their operations.

Over time, large-scale environmental damage occurred as the companies used the environment to work out their engineering kinks. These abuses increased until public outrage forced the state to pass legislation in 1975 creating government oversight of uranium mining in Texas. The law provided some very needed protection by establishing state agencies to regulate the industry but it did not address any of the problems that had been created by mining. Instead the law required that the state agencies figure out how to deal with the problems (see the "Inadequate Protection" section below). Unfortunately, by providing the specter of government oversight, the regulations served to pacify the public's concerns about uranium and this allowed the industry to use their political power to influence the agencies and continue to grow unabated.

The industry grew and their profits increased until 1984, when the market for uranium "yellow cake" ore crashed due to the decline of nuclear power plant construction and a flood of cheap ore from reprocessed Russian nuclear weapons. Because of the worsening market, many small companies sold out to large energy companies or formed alliances with foreign-owned conglomerates.

According to a report written by the Texas Department of Agriculture (TDA) in the 1990's, a total of 23 uranium-mining companies have operated in Texas. For the first time, this report gave some idea of the size of the industry:

1) Uranium mining operations covered 18 South Texas counties: Atascosa, Bee, Brooks, Duval, Goliad, Gonzales, Hidalgo, Jim Hogg, Jim Wells, Karnes, Kleberg, Live Oak, McMullen, Nueces, Starr, Webb, Wilson, Zavala.
2) 40 strip mine sites were permitted covering over 31,000 acres of land. This included four (4) uranium mill-tailings ponds.
3) 80 In-Situ mining sites were licensed. In-Situ is a new technology that uses surface wells to mine the aquifers with solvents. These sites contained 20,000 individual solution wells.
4) 32 deep well injection sites were permitted for the In-Situ mines in order to dispose of their radioactive waste and contaminates into deeper aquifers.

Current Status

The current energy crisis has created a new push for nuclear power plants. As a result, the price of uranium ore has increased over 500% in the last 5 years. Today, uranium fever has returned to South Texas with a vengeance. Uranium has become the new darling of Wall Street as promoters push uranium as the next get-rich-quick scheme. The exploratory drilling for new ore fields is in full gear. New mines are being permitted and long closed mines are being rushed into permit. New international players have entered the picture.

Foreign influences such as the French Government, have invested heavily in Texas because they need a dependable, non-third world source of fuel for their nuclear power plants. They have hidden their involvement in large multinational conglomerates. The French promote nuclear power as a safe source of energy but in reality, they are not paying the true cost of this technology. The uranium is mined and

refined here before being shipped abroad. This leaves behind massive amounts of perpetually radioactive wastes in the US.

Because of increasing lawsuits, the mining companies are now fully aware of their liability exposure and have become expert at hiding problems and corporation assets. The large energy companies (Mobile, Exxon, Gulf-Chevron, Conoco-Dupont) have closed down their mines and removed them as far as possible from the waste they have created. Chevron has transferred their entire uranium holdings to General Atomics, a company that specializes in "liability conveyance". By shifting ownership they have lowered their exposure to expensive lawsuits.

Mining Problems

A quick overview of the problems with uranium mining:

1) In Texas uranium ore bodies are found underground in aquifers. Here the radioactive and hazardous materials in the ore body are tightly locked up and unable to migrate. Mining exposes the ore to oxygen, which makes the uranium and its toxic byproducts mobile. *This migration threatens the aquifers of South Texas.*
2) Mining for uranium involves the removal of uranium oxide from an underground ore body. The ore body is composed of less than 2% uranium oxide. *The waste that remains after the uranium oxide is removed contains 98% of the radioactive and hazardous materials.* This includes thorium-232, potassium-40, and thorium 230, radium, radon, molybdenum, arsenic, selenium and other toxic and radioactive substances. This material is left behind in the environment.
3) Most strip mines pits were abandoned by the companies and left open to the environment for years. *The state spent over 10's of million of taxpayer dollars filling in abandoned uranium mine pits before the problem of oxidation and migration could be addressed.*
4) There were four uranium-processing mills that serviced the mines in South Texas. The mills used sulfuric acid to dissolve the uranium out of the ore. The radioactive acid waste was dumped into "tailings ponds" which were little more than aboveground enclosures made of mounded earth berms. The four tailing ponds now *contain over 27,000,000-tons of solid hazardous and radioactive waste and untold amounts of radioactive liquid waste*. The state allowed very dangerous out-of-state military and industrial waste to be dumped at these sites. The D.O.E. has expressed concern over the scope of the dumping and the levels of "hot" materials that were allowed.
5) Texas regulators allowed the Conoco-Conquista tailings pond to become the unregulated nuclear dump for the state of Texas. This site was never licensed and was in clear violation of the law because did not contain a suitable geology as required by Federal law; a shallow aquifer existed only feet below the bottom of the pond. Several states were allowed to dump their non-mining, "very hot" nuclear waste at the Conoco pond. Now that the Coquesta is closed this same waste is being sent to the "high level" nuclear site facility in Hanford, Washington.
6) Many more millions of tons of hazardous liquid chemicals were dumped into these tailing ponds but the exact amount of fluids is unknown because the companies were not required to

keep accurate records. All the ponds have leaked and most of the radioactive liquids have entered into the aquifers.

7) The state regulatory agencies have not required the mining companies to properly isolate the nuclear waste stored in the tailings ponds. They have allowed the mining companies to simply cover these aboveground waste mountains with a few feet of clay as the only protection against the elements. This is in spite of the fact that Federal law requires that they meet a 100,000-year intrusion requirement. Further, in order to demonstrate proper enclosure, the Federal Government set the example by reclaiming the Susquehanna tailings pond at Falls City, Texas. This was the first reclamation in the state and includes both a clay cap and a rock bolder cap to help prevent intrusion over the 100,000-year period.
8) The state has not required any cleanup of the aquifers contaminated by the tailings ponds as required by the original mining permit.
9) Texas is the birthplace of the new uranium mining method called In-Situ mining. The technology uses water well technology to inject solvents into the aquifers where the ore bodies are found. The state licensed this technology without any independent studies showing that it was safe to operate. Instead they depended on company data as proof of the technologies dependability. Years later, this data turned out to be completely wrong but it was too late to change the rules because the industry was already too well established (see the "Bruni-Westinghouse" section below). Currently, *Texas has the largest concentration of In-Situ mines in the world.*
10) In-Situ mining oxidizes the uranium ore body the same way strip mining does (see lines 1 and 2 above). This toxic and radioactive material is free to migrate in the aquifers but unlike tailings ponds; this waste is unavailable for direct reclamation because it is located hundreds of feet underground where it is difficult to monitor or access.
11) The In-Situ mines are allowed to dispose of their nuclear waste with deep well injection into lower aquifers. Texas is the birthplace of deep well injection and today has the largest concentration of deep well injection sites in the world. Injection was originally used to dispose of salt water from oil wells but Texas has expanded the use to include the dispose of radioactive waste from uranium mines. Most states have outlawed deep well injection because it is inherently unsafe.
12) As if to insure that no one will find a problem, the regulatory agencies do not allow the monitoring of the aquifers below the In-Situ mining zone. Because of this, no one knows what damage has occurred to the deeper aquifers from deep well disposal.
13) So far, the state has allowed 32 of the In-Situ mines to close down without returning the aquifers to the original levels as required by their permits.
14) Five In-Situ mines were allowed to dispose of their radioactive waste by spraying it directly onto the ground even though the EPA and the employees of the state regulatory agencies opposed the practice. *One of these sites was on the shoreline of Lake Corpus Christi, the drinking water for a million people. The agency personnel estimated that 50% of the radioactive waste wound up in the shallow aquifer that was connected to the lake.*

Inadequate Protection

The state regulators police the industry by writing the rules that the industry has to operate under. These rules have to be continuously rewritten because of the continuous and ongoing problems that occur. This

patchwork of regulations reflects the industries' dangerous trial and error method of mining and demonstrates the problems that are inherent with this technology.

Once the rich ores are removed, the mines are no longer profitable to operate and the companies want to close them down but the ore bodies that remain are now oxidized and the underground waste remains mobile. It has become clear that there are no technologies available that can return the waste to its original lockup state. So far, the state has allowed 32 of the In-Situ mines to close down. *All of them have been allowed to close without returning the aquifers to the original levels required by their permits!* The early In-Situ sites, which used ammonia and acid solvents, were allowed to close down with basically no cleanup. The Bruni mine in Webb County was allowed to close down even though aquifer contained approximately 4,330 lbs of ammonia per 40 square feet of aquifer. The new In-Situ process tries to deal with this problem by using huge amounts of fresh water to flush out the remaining ore from the aquifer and then disposing of it by deep well injection. No only does this waste valuable fresh water aquifers but this technique has shown that it is not capable getting anywhere close to returning the aquifers to their original background levels. The underground geology is so complicated that ore remains in the aquifer, available for future migration.

Today, the agencies deal with these problems by simply changing the rules so that increased contaminate levels are allowed. This allows the companies to close the mines before any further increases in contamination can be noticed.

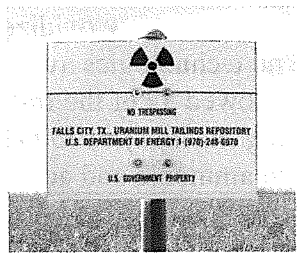
This waste will remain a threat for hundreds of thousands of years and *yet the state does not require any long-term monitoring of the aquifer so we can determine what level of migration are occurring!*

Because the cost of cleanup is so expensive, the regulatory agencies feel it is necessary to allow cheap, Band-Aid fixes in order to keep the companies from going bankrupt, thus saving the taxpayer the cost of cleanup. But time has shown that these easy fixes do not work and are simply postponing the problem to some future generation. This attitude reflects the agency's pro-nuclear stance. But more important, this illustrates how politically effective the industry has become at installing "business friendly" commissioners on the agency boards in order to enforce industry concerns. These commissioners have the ultimate power to affect agency policy but have repeatedly demonstrated their indifference to the public's concern.

Today the local public and their elected officials are fighting to stop new mines from being built but because the mining is occurring in rural areas with low populations, they cannot raise the political muscle to stop them. As a result, *the agencies have never denied a permit in 60 years of mining*.

Apparently the state agencies cannot decide whether their allegiance is to industry or the public. Their pandering to industry has resulted in the failure to protect the public and the environment. The government must stop propping-up this industry so that it can be exposed for what it really is: unsafe, unsustainable, and unprofitable.

A Warning



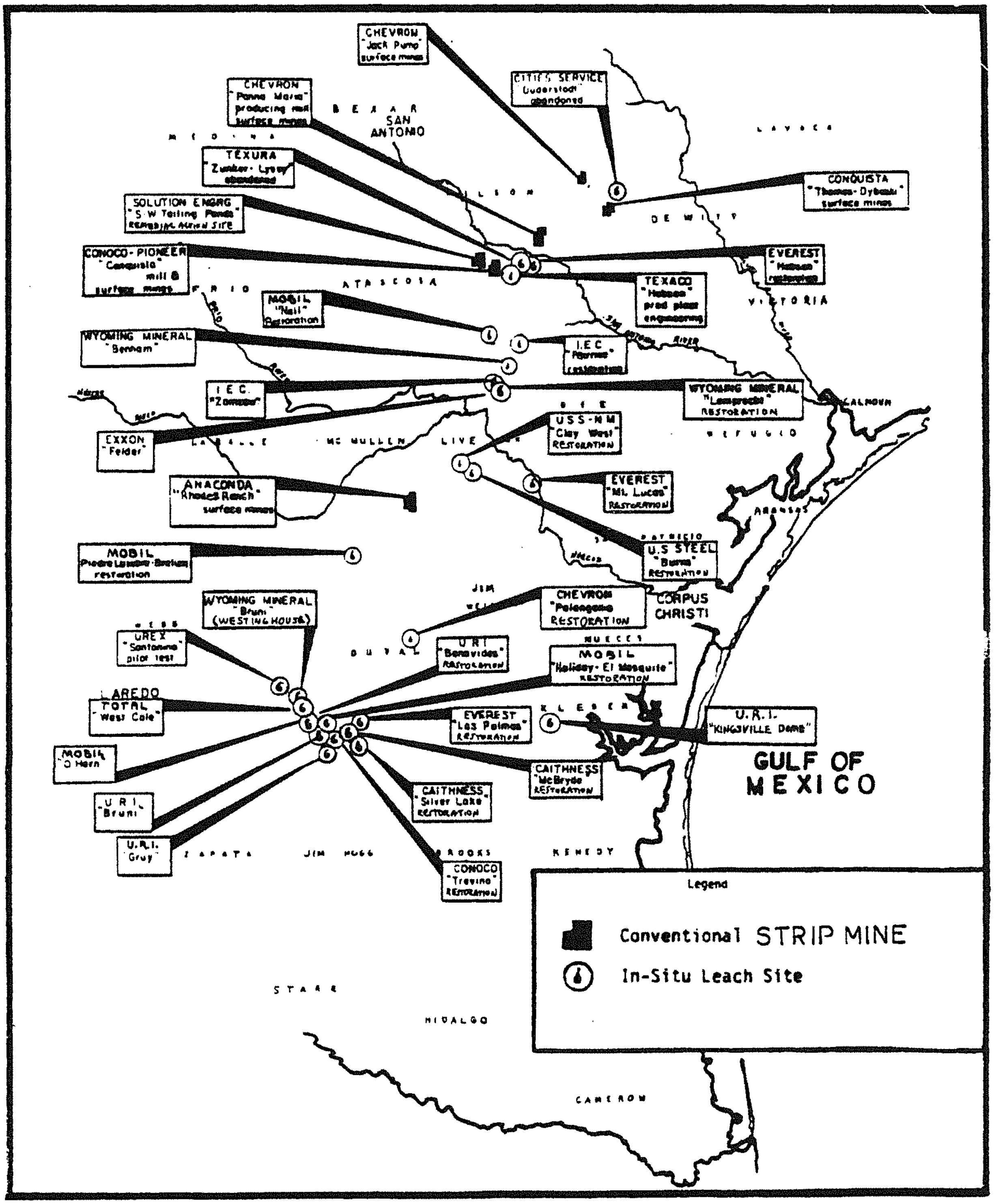
It has been suggested that nuclear power is the answer to our energy problems. This opinion is based on industry propaganda, not on facts.

- •) The nuclear power generation is a piece of a 3-part cycle:
  1) Mining and milling;
  2) Nuclear power and bomb making;
  3) High- and low-level waste disposal.
- •) All these cycles produce waste that cannot be disposed of safely. Once created, the radioactivity cannot be turned off and remains a perpetual threat. Institutions, governments or religions will not last long enough to safeguard future generations from the waste.
- •) There is an estimated 7,000 radioactive contaminated sites in the U.S., containing 1,700,000,000,000 gallons of contaminated water and about 40,000,000-cubic meters of contaminated soil. It was estimated in 1999 to cost between $373 million and $1,694 trillion to cleanup these sites in the U.S. alone.
- •) Some estimates say that there is less than 60 years of uranium left in the ground. To exchange a few years of nuclear power for hundreds of thousands of years of environmental problems makes no since especially when there are cleaner and safer alternative energies available.

The Navajo Nation in the four corners area (New Mexico, Utah, Colorado and Arizona) has set an example by banning uranium mining in 2005. This area has some of the richest uranium ore deposits in the world, as well as some of the worst uranium mining devastation.

Uranium mining is a boom and bust industry that provides few jobs and leaves behind enormous environmental problems. The hidden cost of mining far exceeds any perceived benefit. When considering energy sources for the future, it is important to remember:

If it is not sustainable, it's not a solution



Uranium Recovery Facilities

Table 9 - ISL Proposals, Trials and Mine Sites in Texas[1]

Site	Company	Notes & Status
Alta Mesa	Cogema Mining	Announced plans
Benavides	Uranium Resources Inc.	Wellfield undergoing restoration, plant decommissioning
Besar Creek	Rocky Mountain Energy	Early 1970's trial of sulphuric acid
Boots/Brown	U.S. Steel	Unknown
Bruni / Sulfur Creek	Westinghouse	Wellfield restored, plant decommissioning
Burns Ranch / Clay West	U.S. Steel	Wellfields undergoing restoration, plant decommissioning
Dunderstadt	Cities Service	Trial of sulphuric acid ISL, operated from 1969 to 1970.
Hobson / Gruy	Everest Minerals	Wellfield undergoing restoration, plant on standby
Holiday-El Mesquite	Malapai Resources	Wellfield undergoing restoration, plant on standby
Kingsville Dome	Uranium Resources Inc.	Operating facility
Lamprecht / ZamZow	Intercontinental Energy	Wellfield in restoration, plant decommissioning
Las Palmas	Everest Minerals	Wellfield restored, plant decommissioning
Longoria	Uranium Resources Inc.	Unknown
McBride	Caithness Mining	Unknown
Moser	U.S. Steel	Unknown
Mt Lucas	Everest Minerals	Wellfield undergoing restoration, plant decommissioning
Nell	Malapai Resources [3]	Unknown
O'Hern	Malapai Resources [3]	Wellfield and plant on standby
Palangana	Chevron (Union Carbide)	Unknown
Pawlik	U.S. Steel	Unknown
Pawnee	Intercontinental Energy	Unknown
Piedre Lumbre	Malapai Resources [3]	Unknown
Rosita	Uranium Resources Inc.	Operating facility
Santonino	Urex Inc.	Unknown (at trial stage in 1984)
Tex-1	Everest Minerals	Wellfield undergoing restoration, plant decommissioning
Trevino	Conoco Inc.	Unknown
West Cole	Cogema Mining	Wellfield undergoing restoration, plant decommissioning

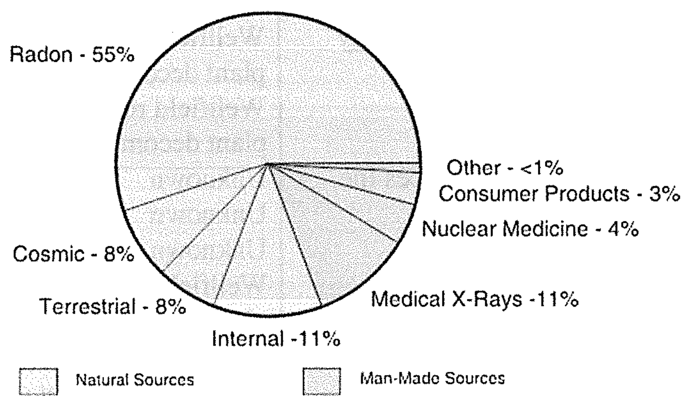
[1] - compiled from Charbeneau (1984), Larson (1981), USEPA 1995, Underhill (1992), Nigbor *et al.*, (1982), USDoE (1995), USDoE (1997) & USDoE (1998).

[3] - Exact current ownership unknown, assumed Malapai Resources acquired the sites when they bought out Mobil's interests in uranium (Moody, 1992).

What are the Environmental and Health Risk from Uranium Mining?

We are continuously exposed to small levels of radiation from our environment. The earth's crust contains an average of 3 ppm uranium and seawater contains approximately 3 ppb. This natural radiation is known as background radiation and it measures about 0.2 mrem (millirem per hour) of gamma radiation. It is important to understand that there is no safe level of exposure to radiation. Even at background levels, the EPA estimates that 10,000 to 30,000 people will die each year. Because radiation is invisible, it is necessary to remain aware of the danger in order to insure good health.

Sources of Radiation Exposure in the United States*



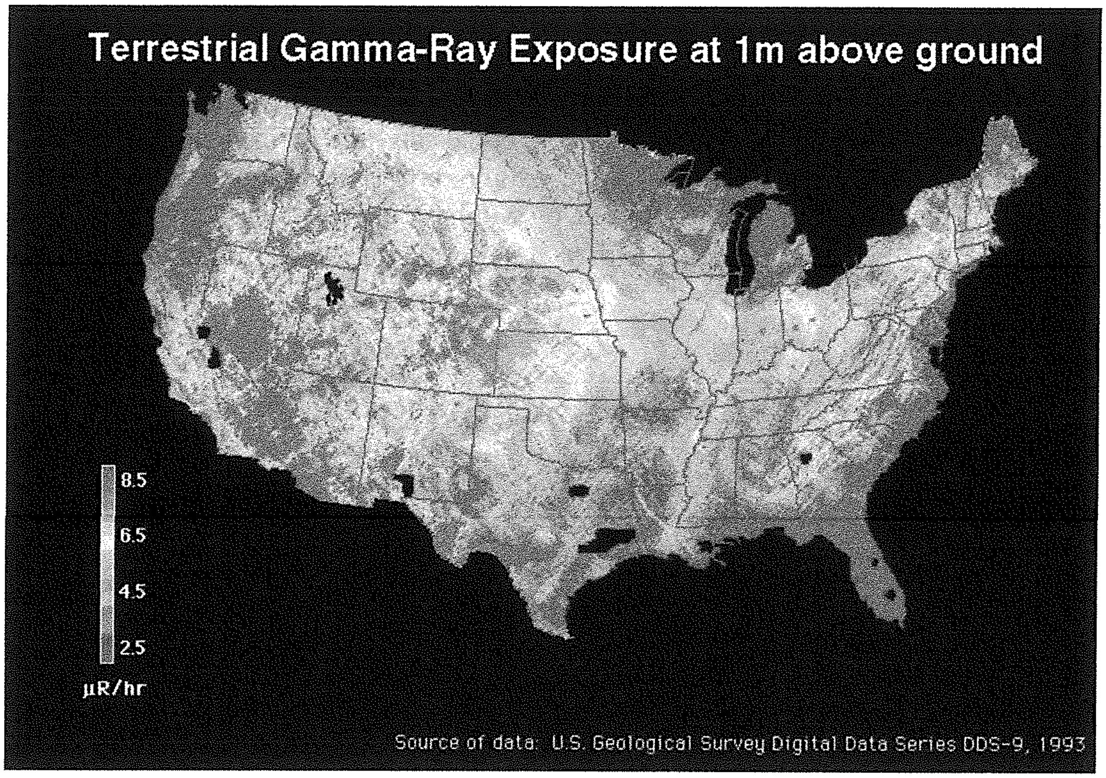
The industry continually stresses that because of the naturally occurring uranium ore bodies in South Texas, background radiation levels are naturally high and because of this, there is no increased health risk form mining. This is misinformation. It is important to realize several things about the South Texas background levels:

1) All aquifers contain small amounts of radioactive daughter products but in Texas, uranium rich deposits exists naturally in the aquifers because volcanic fly ash from exploding volcanoes in Mexico long ago that floated into Texas and covered the land several feet thick. This ash contained uranium and over the years, it washed into the streams or soaked into the aquifers where it was eventually flushed out to the Gulf of Mexico leaving the aquifers free of excess uranium. But in some areas in the aquifer, pockets of concentrated uranium remained because several unique conditions. These conditions tightly locked up the uranium and made it unavailable to migrate in the aquifer.

2) The undisturbed ore is usually buried more than 150' below the ground. The tons of earth that cover the ore form a perfect radiation shield. Environmental Assessments completed at several

mine sites before mining showed that surface background radiation levels are lower than the national average. At some sites the levels were *2 times lower* than national average.

The following map shows that the South Texas has gamma radiation levels of 2.5 to 4.5uR/hr, generally equal to or lower than the average radiation levels of the United States. Living on top of an undisturbed ore body in South Texas can be safer than living elsewhere in the U.S in terms of exposure to surface levels of gamma radiation.



3) The migration of radioactive product in the aquifer around an undisturbed ore body can be very low. If these reduced areas had not tightly locked up uranium, they would have washed out to sea long ago. Assessments completed at mine sites before mining began show that the aquifer surrounding the ore is generally free of the high contamination levels that exist inside the deposit. The South Texas Bruni IN-SITU uranium mine permit application explained that "water movement is virtually nil in the ore body because elevated radium concentrations are found only in the ore body and not the aquifer around the ore".

Although the Bruni mine was a very rich uranium ore body, the levels of free, unlocked uranium in the groundwater before mining was very low. The average level of uranium in the ore field was between 0.21 mg/l and 0.331 mg/l. At 200' outside the ore zone the levels were less than

0.06 mg/l. Uranium mining unlocks ore body allowing the radioactive materials to migrate in the aquifer. *Once mining began levels rose to 150 mg/l outside the ore zone.* This illustrates how In-Situ mining creates high levels of migratory waste.

Problems occur when humans disturb the ore. For example, the town of Flatonia, Texas, east of San Antonio has municipal water wells that are drilled into pockets of elevated radioactivity. The water contains the highest concentrations of radon in Texas, as high as 9,000 pCi/l (Pico Curries per liter) of radon before treatment (the radon is easily removed in the city's water treatment plant). Oil field brines in Panna Maria, Texas, have shown radium content as high as 317 pCi/l (average radium levels in the soil for the U.S. is 0.6 pCi/l radium). Measurements at some natural gas processing plants have shown readings on the ground higher than 30 uR/hr (average South Texas levels are 2.5 to 4.5 uR/hr) because some of the gases processed at the plants have elevated levels of radioactivity.

Today, the most serious threat to radiation exposure is from mining, not from naturally locked up and undisturbed ore bodies. Tightly locked-up uranium ore bodies do little harm as long as the public is aware of their location and the uranium is left alone. Mining brings the ore to the surface where it becomes available for direct exposure to the public by wind, food, and water. After mining, the ore that remains in the aquifer will migrate causing a serious long-term invisible threat that is not easy to monitor or track.

How Low-Level Radiation Affects the Public

Low-Dose, Long-Term Exposures

Uranium mining exposes the public to radiation. Although high exposures do occur, most contact is in the form of low-levels of exposure over long periods of time. Current research shows that constant contact to low levels of radiation is proving to be the most deadly form of radiation.

Since the beginning of the nuclear age researchers have documented the biological threat of radiation but the knowledge that lowlevels of radiation could be dangerous has always been hotly debated and denied by the establishment. In fact, as mentioned earlier, the government has attempted to cover up and prevent radiation health studies in the interest of national security. According to many experts, the Federal bomb priority has probably resulted in the killing of more people than all the world wars.

Today, there is a large body of scientific evidence that supports the fact that low-level radiation causes damage. As far back as 1958 Nobel Laureate McFarland Burnet showed that the worldwide increase of leukemia in three and four year old children could only be caused by radiation exposure around the time of birth. He proved that the rapidly growing cells of the unborn fetuses were the most sensitive of all human cells to the mutagenic effects of radiation.

In 1968, Dr. Stoke and his coworkers at Oslo Cancer Hospital discovered that ingested or inhaled radioactivity, like that from fallout can be 1,000 times more effective at causing cell damage than external radiation exposure. He showed that extremely small internal doses of Strontium90, amounting to 10 to 20 millirads could produce visible damage to the blood forming cells of the bone marrow (average intake of radioactivity from food, water, and air in the U.S. is 24 millirems per year alpha, beta, and gamma). By killing cells and lowering the ability of the immune system to detect and destroy cancer cells, Dr. Stoke showed that bone cancer, leukemia, and other malignant neoplasm can result. This was the first evidence that radiation could destroy the body's immune system.

In 1971, Dr. Abram Petkau of the Whiteshell Nuclear Research establishment in Canada, conducted radiation studies of lipid molecules. These molecules are the principal structural component of all cell membranes. After experimenting with short exposures to high xray radiation, Dr. Petkau found that it took 3,500 rad to break apart and kill the cell membranes. But to his surprise he discovered that if the cells were exposed over a long period of time, it took only one rad of X-rays to kill the same cells. Dr. Petkau found that low-level radiation was more effective at creating unstable free radicals (a toxic negative ion) and these free radicals were the agents responsible for destroying the cells.

Dr. Petkau concluded that the longer the exposure, the smaller the dose needed to damage cells. Subsequent research by Petkau and others have demonstrated that this damage occurs even at levels that exist naturally in the environment. For the first time it could be said that there is no such thing as a safe exposure to radiation. EPA now estimates that 10,000 to 30,000 people die from these unavoidable background levels every year.

In 1990, the National Academy of Science released the "BEIR V" report, a peer reviewed publication considered the bible by both government and industry. The committee concluded that cancer and leukemia risk for the survivors of Hiroshima and Nagasaki were underestimated by a factor of three or four. The HiroshimaNagasaki study has been one of the cornerstones of the scientific communities' understanding for radiation health effects. The regulations for allowable radiation exposure of the public are based in large part on extrapolation from the Hiroshima data. The scientists have miscalculated and the routine environmental releases of radioactivity allowed by law at nuclear facilities could be 100 to 1,000 times too high, especially for infants.

BEIR V state that risks from diagnostic X-rays to be underestimated by a factor of five to six times. BEIR also relates scientific studies that show mental retardation, leukemia, and mortality increased with extremely small doses of radiation.

One very important study in BEIR V deserves further attention. A large British study by Dr. Alice Stewart covering 35 years and involving 16 million women came to the conclusion that *most childhood cancer and leukemia is probably the result of background and or manmade radiation. The study suggests that a fetus exposed to background radiation levels of 150 milli**rad** (normal background levels average 100180 milli**rem** per year) doubles the risk of that child dying of cancer or leukemia before age 15*. Children born to women who received even one abdominal x-ray during pregnancy were four times more likely to suffer childhood cancer as "post-birth defect".

Childhood disease clusters have been found around many nuclear facilities:

1) Increases in childhood leukemia near reprocessing facilities in La Hague, France and at Sellafield in the British Isles and the Krummel nuclear reactor in Germany.
2) Childhood leukemia cases near Sellafield are associated with occupational exposure to the father before conception of the child. Increases in childhood leukemia also occurred Europe-wide after the passage of the Chernobyl radiation cloud.

3) Increases in childhood cancers have been found near nuclear operations in the Navaho Nation from uranium mining, Brookhaven, New York from nuclear weapons, and nuclear power stations in Oyster Creek, NJ and Clinton, Illinois.
4) Increases in Down syndrome are found near Yankee Rowe power station in Massachusetts.
5) Heart defects of various types have been associated with ionizing radiation exposure.

According to the predictions of Nobel Laureate Linus Pauling and Andrei Sakhorov, the inventor of the Soviet H-bomb, *radioactive fallout from atomic bomb testing has killed four to eight million innocent people*.

Diseases That Kill

In the 1920's, Nobel Prize winner Herman Muller showed in experiments with fruit flies that radiation can accelerate the mutation of organisms. Recently Charles Waldren and coresearchers have found that a single human chromosome placed in a hybrid cell and bombarded with very low levels of radiation can produce mutations two hundred times more effectively than at higher radiation levels. It is very possible that half a century of increased environmental radiation levels have created new organisms that can take advantage of our weakened immune systems.

Since the 1950's an enormous increase in pesticideresistant insects and mites have occurred. In 1938 there were only seven such organisms known. By 1984 the number had climbed to 447. Fortyeight species of weeds have gained resistance to chemicals.

According to the book, "Deadly Deceit: Low-level Radiation – High-level Cover Up", by Jay M. Gould & Benjamin A. Goldman; AIDS, chronic Epstein Barr virus, Lyme disease, Candida Albicans, herpes, toxic shock syndrome, septicemia and others, are possibly the result of the Nuclear Age. All these aliments were rare or unknown before 1945.

The Texas Problem

The state regulators do not consider themselves researchers and because of this, they have not provided the basic studies necessary to determine the safety of mining. They have shown that they are not receptive to outside information that does not agree with their own opinions. They have not been forth coming about the industry's problems, preferring to burry the problems in their files instead of releasing it to the public. The director of the Bureau of Radiation Control (now defunct) was once quoted on TV as saying that the public does not understand radiation and only gets excited when they (meaning the Bureau) talk about it, so it is best not to say anything.

It is the responsibility of the state legislators to make the laws that safeguard the public. In order to this, they need information provided by scientific studies, to understand and address the issues. In this most important duty, the state regulatory agencies have failed.

Incomplete Monitoring

Under the original 1975 Texas mining law, Environmental Assessment Reports were required to be completed on every mining application. These report were studies of the environment around the proposed mine that established the baseline pre-mining radiation levels by measuring the soil, plants, and animals in an area. They also provided information on the geology and economic history of the area. But very few of these assessments were completed because *the industry successfully lobbied to change the law and now the agencies are not required to do assessments.*

Without the baseline data provided by the Environmental Assessment, the chain of data is broken. Because the food chain acts to gather and concentrate contaminates in the environment, pre-mining data is crucial in order to understanding how the food chain has been altered. It works this way:

1) Plants and animals need essential minerals to survive and grow. Radioactive elements are similar to minerals in the soil; plants and animals cannot differentiate between the two.
2) At the base of the food chain, plants easily take up the radionuclide found in soil, water, and air. By this action, contaminates in the environment are taken up and concentrated into the plant's cells. The longer the plant lives, the more radiation it can take up. Some plants take up more radioactivity than others.
3) The higher up the food chain, the more concentrated the pollutants become. As an example: in the mining districts, cattle need anywhere from 12 to 40-acres of grass a year to grow. Cattle are sold to market at 16 to 30 months. *This means that over 2.5 years the cow will eat up to 100-acres of grass.* This action serves to collect and concentrate low level contaminates that exist over large areas. The cow's organs and bones take up radioactivity better than it's muscle or milk. Fish and chicken eggs are even better absorbers of radiation (these are the bio-accumulator equivalent of the canary in the coalmine).
4) Because people are at the top of the food chain, this makes us vulnerable to environmental degradation anywhere in the food chain.

This accumulation is called bioaccumulation. Uranium mining increases the radioactive elements in the environment. Because humans are at the top of the food chain, we are the most exposed to contaminates. *Ingestion or inhalation of radioactive material is the most deadly form of exposure.*

The few environmental assessment studies that have been completed show that the pre-mining environment that had low radiation levels in the soil, water, plants and animals (up to 2 times lower than the average US levels in some areas). Studies during and after mining are sadly lacking but one study at the Panna Maria strip mine shows data that windblown radiation from the mine caused an increase in radiation levels in some grasses surrounding the mines as high as 500%. The Bureau of Radiation Control attempted only one post-mining bioaccumulator study. They studied dairy cattle at one site between the Susquehanna and Conoco-Conquista mines to see what effects mining had on the meat and milk. Meat and milk studies are the least effective way to study radiation uptake because meat and milk do not absorb radioactivity easily, the bones and organ meats are much better indicators. Fish, chickens, and eggs are better uptake indicators because they absorb radiation much more effectively and they should have been included with the cattle study. The Bureau claimed that their study showed was no problem with uptake although the results did show an increase in radiation content. A small increase in meat or milk means that all the other accumulators would show higher increases.

Uranium mining in Texas is located in major farming and ranching districts. The grain grown in these districts are shipped all over the state as livestock forage. Many private agricultural wells have been condemned because of elevated contamination in the aquifers from nearby mines. The D.O.E. condemned the aquifer around the Susquehanna and Conoco-Conquista mines. This is the same area where the cattle bioaccumulator study mentioned above was done. It was one of the largest dairies in the state.

It is absolutely necessary to monitor the food chain because it is nearly impossible to correct radiation contamination once it has occurred. Since radiation is invisible, it is impossible for the public to protect themselves. Without monitoring, the public remains blind and defenseless.

Improper Monitoring

Current environmental data at the mines is questionable because of flawed monitoring. The state law requires ongoing air and aquifer monitoring at the mines but the agencies do not have the funds to provide full time monitoring, so *they require the mining companies to do most of the monitoring themselves and then <u>honestly</u> report the data to the agencies*. This is obviously a big problem and the agency incident files confirm it. The files contain hundreds of reports of lost data, falsified samples, altered records, covered-up spills, unreported excursions, illegal dumping, worker overexposure, and so on.

Accurate data is an essential requirement for safeguarding the environment and health. By allowing the fox to guard the hen house, the agencies have made it impossible to gauge how serious our exposure really is.

Low-Dose, Long-Term Monitoring and Health

Monitoring at the mines is set up to record excursions. This type of monitoring is good for indicating high radiation spikes that occur in the elevated radiation environment of the mine. But this is not a good system for monitoring the environment surrounding the mine where the population lives. This environment is a "low-dose, long-term" scenario. Proper monitoring outside the mines has not been attempted because the agency professionals do not believe that low-dose, long-term exposure causes any health problems.

The state legislators sponsored Dr. William Au of the University of Texas to study the effects of low-level radiation on the people living near the Panna Maria uranium mine in South Texas. Dr Au's study showed that the constant exposure to low-level radiation has caused a large amount of cell damage in the blood of the local population when compared to the cell health of other non-mining populations. This demonstrates the Petkau Effect: low-dose, long-term exposure causes cell damage.

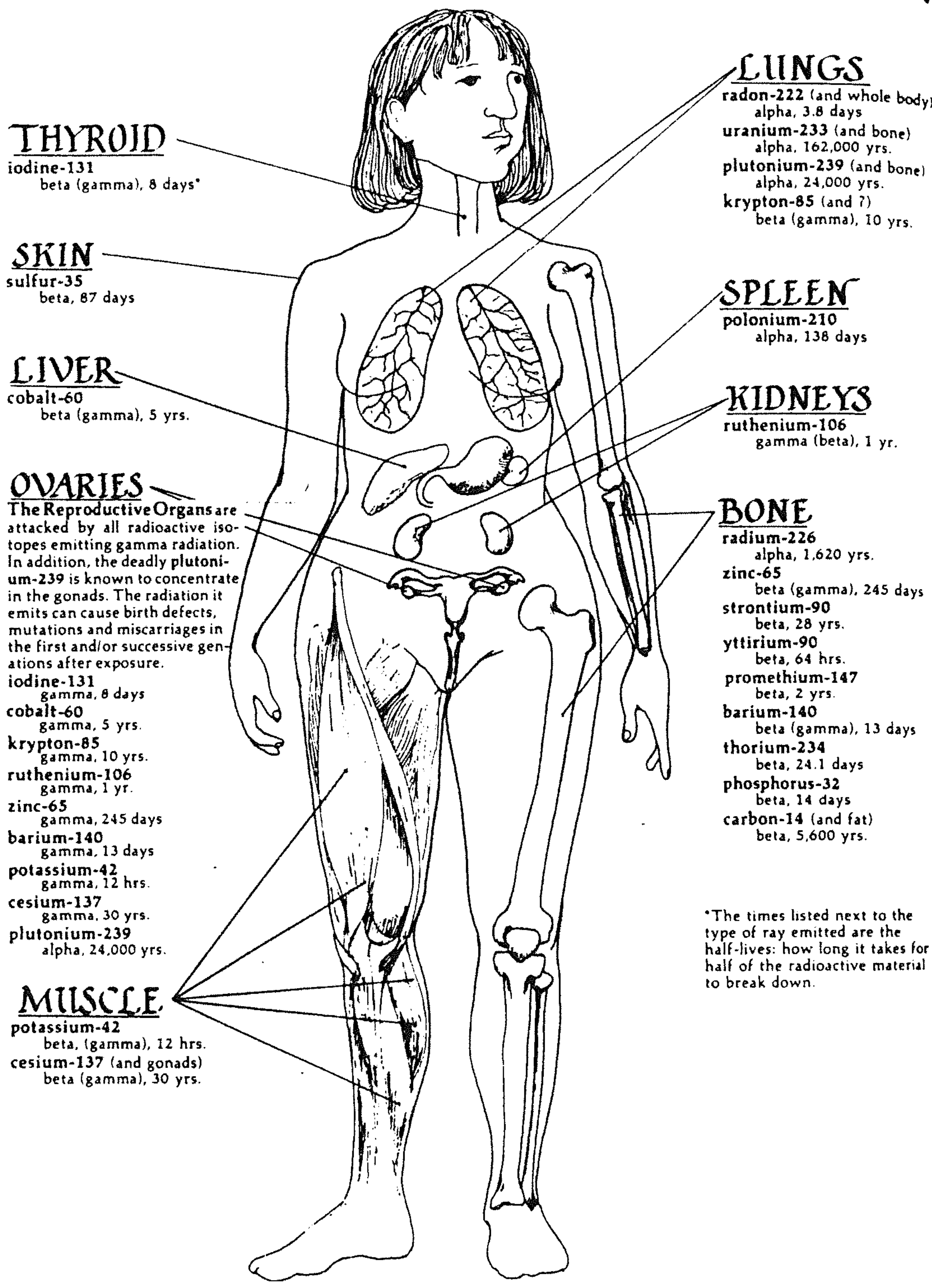
What does this mean to the people living around the mines? Research shows that continuous exposure to low-levels of radiation is a source of continuous free-radical damage. This eventually causes the body's immune system to shut down. Lowered immunity can cause all types of diseases but more importantly, it can also create new and unknown health problems. There is mounting evidence that the bazaar diseases that affect society today are a result of the increased exposure to continuous low-level radiation in our food and environment. Things that we have always been immune to are suddenly becoming life threatening.

Apparently, the state agencies are waiting for an epidemic to occur before dealing with the mining populations health issues. They are waiting for hospital death records to show large increases in cancer and leukemia before taking action. But this will not occur because of the small size of the rural populations and the obtuse nature of the diseases involved. In the mining areas health problems do not fit normal disease patterns, lowered immunity has cause confusing and undetermined health problems. How do you gauge a community's level of health if you can't label their diseases? It used to be common practice in these areas for hospitals to label unknown causes of death as heart failure on the death record, leaving no record of actual death.

The nuclear professionals of the state's regulatory agency are a closed society; they are not receptive to outside advice. In contrast, the *agencies are totally accepting (and dependent) on industry-sponsored studies that only show how safe mining is.*

The current health problems in these mining areas are blamed on other issues. The industry claims that radiation cannot be proven to cause any health problems without direct evidence. This is the same argument the cigarette industry uses to convince people there was no direct link between cigarette smoking and cancer.

IONIZING RADIATION



*The times listed next to the type of ray emitted are the half-lives: how long it takes for half of the radioactive material to break down.

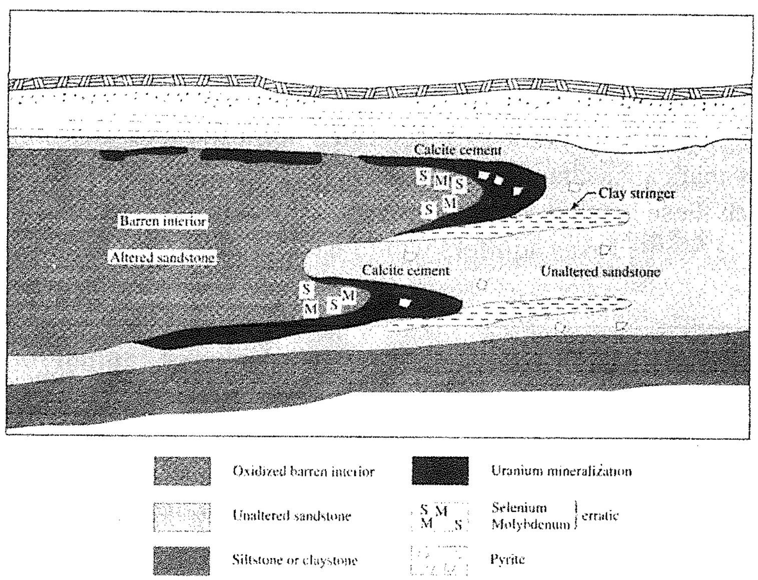
Where does Uranium come from?

In Texas, uranium ore is found in shallow aquifers. These ore bodies are the result of a combination of natural processes that have gathered up very small amounts of radioactive materials spread over large areas of Texas and delivered them to special areas where they were concentrated into uranium rich ore deposits.

Some rocks contain naturally occurring low levels of radioactive materials. It is believed that these materials are left over from the creation of the Earth (so-called primordial radionuclide). They typically have half-lives of hundreds of millions of years and include uranium-235, uranium-238, thorium-232, and potassium-40. Over the years, weathering and plant roots have broken down this primordial rock, contributing to the background levels of radioactive material in the soil and groundwater.

Researchers have suggested that uranium ore bodies in Texas were formed many eons ago when volcanoes in Northern Mexico exploded ejecting lava rock under high pressure, miles into the upper atmosphere. This finely atomized form of lava is known as fly ash and it contained small amounts of radionuclide from the primordial rocks. Fly ash is so lightweight that the prevailing trade winds carried it for hundreds of miles into the southern United States where it settled into the ground many feet thick.

Figure 5 - Typical Roll Front Sedimentary Uranium Deposit (Langmuir, 1997)



Schematic cross-section of an idealised uranium roll-front orebody showing the zonation of elements and primary hydrologic and geochemical features. Oxidised groundwaters flow from left to right. The roll front and associated redox interface moves in the same direction.

Over the years, rainfall washed most of this fly ash into the rivers carrying it into the Gulf of Mexico. But some of the uranium in the ash leached into the ground where it migrated down into the shallow

aquifers. Like the ash, this uranium also flowed out to the Gulf of Mexico except in some areas where the aquifers contained reduced atmospheres (without oxygen). Reduced atmospheres areas can be found in front of fault zones where reducing gasses from lower formations (hydrogen sulfide from oil deposits) seep up the fault line crack and replace the oxidized atmosphere in the shallow aquifer. The lack of oxygen allowed the uranium to precipitate out of solution. The fault zones block the aquifer flow and trap the reduced gasses in a stagnate zone, keeping the oxygen in the aquifer from washing away the uranium. The alkaline environment further helped to trap the uranium by locking up the metals on the clay particles that surround the sand granules in the aquifers. In the 1990's it was discovered that the bio-film created by certain anaerobic soil bacteria also play an important part in trapping the uranium.

The Mining Environment

Because uranium moves freely in an oxidized environment, it has long since washed out of the South Texas aquifers. As mentioned above, the ore bodies are only found in specific oxygen-free atmosphere areas where the ore is tightly locked up deep underground, safe from public exposure.

Strip mining removes the overburden exposing the ore to atmospheric oxygen, allowing the uranium to unlock and migrate in the aquifer. In-Situ mining pumps oxygen down into the aquifers in order to make the uranium mobile. Currently, there is no technology available to stop the migration. Because of the long-lived nature of this toxic material, this is a threat to many future generations.

The companies are suggesting that is not a problem because the waste will migrate to a new reduced atmosphere underground and eventually lockup. The state regulators are accepting this "do nothing" concept because they want an easy fix; they are too dependent on industry-sponsored studies that promote the cheapest possible solutions.

There are many unanswered questions with the "do nothing" approach. The original ore bodies have remained lockup securely by Mother Nature for centuries because these sites are extremely stable and isolated from conditions that cause changes. Finding new down-dip lockup sites, as proposed by the industry, is unlikely since these original lockup sites are now being mined for uranium. New lockup sites are unlikely otherwise the South Texas aquifers would have uranium ore bodies locked up everywhere, and it doesn't!

There are apparently many conditions that are necessary for lockup. Uranium forms where fault zones allow hydrogen sulfide to seep up from deeper oil formations, replacing the oxygen in the aquifer and creating the necessary reduced atmosphere. Current studies show that the reduced atmosphere allows certain anaerobic soil bacteria to create chemicals and bio-films that lockup uranium naturally. Aquifer pH plays a roll; high pH will lock up some of the heavy metals on the aquifer clays while other low pH will lockup other metals but no condition exist that will lockup all of them at once. Then there is the necessity of finding an area in the aquifer with a stagnate flow (which is caused by the damming effect of the fault zones) to prevent washout.

Even if lockup site can be found, long-term stability is questionable. Research has shown that uranium can re-oxidize from rainwater seeping down into the groundwater along the fault lines. Only Mother Nature has proven to have the capability of forming stable sites capable of long-term storage.

Today these contamination plumes are moving underground, the only solution currently available is to provide long-term monitoring in order to safeguard the public but *the regulatory agencies have no plans to provide any perpetual monitoring*.

Strip Mining

In the 1970's, the Corpus Christi Caller newspaper published aerial photos of Karnes County showing what they called a "moonscape" of deep craters stretching far over the horizon. These were the abandoned uranium strip mining pits. These steep-sided, 300 feet deep canyons formed mile after mile of un-earthly landscapes across South Texas. The combined area of the pits equaled approximately 31,000-acres, spread out over 18 South Texas counties. Although strangely beautiful with their subterranean azure-blue lakes, these pits hid a deadly secret. Neighbors adjoining the pits report of cattle, dogs, and birds dying after drinking or swimming in the ponds.

Strip mining is the process of removing millions of tons of soil, called overburden, in order to mine the underground ore. It was necessary to remove the overburden in order to get to the uranium ore but it was only profitable to dig down to a maximum dept of 300'. Since the uranium ore is found in the shallow aquifers, lakes formed in the bottom of the pits as the aquifer rushes in to fill the hole. In order for the companies to work the mine, it was necessary to pump-out the radioactive water. Pumping resulted in the wholesale draining of a huge portion of South Texas' aquifers and *resulted in the radioactive contamination of the local rivers, of with the San Antonio River was the most affected.* There have been no studies to determine the effects this had on the rivers and estuaries of the Gulf Coast and the Texas fishing industry?

The companies are only interested in extracting uranium oxide content of the ore. This uranium oxide comprises less than 2% concentrations in the ore. During mining, only the ore containing the highest levels of uranium oxide are profitable enough to be removed from the mine. Once the profitable ore was removed from the aquifer, the miners moved on leaving the mining pit abandoned. The ore left behind contained lower levels of uranium oxide and 98% of all the other radioactive and toxic materials common to radioactive ore bodies, including thorium-232, potassium-40, and thorium 230, radium, radon, arsenic, cadmium, chromium, lead, mercury, molybdenum, selenium, zinc and other toxic and radioactive substances.

The low grade ore left behind was left to oxidize. The excavated pits filled up with water as the unearthed aquifers continued their flow. The uranium flowed with the oxidized aquifers waters, destroying any reduced atmospheres in front of it. In the 1980's, the state spent 10's of millions of taxpayer dollars filling in these abandoned mining pits. No studies were attempted to find out the extent of the migration.

Tailings Ponds

During strip mining the ore was extracted from the mine and brought to the processing mill where the uranium oxide (also known as "yellow cake") was leached out of the ore. Less than 2% of ore is composed of high-grade uranium oxide. After the ore is milled and the uranium oxide is removed, *the*

unwanted material contains 98% of the radioactive and toxic materials including all the toxic and radioactive substances mentioned above. Large volumes of sulfuric acid were used in the mills to leach the uranium oxide from the ore. The spent acid and left over solid uranium waste was disposed of in aboveground holding ponds called “tailings ponds”. Tailings ponds are aboveground holding ponds made by mounding up large earthen berms that are meant to confine the solids and liquids produced by the milling process.

<u>Today these ponds contain over 27,000,000 tons of solid radioactive waste.</u>

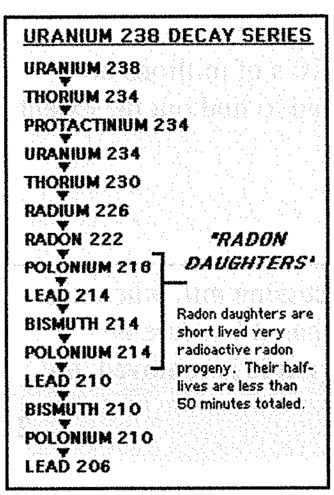
The idea of using tailings ponds for waste storage came from the oil industry. They wanted a cheap way to hold the excess saltwater that resulted form oil well drilling operations. They would mound up dirt mounds forming an aboveground tank to hold the saltwater. Someone got the great idea that these dirt embankments would be a cheap way to hold the uranium waste. The engineers were expecting the tailings ponds to hold the sulfuric acid until the sun could evaporate the liquids leaving behind only the solid waste. Apparently they did not know that *sulfuric acid does not evaporate after a certain concentration is reached.*

The engineers were also expecting the high clay content of the soil to prevent the fluids from leaking offsite but no one ever tested to see if the clays were compatible with the chemicals involved. During the 1980’s, the government released studies showing that the sulfuric acid altered clay soils. *The acid changed the physical makeup of the clay, turning it into a non-plastic powder that actually increase the migration of the tailings waste out of the pond.* Basically these ponds had no holding capability at all.

Over the years, the companies dumped more liquid into these tailings ponds than they were designed to hold. This was possible because the liquids were leaching directly into the aquifer. The companies were aware of this discrepancy but continued on. The total amount of liquids is unknown because the companies were not required to keep records.

The 27,000,000-Ton Problem

The DOE spent $35,000,000 in 1984 to entomb the contaminated waste the Susquehanna mine into a massive flat-toped mountain. The Federal standards requires that the mesa was covered with a layer of clay and a layer of rock boulders in order to meet the Federal 100,000-years intrusion requirement that is necessary to insure the radioactivity solids and radon gas could not escape by erosion or intrusion.



But there is a unique problem with entombing radioactive waste; during this material radioactive lifespan, it transmutes from a solid, to a gas, and back to a solid again making it particularly difficult to contain. Uranium transmutes into Thorium; Thorium transmutes into Radium; Radium into Radon (a gas); and so on until it winds up as lead. This process is known as the “daughter product chain”. These elements have very long half-lives, meaning that after one half-life has passed, only half of the radiation will be gone. Thorium 230 is has a half-life of 78,000 years, meaning that after 78,000 years, only one half of the radiation will be left.

Since Radon is a gas, it can travel for many miles before changing back into a solid radioactive element again. Because of this, Radon can cause areas in the downwind path to have elevated in radioactive levels.

The following examples illustrate how difficult it will be to keep the waste isolated from the public using only dirt as the tailings cap:

•) Plant roots can easily penetrate through the clay cap and take up radioactivity. As time goes by, radiation levels at the surface will increase as the plants die and leave behind their radioactive remains.
•) Animal will graze the site and burrow into the cover. This is an easy way for contamination to leave the site.
•) Wind and rain will eventually eroded the cap. Erosion is severe in South Texas. There are natural mesas in nearby McMullen County that were formed centuries ago when erosion leveled the surrounding clay soils and left behind the gravel mesas standing 100-feet above the surrounding plains.

Entombment with rock and clay is far from a perfect solution but by cleaning up the Susquehanna, the federal government set the example for tailings ponds. The state should have followed this example but because this was the smallest tailings pond in the state and it cost so much to clean up, the state regulators basically ignored the Federal example and allowed the mining companies to simply cover their tailings ponds with a single layer of clay. Although this saved the companies lots of money, dirt alone cannot survive the long-term threat of erosion, intrusion and out-gassing.

The waste will remain a danger for hundreds of thousands of years. How do you safeguard future generation when history shows that most governments do not survive longer than a couple of hundred years? In order to extend the isolation of the waste as far as possible, the boulder intrusion layer is required.

Denial of The Aquifer Problem

Because of the huge cost involved, the state has not required any company to cleanup of the aquifers contaminated by the tailings ponds.

The industry believes that the alkaline and reducing environment in the aquifers will eventually lockup the waste as it migrates underground. Several private wells have been contaminated next to the tailings ponds and the DOE has condemned the Susquehanna aquifer. The state agencies have argued that the aquifers in these areas are generally brackish and the populations are small, so any environmental or health problems that occur would have minimal impact. The agencies are suggesting that these areas are disposable! There is no acceptable excuse for letting a private company destroy the environment!

The Tailings Pond History

Susquehanna-Western and tailings pond:

The first mining operation in Texas was started in 1959 just west of Falls City, Texas. This was a joint effort by the San Antonio Mining Company, a subsidiary of Climax Molybdenum Company and Susquehanna-Western, Inc. They sold their ore to the Atomic Energy Commission but after that contract ended in 1966, they contracted with the Atomic Energy Commission to sell ore to the West German Government. This mine operated without regulatory oversight.

The mine originally used a solvent-extraction process that involved mounding up large piles of uranium ore and then setting up sprinklers on top of the piles in order to irrigate them with sulfuric acid. This leached the uranium oxide out of the ore. They than collected the uranium rich acid in pipes as it seeped out the bottom of the piles.

A tailings pond at the mine held the spent acid from the leaching process. The waste ore was dumped back into the mine pits. The pond frequently overflowed into the local creek. A large dairy adjoins this creek and their milk cows drank from this creek. They contracted a copper-molydenum imbalance called molydnenosis, turned white, and died of anorexia.

During a hurricane, the tailings dam broke and spilled the entire contents of the pond into the creek. *This was probably the largest radioactive spill to ever occur in the Texas (maybe in the U.S.)* but since the mine was unregulated, the exact details of the spill are unknown. This creek flows for a mile and then joins the San Antonio River where it empties into the river just upstream from the most popular swimming hole in the county. No one in the county was ever notified about the dangers of swimming in this area.

The site had been abandoned for many years when the Federal Government passed the UMTRA law that required the United States government to cleanup the early processing sites. Because of the sever leaking of the Susquehanna tailings pond the D.O.E. eventually condemned the regions aquifer after finding out that all the area wells were unsafe. In 1988 the D.O.E. estimated the price for cleaning up the aquifer was going to cost $350,000,000 but they did nothing to clean it up. Because of the cost involved, the state has made no effort to cleanup any of the other 3 mill tailings aquifers.

The Feds spent $35,000,000 of taxpayer money to build a 60-acre mesa-shaped entombment. To insure long-term isolation of the waste, the mesa was covered with a clay layer, then a layer of granite boulders several feet thick. The rock cover was necessary in order to protect the cap. Originally the feds planned to cover the entire mound with rock but this proved to be too expensive so only the sidewalls were covered. In order to provide this rock, two granite quarries were cleaned out during the building of this gravesite.

This mound contains 7,134,100-tons of radioactive waste. This includes 800-acres of contaminated farmland that surrounded the mine which had to be dug up and entombed. There is a total of 1,277 Curries of Radium-226 buried at this site.

Granite tombstones encircle the site. They are necessary to order to survive the hundreds of thousands of years necessary to warn the public of the danger that exists onsite. What kind of message does this send to future generations?

This mound can be seen at the intersection of Hwy 791 and Ranch Road 1344, a couple of miles west of Falls City, Texas.

Susquehannna Uranium Strip Mine - Radioactive Waste Burial Site
Tombstone Waring to Future Generations

Exxon-Ray Point and tailings pond:

Ray Point is mill tailings pond located east of Three Rivers on Hwy 72, next to the one of the public water supply towers. Little is know about the site because it operated mostly during the unregulated period. Apparently, Exxon covered the pond with dirt in an attempt to quickly close the site but the pond was not thoroughly dried out (concentrated sulfuric acid does not evaporate). Eyewitnesses report that the ground would shake when the cap was walked on.

Dupont / Conoco-Conquista and tailings pond:

During the early years of the Conoco-Conquista, the mine operated without any regulatory oversight. After the mining operations ceased, the Texas Bureau of Radiation Control allowed Conoco (later bought by Dupont) to operated the 256-acre tailings pond for 8 years as the official, unlicensed nuclear dump for the state of Texas.

The local residents were never informed that the site was being used as the nuclear dump for the state of Texas. The director of the Bureau of Radiation Control was quoted on the San Antonio TV news saying, "The public does not understand radioactivity, they just get excited when you talk about it. It's best not to say anything". It took a large public effort and heavy media attention to force the agency to close the site in 1988.

Only mining waste was supposed to be disposed of in the pond but since almost all nuclear waste can be considered a byproduct of mining, the company was allowed to dump all types of waste here. Some of the stuff was so hot that it should have been sent it to the federal high-level dump at Hanford, Washington.

One of the companies allowed to dump at the Conquista was the French company Rhone-Poulenc (now called Sanofi-Aventis). This is the third largest pharmaceutical company in the world. Rhone-Poulenc sold "rare earth" phosphors for TV screen and rare earth magnets. Rare earth refers to lanthanide series of the Periodic Chart, atomic numbers 57-71, plus yttrium, scandium and thorium. These materials contained levels of thorium and uranium *50 to 1,000 times more radioactive than typical South Texas uranium tailings mill waste*. Since the Conquista is now closed, Rhone-Poulenc sends this waste to the high-level nuclear facility in Hanford, Washington. Today, Rare Earth mining in the U.S. has been put on standby because cleaner, thorium-free Rare Earths from China, Brazil, India, and Russia have become available.

Rhone-Poulenc now processes its Rare Earth through its Rhodia Rare Earths division. Parts of the Rhone-Poulenc plant and several areas around the plant in Freeport, Texas was so radioactive that it had to be dug up for disposal at a nuclear dump.

During a regulator hearing on the Conoco-Conquista, a senior researcher with The Southwest Research Institute was going to speak about the possibility of the pond exploding because of the large amounts of ammonia and nitrate waste that was dumped here (this supposedly happened to a tailings pond in Russia). But before he could speak, Dupont apparently offered him a contract to study the situation and that was last time anyone heard from him.

The records show that one worker was sent to the hospital after passing out from fumes that came from a dump truck he was standing next to as it unloaded its waste into the pond.

Conquista was located less than a mile from the Susquehanna and it shared the same aquifer. The monitor wells showed the tailings pond was leaking but the contamination form the Susquehanna made it difficult to monitor the site. Because of this, Dupont claimed that the site could not be proven to be leaking. This was a lame argument because there was only a couple of feet of soil between the bottom of the pond and the aquifer and studies have shown that acids destroy the plasticity of clay and actually aids in the migration of contaminates.

Dupont now owns the Conquista. They have deep pockets and they must be held responsible for all long-term problems.

Chevron- Panna Maria tailings pond:

Chevron owns 3 uranium operations: the Palangana mine and the Panna Maria mine in Texas, and the Mt Taylor mine in New Mexico.

The Palangana was an In-Situ mine started in 1960. More information can be found on this site in the In-Situ section.

In 1979, Chevron opened the Panna Maria uranium strip mine and mill in Hobson, Texas. It was designed to process 2,500 tons of uranium ore a day. The mill and tailings pond covered over 290-acres. The mine closed in 1985 when the ore was exhausted.

The mill was then revamped in 1986 to process the uranium ore from Chevron's Mt. Taylor mine, a conventional underground mine located in northwest New Mexico. Coffinite was the primary ore, a gray colored sandy material. The uranium oxide content ranged from 0.15% to 2.0%. Chevron shipped millions of tons of the unprocessed ore daily in open, uncovered railcars from New Mexico to be milled at the Panna Maria facility. Clumps of this radioactive material could be found along the rails from New Mexico to Texas with a simple Geiger counter. The train tracks passed through several major cities in-route.

The Mt. Taylor mine produced over 8 million pounds of uranium oxide before it was put on standby in 1989. It is currently being considered for In-Situ leaching. It apparently has the largest uranium reserves in America with 100 million pounds of uranium oxide still in the ground.

During this time Chevron also processed the ore from their Rhode Ranch mine in McMullen County. At 800-acres, this was the largest uranium strip mine ever operated in Texas. The ore was shipped in dump trucks through 3 counties before being processed at the Panna Maria mill in Karnes County. The Rhode Ranch mine produced over 6.7 million pounds of uranium oxide.

A total of 10,000,000-tons of solid waste and an unknown amount of liquid waste was dumped into the Panna Maria pond, the largest in the state. Over the years, Chevron dumped all forms of radioactive waste into their tailings pond at the Panna Maria mine. The records show that the following wastes have been dumped at this site:

- •) RCRA hazardous waste.
- •) Uranium Hexafluoride waste from Allied Chemical conversion facility in Illinois.
- •) Radioactive pipe scale from Mississippi.
- •) Depleted uranium artillery shells from the military's Aberdeen Proving Grounds in Oklahoma.

•) When the EPA fined Chevron for trying to illegally dispose of acid waste from their refineries, the company shipped it by the trainloads to Panna Maria where they disposed of it in the tailings pond.

The Federal law requires that the state and federal government jointly take over ownership of a tailings pond when it closes. The Federal Nuclear Regulatory Commission questioned whether the federal government could legally share ownership of Chevron pond because the state of Texas had allowed so much non-mining radioactive waste to be dumped in the tailings pond.

During a public hearing on extending the permit of the Chevron-Panna Maria tailings pond, it was discovered that the company never plugged the hundreds of original exploratory drill holes under the tailing pond. This meant that the pond bottom was a Swiss cheese of holes that were direct paths into the aquifer.

A half-mile from the pond it was discovered that an old hand dug well had suddenly turned radioactive. On further investigation it was discovered that this well was located directly in the old, abandoned path of the San Antonio River. Over the years, the river had changed its course leaving behind a dry, sandy riverbed where the river once flowed. This ancient river flowed directly under the Panna Maria tailings pond where it served to funnel the waste from the pond directly into the ancient sandy river bottom providing a fast-track channel directly into the San Antonio River located less than a mile away.

Not a single monitor well was located in this riverbed. No data is available to determine how much fluid flowed out. No studies have been done showing the affects this contamination had on the river or the estuaries.

In 2005 Chevron bought Unocal Corporation making them the 4th largest energy company in the world. Unocal has a division, Molycorp, Inc, which owns one of the world's largest reserves of Rare Earths materials. These materials are open-pit mined in the Mojave Desert at Mountain Pass, Ca. The mine has been put on stand-by status in 2005 because cleaner, thorium-free Rare Earths have become available from China, Brazil, India, and Russia.

Chevron's transfer to General Atomics:

In1991, Chevron transferred ownership of their mining properties to General Atomics' Rio Grande Resources division. With this transfer Chevron also conveyed ownership of the Mt. Taylor, Rhode Ranch and Palangana uranium mines to General Atomics.

This transfer of ownership effectively put a layer of separation between Chevron and their direct responsibility of the radioactive waste. As shown below, General Atomics has provided this "service" to other troubled "deep pocket " corporations. General Dynamics is a conglomeration of other companies' liabilities.

Because of the recent push for nuclear energy, the Mt Taylor ore is now worth

billions.

General Atomics is a major player in Washington D.C. politics and is responsible for affecting many of the laws governing the nuclear industry.

More General Atomics history:

•) General Atomics was established in 1955 with a founding mission to find commercial uses for nuclear energy. They began building small research reactors, the TRIGA reactors. 65 TRIGA reactors were built during the next 40 years (including the University of Texas's nuclear reactor in downtown Austin).

•) After many years of problems with the TRIGA reactors and other lawsuits, Gulf Oil bought General Atomics in 1982.

•) In 1984, Chevron bought Gulf oil.

•) In 1984, after settling a 10-year litigation by Westinghouse over a uranium price-fixing conspiracy by General Atomics and 23 other companies, General Atomics paid out over $200 million in claims (for more information see the Bruni-Westinghouse section below).

•) In 1986, two brothers, Neal and Linden Blue, bought General Atomics from Chevron for $60 million. This was an incredibly cheap purchase price and some business annalist considered this the bargain of the century.

•) As CEO, Neil Blue shifted the company into nuclear waste cleanup operations. During the 80's, Kerr McGee Corp. transferred ownership of the Sequoia Fuels facility in Oklahoma to General Atomics. Sequoia is the nuclear fuel conversion facility made famous in the movie "Silkwood". This site was extremely contaminated. It was eventually closed down, dismantled, and dumped in a nuclear waste dump. *It is possible that the Sequoia facility was dumped in the Panna Maria tailings pond since General Atomic now owns the site (see next).*

•) In 1991, Chevron transferred their liabilities for the second time, by conveying ownership of their mining properties to General Atomics.

•) General Atomics had set up an "advisory council" to trawl for taxpayer dollars. The Council featured the former Secretary of State Alexander Haig and ex-U.S. Joint Chief of Staffs chairman General John Vessey. The brothers became big contributors to both the Republicans and Democrats.

•) In 2001, the U.S. Attorney and Sam Kholi, a former General Atomics employee, claimed that the two brothers had conspired to defraud federal taxpayers of millions of dollars by rigging contracts, padding payroll cost, and presenting false claims for payment. At the time, General Dynamics had over $210 million worth of government contracts. From 1998 to 2003, General Atomics has had a total of $981,366,405 in defense contracts.

•) In 2005 alone, General Atomics spent $2,420,000 on total lobbying expenditures in Congress. General Atomics is the single biggest corporate underwriter of Congressional trips between 2000 and 2005. The company spent more than $666,000 on 86 trips by members of Congress, their aids and families.

The In-Situ Problem

Strip mining dominated the industry until the 1970's when it was replaced by a newer, unproven form of underground mining, called In-Situ. It is currently the only process that is currently being licensed by the regulatory agencies.

In-Situ involves injecting a leaching solution into the underground aquifer where the uranium is locked-up on the sand and clay particles. The ore is sucked back to the surface where it is separated from the mining fluids. This process transfers the isolated, underground ore body to the surface where it increases the public's exposure. After processing, the radioactive liquids are pumped into deep aquifers for disposal. These waste liquids contain the same levels of radioactivity and hazardous materials associated with the ore bodies. This process results in the contamination of two (2) aquifers and the creation of large volumes of solid radioactive waste that must be disposed of.

In-Situ offers two main advantages to the industry:

1) It is much cheaper than strip mining.
2) It takes place underground, offering an "out-of-sight, out-of-mind" solution to their liabilities.

Texas is the birthplace of commercial In-Situ mining and today has the largest concentration of In-Situ mines in the world. The state agencies were forced to cobble together the first In-Situ regulations in 1975 when they licensed the illegally built Westinghouse designed Bruni In-Situ mine (see Bruni section below). The state was originally going to close down the mine and prohibit the technology but after studying information provided Westinghouse, they decided to license the technology. Years later they found out the information provided by Westinghouse was badly flawed and promises made could not be meet. But it was too late to change the law because the industry was firmly established.

Because of the premature birth of this industry, South Texas has been used as a large-scale experiment for In-Situ technologies. This ongoing experiment has resulted in a patchwork of In-Situ regulations that are a reflection of the problems inherent with this technology. Over the years, whenever In-Situ problems developed, the regulators would simply change the regulations allowing the miners to try other techniques in the hope that they would finally get it right. As a result:

- Many shallow aquifers have been damaged as companies cycled through different chemical solvents and oxidizers.
- Deep aquifer are threatened by unproven disposal technologies.
- Permits have been changed in order to allow for increasing contaminate levels in the aquifers.
- Large amounts of land have been contaminated by spills and untested surface disposal techniques.
- Workers have been injured by unsafe work practices and jerry-rigged equipment.
- Future generations are threatened by this long-term, mobile threat.

Although the public as actively worked to stop the permitting of new sites, the agencies have never denied a permit in the 60 years that the industry has existed. Since Texas has allowed the industry to become established, companies all over the world have been given the green light to use In-Situ mining.

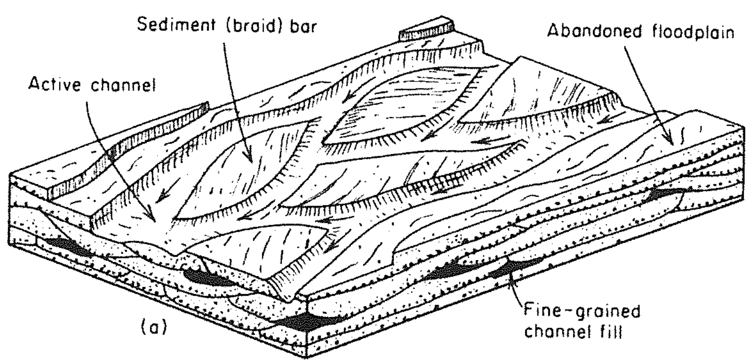
Groundwater Geology

Groundwater is commonly found in the materials laid down by river channels and floodplains. This includes gravel, sand, silt or clays. A layer of sand might be deposited under a particular environment, and over time, water accumulates forming an aquifer or groundwater reservoir. They are known as alluvial deposits or aquifers, and due to the inherent complexity of shifting river channels and everchanging flow velocities, the exact layering and connection of sands or clays can be difficult to determine, even with an extensive number of boreholes. Two distinct types of alluvial deposits are recognized: braided river and floodplain alluvial deposits.

Floodplain river environments also contain coarsegrained deposits of sands and gravels, but are typically dominated by finegrained silty or clay deposits. They are characterized by lower slopes and smaller flow velocities. The complex channels that are formed are also highly variable and very difficult to characterize with borehole data.

Braided river environments generally occur in settings where the sediment available for transport has considerable coarsegrained sand or gravel and where river velocities are large due to steep regional topography. Sequences of sands and gravels can develop, with only minor zones of silty or clayey sediments. The flow of groundwater through an old braided riverbed can often thus be unpredictable due to complex channels and bars (braids) that are formed during deposition.

Figure 2 - Braided River Environment (Freeze & Cherry, 1979)

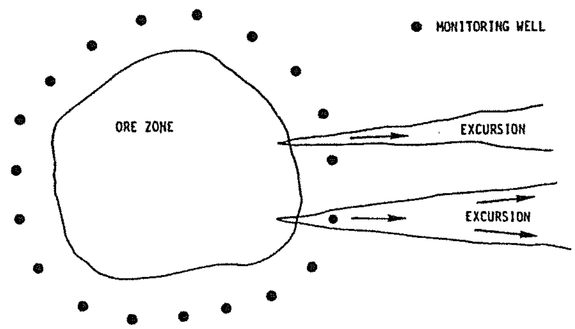


Other types of sedimentary type groundwater systems are formed by the action of winds (aeolian deposits) or glaciers. They are also highly variable, and are characterized by fractures and variable properties. Fractures, or lines where the sediments are discontinuous, often provide avenues for groundwater flow to escape.

Monitoring by Guessing

The industry suggests that by sucking excess water out of the aquifers, they can control the movement of the underground fluids. To achieve this, the mines dispose of 10% of the leaching fluid that is sucked out of the ore field; this fluid is called the "bleed stream". Newer mines claim that by leaching sander formations, they can use bleed streams that are less than the 10% average. The bleed stream creates an area of negative pressure underground around the suction wells; know as the "cone of depression". It is

suggested that this continuous, excess suction can control the flow of the leaching fluids by pulling the injected fluids back into the suction wells before they can migrate offsite.

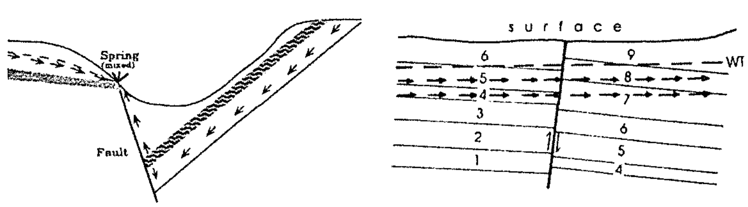


But this cone of depression technique is flawed because the complex nature of the aquifer geology makes it impossible to predict what is going to happen underground. The industry acts like the aquifer is composed of uniform beech sand where all the material is the same size and porosity. As described above, these strata are full of rocks, clay and sand lenses of different sizes and porosities. The injected fluids take the route of least resistance, flowing in narrow and torturous paths in a non-homogeneous stratum. It is impossible to monitor the fluids because it is impossible to know where to accurately place the monitor wells. The monitor wells can be isolated from the fluids by impermeable barriers or stagnate zones. To illustrate this problem, it is common for contaminates to be discovered in private wells outside the monitoring ring, un-detected by the mine's monitor wells.

No Such Thing as Impermeable

The key requirement of In-Situ technology depends on an impermeable layer above and below the injection aquifer. The presence of fractures can cause unpredictable contaminant migration away from a site. South Texas is a hot bed of oil and gas exploration, the geology is a Swiss cheese of abandoned oil well exploration holes. These holes are direct access into other aquifers. During the early years the In-Situ, the industry drilled thousands of holes exploring for uranium and then thousands more holes defining the shape of the ore bodies. None of the early holes were plugged. At the Bruni site, when the injection pumps were turned on for the first time, hundreds of open holes suddenly became fountains. The same thing happened at U.S. Steel when several upper aquifers were also contaminated from open holes.

Figure 17 - Idealised View of Some Typical Faults (Mazor, 1997)



Natural fault zones exist in these areas. These faults are what caused the uranium to lockup in the first place because they allowed the reducing gasses from lower formations to seep up the fault cracks and replace the oxygen in the upper aquifers, and this created the reduced atmosphere necessary for uranium to lockup. The very nature of uranium formations requires the ore bodies to be located in fractured, porous zones.

Mining changes the stable, steady-state environment of the uranium by making it mobile so that it can be remove from the aquifer. This mobility allows the uranium to freely travel on its on. The industry stresses any contaminates are contained by impermeable layers above and below the ore zone but as explained earlier, this impermeability is unlikely. The industry has tried to recreate the reduced atmosphere underground but they have not been successful. No technology currently exist that can return the uranium to its safe, reduced state.

For an excellent 144 page Australian report on aquifer problems see: "An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining", by Gavin Mudd, Victoria University of Technology". Go to this website: http://www.sea-us.org.au/pdfs/isl/no2isl.pdf

Disposing of the Waste

During processing, only the uranium oxide is removed leaving behind 98% of the radioactive and heavy metal toxic waste that must be disposed of.

Early mines tried to dispose of this waste in surface evaporation ponds. Heavy rains and broken float valves caused the ponds to overflow frequently. The solvents used in early mines became progressively harder to evaporate as the chemicals in the solutions became more concentrated. The radon out-gassing from the millions of gallons of radioactive water stored in the ponds was very high. The solid radioactive waste that remained after evaporation was simply stockpiled onsite. All these problems increased worker exposures.

Five sites were allowed to dispose of their radioactive wastewater by irrigating it directly on top of the ground. The EPA stated that this type of disposal was not acceptable and the Texas agency personnel fought to prevent the practice, but agency permitted the sites anyway.

One of the most notorious sites was the 105-acre Everest Exploration irrigation site was located 900' from the shoreline of Lake Corpus Christi, the drinking water supply for 1,000,000 people. The agency personnel suggested that *approximately 50% of the fluids dropped on the ground at the site wound up in the lake*. Eventually, after 4-years of operation, the agencies realized this technology was a mistake and outlawed the practice (see the "Everest Exploration" section).

Because of the problems caused by early disposal techniques, the state has allowed the industry to use deep well injection to dispose of their wastewater into lower aquifers. This has caused a whole new set of problems.

Other states consider deep well injection to be a questionable practice and most have outlawed the practice but in Texas there are over 32,000 thousand deep well injection sites. Texas is the birthplace of the deep well injection technique and it has the largest concentration in the world. It came about because

the oil industry wanted a cheap way to dispose of excess saltwater from oil well operations. Using deep wells to inject saltwater is not the same as injecting radioactive waste.

Deep well injection pumps the waste into the lower aquifers *basically transferring the ore body to a deeper aquifer.* Deep well injection creates two contaminated sites: the original shallow aquifer and the newer deep aquifer, both are oxidized and migratory.

The deep aquifer waters are under great pressure from the inflow of fresh water into the water column. Given any chance, they will flow into and contaminate upper aquifers. *The agencies do not allow monitoring of any strata below the mined ore field.* Because of this, we have no idea how much damage has been done to the lower aquifers.

The agencies feel that allowing monitor wells to penetrate below the "impermeable" layer of the mining zone would increase the risk of contaminates migrating past the impermeable cap. This is a reasonable concern but there are already many possible natural and artificial excursion paths in the cap including the fault zones. The dangers posed by deep injection require monitoring of all the lower aquifers.

Aquifer Protection

Over the years, the industry has tried many types of leaching fluids in an attempt to find one that would work properly. These fluids have included: ammonia, sulfuric acid, hydrogen peroxide, carbonated water, baking soda, and oxygen. The worst of these was the ammonia used in the early mines. It was found to lock up on the clays in the aquifer and was impossible to flush it out of the aquifer (see the "Bruni" section below).

Current technology involves the use of oxygen in the leaching fluid to oxidize the ore atmosphere and make the uranium mobile. The industry claims that this is safer than older techniques. But concerns exist because oxidization unlocks the uranium and allows it to migrate.

Large amounts of uranium waste products remain in the aquifer after mining. In public hearings the companies promised the local communities that they would cleanup the aquifer to the baseline levels and originally, all mining permits required that the aquifers to be cleaned up to the original pre-mining levels. But over the years it became clear that the companies could not do this, so the state changed the rules and allowed increased contaminates in the aquifers. Even at these increased levels, companies could not meet permit requirements. An examination of 32 permits from closed Texas In-Situ mines showed that *in each case*, companies were permitted to leave behind higher levels of contaminants in the groundwater than were allowed in the permit (Corpus Christi Caller-Times, Nov. 5, 2006). These included elevated levels of contaminates such as calcium, nitrate, magnesium, potassium, bicarbonate, sulfate, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, and uranium. In some cases, companies were able to meet the restoration target for one mineral but reported 10- and 20-fold increases in others. Older mines tended to require more drastic permit amendments; some mines had to have their contaminate levels increased several times and some mines were closed without ever getting anywhere close to cleanup requirements.

After the companies finish mining, the oxidized atmosphere that remains underground continues to leach

the ore field. The industry tries to remove the remaining ore by flushing the aquifer with billions of gallons of clean water. But when the flushing stops, the oxidizing action continues on unlocking the large volume of ore that remains. At the Bruni In-Situ, mine 35% of the profitable uranium remained in the aquifer after the wells were plugged and the mine had shut down. U.S. Steel used over 2,000,000,000-gallons of water without being able to reach the permit requirements.

Currently, the companies are allowed to close down an In-Situ site if during restoration, the monitor wells in the aquifer do not show significant increasing contamination for a 3-month period. 3 months is a ridiculously small amount of time. Since the ore is located in stagnate flow zones, movement of contaminates will not show up in the wells in 3 months. But the oxidation does not go away and the waste will eventually will find their way into the faster flowing aquifer.

At the end of the 3-month period the agencies allow the companies to plug all the onsite wells. At this point there is no way to detect any increases. That is until they show up in down-dip private wells. The agency has no plans to monitor these wells

Exposure Levels

In-Situ mining is a process of removing the uranium ore bodies in the aquifer and delivering them to the surface. The leaching fluids sucked out of the ore fields contain large amounts of radioactivity. Once on the surface, the public is exposed to the dangers.

Table 6 - Average Leach Solution Composition - Minor Elements (mg/l)
(Underhill, 1992)

Element	Acid	Alkaline
Arsenic	<0.05	<0.05
Copper	1.00	0.04
Zinc	4.30	0.10
Lead	0.70	0.20
Iron	25.40	0.60
Nickel	0.60	0.06
Chromium	0.15	0.07
Strontium	3.70	1.50
Zirconium	3.30	0.90
Selenium		1.60
Manganese	1.20	
Molybdenum		0.90
Radium-226[1]	390	1,750
Vanadium	1.00	
Cobalt	0.20	

[1] - pCi/l

This fluid is pumped from the wellheads to the processing plants by a network of miles of PVC pipe. This fluid is concentrated with very high levels of radioactive and hazardous materials. These pipes frequently break and decouple, releasing thousands of gallons of fluid. Long periods of time can elapse before workers discover and repair the leaks. The worst site is the U.S. Steel plant and even though they were fined many times for not reporting their spills, the incident files of the Bureau of Radiation Control show over 1.2 million gallons of radioactive spills (see the "U.S. Steel / Niagara Mohawk – Clay West" section below).

The holding tanks at the processing plant must be vented to atmosphere in order for the tanks to be filled. They are a large source of Radon gas to workers and anyone in the downwind direction. At U.S. Steel, leaching fluids contained a radon content of 167,000 pCi/l (pico Curries per litter).
The In-Situ processing plants produce large amounts of solid radioactive sludge, filters, resins, plumbing parts and equipment that must be disposed in a nuclear dump. They are stored onsite until a large quantity can be assembled for shipment to a nuclear dump. Disposal cost are high and the companies frequently allow the waste to pile up to dangerous levels requiring the agencies to force the removal. This waste used to be disposed of in the tailings ponds at Conquista and Panna Maria but they are closed. Currently, the companies dump their waste at the Envirocare site in Utah or one of several tailing ponds in Utah and Wyoming that are still open.

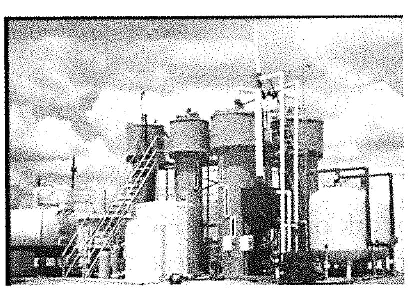
In-Situ Site Examples:

The Utah Construction and Mining Company built the first experimental In-Situ mine in 1963, near Shirley Basin, Wyoming. In was later converted to a conventional strip mine.

Chevron Palangana:

The Palangana is located in Duval County, Texas. Originally started as a conventional underground mine in 1960, it was converted to a test facility for a new mining technique called "In-Situ" leaching. This was the earliest experimental In-Situ site in Texas. Because of on-going problems with the In-Situ process, the project was shut down in 1979 after mining only 314,000 pounds of uranium. There is still 5.6 million pounds of uranium in the ground. The site was allowed to close by the regulatory agencies in 1999 after a long and unsuccessful attempt to restore the aquifer back to the permit requirements. We are investigating this site and will have further information available in the future.

Bruni-Westinghouse:



In 1971 Wyoming Minerals, a wholly owned subsidiary of Westinghouse Electric Co. (now a division of Siemens) began laboratory studies on In-Situ mining methods.

Westinghouse became involved in the uranium mining business for a particularly unusual reason. During the early days of the nuclear age, the government wanted to commercialize nuclear power, as a source of electricity but no utility would build a plant because they felt the technology was too dangerous.

The government's Atomic Energy Commission (AEC) had a monopoly on uranium sales in the U.S. and they had fixed the price of the ore. This allowed Westinghouse to offer the utilities long-term contracts to

supply them with fuel at a fixed cost. Fixing the fuel price was a good deal for the utilities because it allowed them to stabilize the consumer's electric rates.

In the beginning, this worked well for Westinghouse and they built several plants. But in 1970 the AEC released their market controls on uranium and this caused the cost of the ore to skyrocketed. Westinghouse found itself going bankrupt trying to supply fuel to the utilities.

In an effort to find a cheaper source of uranium, Westinghouse went into the In-Situ uranium mining business. They built the pilot In-Situ plant in Bruni in 1973 to test an unproven, experimental ammonia leaching process. It was a consortium of Wyoming Minerals-Westinghouse, Union Carbide, Pechiney Ugine Kuhlman, Conoco Oil, Pioneer Nuclear, Cleveland Cliffs, and Getty-Skelly Oil.

Geoffrey G. Hunkin, a mining engineer, developed this process. In his resume he states that this technology is "comparable in economic importance to the introduction of carbide drill bits and ammonium nitrate blasting agents," and he claims the benefits of In-Situ mining are low capital cost, short lead times, and low labor requirements. Mr. Hunkin was responsible for developing the Bruni plant and running it. The plant was designed to produce 250,000 lbs of uranium a year.

The Bruni-Westinghouse was unlicensed and operating for 4 years until 1975 when the Texas Water Commission (TWC) learned of the site. The TWC decided to take legal action against Westinghouse for starting a uranium mine "without any concurrence" from the TWC. But after a couple of weeks, for some unknown reason, the Bureau decided to license it instead. The industry wanted this cheaper technology and since it was clear that strip mining had many problems, the agency probably felt that it was necessary to promote newer and hopefully safer technologies. But the agency based its decision on faulty information provided by Westinghouse and by the time the agency realized their error, the industry was already well established.

Westinghouse claimed in their permit application in 1975 "test in small well fields have shown that they could restore the aquifer to original condition by simply reticulating the groundwater through the ore zone for a few weeks". Five years later Westinghouse admitted, "Developments in restoration technology have not advanced as far as was hoped, and after several years experience in mining and restoration, we now have a more realistic understanding of the limitations of the technology". They estimated that it would take 30 changes of very clean water to clean the aquifer. This amounted to 270,000,000-gallons of fresh water required to lower the levels to 100mg/l ammonia. The TWC permit required the aquifer to be returned to 0.8mg/l ammonia. To achieve this level billions of gallons of very clean water would be required.

In 1987 the Texas Water Commission (TWC) amended the permit to increase the aquifer exemption for ammonia to 5 mg/l. Uranium levels were increased 15 times and conductivity increased to 25 times. The Texas Department of Health warned the TWC to "consider carefully whether to remove the aquifer exemption because of extremely high ammonia levels". This was the beginning of the practice of increasing contamination levels whenever a company could not meet their clean-up requirements.

Westinghouse suggested that the ammonia would eventually breakdown in 3,000 to 3,500 years and should not migrate more than 3,500' during this period. There were no independent studies to back up this statement.

They were never able to clean up the aquifer; it is still loaded with ammonium. Westinghouse estimated that the ammonia carbonate-bicarbonate leaching solution was 65% effective at recovering uranium for the ore field, meaning that 35% still remains in the aquifer, available to migrate. Westinghouse estimates that for every 40 square feet of the ore body, approximately 4,330 lbs of ammonia remained in the aquifer. Eventually the site was closed down with the blessing of the Bureau. They removed all the monitor wells so that it is impossible to determine what is going on underground.

Bruni used five (5) evaporation ponds capable of holding 2,169,173 gallons of fluid in order to evaporate the excess leaching bleed stream. Uranium content in the leaching fluid was 15%. Workers were exposed to high levels of Radon out-gassing form the ponds. The workers were exposed to frequent pond overflows and to the evaporated solid waste that was piled up next to the ponds.

The state licensed In-Situ as a technology before anyone knew if it was safe! There was no public input, no independent studies, and no idea if Westinghouse could ever make the system work. Once the Bruni site was licensed it opened the door for every other company to use this technology and today we are paying for this mistake with the flood of new IN-SITU mines all over the world.

The history of Bruni is one of radioactive fluid spills, uncontrolled migration of radioactive water off site and worker overexposure. Despite this, Westinghouse received only one fine during this time.

For more detail, see the Texas Energy Alliance report: "Analysis of In-Situ Uranium Mines U.S. Steel / Niagara Mohawk and Westinghouse / Wyoming Minerals".

U.S. Steel / Niagara Mohawk – Clay West:

In 1973 the U.S. Steel Co, DALCO Oil Co, and Atlantic Richfield Co. began an experimental ammonia IN-SITU test pilot plant between George West and Freer on Hwy 59. In 1975 they opened the Clay West site. This was the first, large-scale commercial In-Situ uranium mine capable of producing over 1,000,000 lbs of uranium a year. U.S. Steel expanded their operation and opened the Burns site adjacent to the Clay West with a rated capacity of 4,000,000 lbs of uranium a year.

Niagara Mohawk, the electric utility company for upstate New York, became a 50% partner with U.S. Steel by buying a portion of their ore field. They invested $86,000,000 to insure the fuel supply for their two nuclear power plants, Nine Mile One and Two, located in Oswego County, NY. In 1987, a television station revealed that Niagara Mohawk was charging their customers $40 a pound for uranium that could be bought on the open market for $15 a pound. This launched an investigation that showed Niagara Mohawk was on the verge of bankruptcy because of bad investments.

The agencies documented 82 worker overexposures during U. S. Steel's 11-year operation. Overexposure was routine at this plant and could not be avoided because of the plants design:

•) The plant was designed with no conveyance system. The liquid uranium was routinely transferred between processes by dumping it on the floor of the plant where workers would then

use shovels to scoop it into the nearest sump pit so that it could be pumped to the next process. This was contrary to the original design allowed by the permit.

•) It was discovered that the concrete sump pits had been eaten away by the acids in the uranium slurry. During excavations for a foundation at the plant, it was discovered that the entire plant was floating on uranium-saturated ground. Test show that the soil contained from 32mg/l to 3060mg/l uranium concentrations.

•) During an inspection of the U. S. Steel trash pit and storage areas in 1980, a gamma radiation survey showed levels so high that it "pegged" the Geiger counter needle and readings could not be taken.

•) According to a report "The Uranium District of the Texas Gulf Coastal Plain" written by Lewis M. Cook in 1978, the fluids at U.S. Steel showed a radon content of 167,000 pCi/l. "This implies that very high levels of radon in the air can be expected above the water in tanks". All the tanks at In-Situ plants are vented to atmosphere. Worker at U. S. Steel were exposed to high radon levels.

•) During an agency inspection, uranium was observed flowing off the plant floor onto the ground. A solid yellow sheet of dried uranium was observed covering the ground beside the plant foundation.

•) An inspection of the control room found a chair seat coated with yellow cake measuring 1,300 counts per minute, *alpha radiation.*

•) On 8/22/81 the company blamed the workers for the high exposure levels at the plants. They said that poor personal hygiene is to blame.

•) The company reported on 2/17/82 that they had dumped 500 lbs of radioactive ash in the George West town dump. A survey of the incinerator at the plant showed a reading of 30-60 ur/hr. Radioactive material was being disposed of by burning. This was very dangerous because the radioactivity does not burn and it becomes airborne. Inhalation is the most deadly form of radiation exposure.

•) While digging a pit at the Burns plant on 8/31/83, the company discovered a plastic sewer line that used to service the old employee change room. On further investigation, the entire drainage field and septic tank was found coated with uranium. The uranium came from workers washing off the yellow cake that coated their bodies at the end of the workday. A TBRC inspector arrived on 4/17/84 and surveyed the area. Even though all of the pipe, septic tank, and drainage field pipe had been removed, the background Geiger counter reading showed 5,000 counts per minute, gamma radiation (average is 8 counts per minute).

•) During an attempt to clean up a uranium spill that had occurred, workers from three companies in Corpus Christi were overexposed to radioactivity while repairing a machine for U.S. Steel. A TBRC inspector accidentally discovered this on 3/18/85 while inspecting the Corpus companies.

•) The largest overexposure ever recorded in the TBRC files was a U.S. Steel worker on 8/9/82. Armand Salazar was exposed to a uranium level in his urine at a level of 50,494ug/l (30mg/l is the overexposure limit). The company suggested that his sample was contaminated and discounted it. They immediately fired Mr. Salazar in order to eliminate any future liability. This effectively caused the other workers to cover-up overexposures.

Because of the unplugged exploration holes at U.S. Steel, all the upper aquifers were contaminated.

In-Situ processing plants are connected to the well field by miles of PVC plumbing. The agency records show that U.S. Steel's pipes were particularly bad at breaking. Over 22 spills were reported at the U. S. Steel. A total of 1,200,000 gallons of radioactive spilled.

On 6/19/81, the largest surface spill ever recorded by the regulatory agencies, occurred at the burns site when a fiberglass pipe ruptured spilling 850,000 gallons of leaching fluid. It flowed from 4:00 a.m. to 8:00 a.m. before workers noticed it. It flowed out and covered highway 59. U. S. Steel reported to the agencies that only 100,000 gallons of fluid had spilled. The owners of the land were shocked to read about the spill in the newspapers. Neither the company nor the agencies had notified them.

To give an idea of the radiation levels involved in these spills, a 90,000-gallon spill of leaching fluid on 7/01/80 showed gamma readings in the area made the Geiger counter needle go off the scale, making measurements impossible. As shown earlier, the leaching fluids at U.S. Steel contained a radon content of 167,000 pCi/l.

Current update of regulatory action:

- •) The Texas Natural Resources Commission (TNRCC) allowed U. S. Steel to relax the restoration standards in 1998 at the Clay West and Burns/Moser sites allowing for increased contaminates in the aquifer.
- •) In 2001 they released the sites for unrestricted use.
- •) In 2002 the Texas Department of Health terminated the license for U. S. Steel.

U. S. Steel used over *2 billion gallons of water* trying to lower contaminate levels in the aquifer but was never able to reach the permit requirements.

During this time, *the agencies never levied a fined against U. S. Steel!*

For more info see the report, "Analysis of IN-SITU Uranium Mines U.S. Steel / Niagara Mohawk and Westinghouse / Wyoming Minerals".

Everest Exploration:

Everest Exploration's Mount Lucas site was a 9000-acre IN-SITU mine on the west shoreline of Lake Corpus Christi, the drinking water supply for a million people. Everest was allowed to irrigate a 105-acre irrigation site with radioactive wastewater. This is one of 5 sites in the state that were allowed to dispose of radioactive wastewater by surface irrigation. It is probably the worst site because it affected so many people.

The original permit for the mine required the radioactive waste water from the processing mill to be disposed of by deep well injection but Everest wanted to use the cheaper irrigation disposal method. The personal of the Texas Bureau of Radiation Control (TBRC) opposed the idea of radioactive wastewater disposal by irrigation. But on October 1983, the TBRC gave Everest permission to begin the untested

irrigation project on 22.5-acres located 900 feet from the shoreline of Lake Corpus Christi. The law required the Texas Department of Health (TDH) to give its permission for the project but they never did.

From 1983 to 1985 Everest was allowed to monitor the site by themselves. In 1984, the TDH personal discovered Everest had cut and bailed the radioactive hay growing on the test plot. The company intended to sell the hay for cattle feeding.

In 1985, TBRC allowed Everest to expand its irrigation site an additional 88-acres although the original 22-acre site was already showing radium-266 contamination levels 4 to 93 times higher than the permit allowed.

They were required to pre-treat the waste by using barium-settling ponds to remove the excess radioactivity from the water before irrigation. The TRBC set In-Situ limits on the treated irrigation water at 400 pCi/l radium, even though the EPA had set limits for In-Situ mine water discharge at 10 pCi/l radium. Again the TBRC personal voiced their opposition to irrigation. They opposed the "dilution-is-the-solution" disposal method and argued Everest's apparent lack of public responsibility. They pointed out that the aerosolizing / evaporation of 400pCi/l radium water would contribute significantly to the public exposure.

An inspection in 1986 noted irrigation water flowing south out of the irrigation plot and draining close to the edge of the lake. Cattle and geese were observed feeding in this area. Radium levels in the soil in this area were above the 5pCi/l remedial action limit. Another inspection that year noticed that Everest had begun to plow inside and outside the irrigation area in an attempt to spread the radiation over a larger area in order to lower the radium levels below the 5 pCi/l remediation limit.

It was reported in the 1986 Environmental Assessment report that the barium-settling pond had been built with no soil testing and no liner under the pond. The soil under the ponds was described as high permeability and the base of the pond was within 5' of the water table.

In 1986, the TRBC discovered that the company never monitored the aquifer at the site. According to the agency personal, <u>50% of the irrigation water used at the site had percolated into the shallow water table at the site.</u> According to the 1986 Environmental Assessment, the 10' deep water table was shown to rise and lower with the lake meaning it was directly connected to the lake 900-feet from the irrigation plot.

In 1987, it was discovered that Everest had not periodically removed the clay bottom as required in the permit. This was necessary to insure that the radioactive particulates that settle out of the waste stream do not build up to high levels on the pond bottom. The clay liner must be disposed of yearly at a licensed nuclear dump. That same year the TBRC discovered that Everest had used the wrong type of clays when building the ponds and the French drain monitor system under the ponds had been showing increased leaking out of the ponds.

From the beginning, the agency personal opposed this disposal but the agency licensed it anyway. After years of violating the permit requirements, the Bureau of Radiation Control closed down the site, admitting that it should never have been licensed. *The agencies never informed the citizens of Corpus Christi about the problems at the site.*

On 2/25/2002 the state issued an Emergency Order for cleanup of three Everest Exploration's sites including the Mt Lucas site. Everest also owns the Palangana, Rosita, Hobson, Tex 1 and Las Palmas IN-SITU mines.

It is interesting to note that in the 90's, it was discovered that Hugo Berlanga, the Speaker Pro-Tem of the House of Representatives, was discovered to own minerals at the URI Rosita In-Situ mine in Duval County, Texas.

For more detail, see the Texas Energy Alliance report: "Surface Exploration at the Everest Exploration, Mt. Lucas Site".

Total Minerals Corporation/COGEMA/AREVA:

There are foreign influences in Texas that are affecting our laws and contributing to our waste problems.

France is totally dependent on nuclear power plants for its electricity. In order to secure fuel for its plants the France must look to other countries for uranium ore. The French government through the French Atomic Energy Commission and the Electrical Company of France controls all aspects of the nuclear industry in France. In order to secure a stable, non-3rd world source of fuel, France has invested heavily in Texas.

Total Mineral Corporation jointly owns several In-Situ sites in Texas with Areva NC (formally COGEMA), a subsidiary of AREVA, an industrial group. Areva NC is 81% owned by the French State through the French Atomic Energy Commission with Total Minerals Corp. owing 15% and Technip (an engineering firm) 3.5%.

In Texas, Total Minerals owns 71% of the El Mesquite In-Situ mine and the Electrical Company of France owns the other 29%. They also own the Holiday, West Cole and O'Hern mines.

Areva NC provides uranium, conversion and enrichment services to 80% of the nuclear power plants in the United States. They are responsible for 52% of the world reprocessing capacities and over 80% of the MOX fuel fabrication capacities. Areva NC has a history of legally questionable activities and scientifically questionable decision-making in France (for more information see - http://www.bredl.org/pdf/Cogemafile100102.PDF).

The French promote nuclear technology to the world as a safe and clean source of electricity. But in fact, they are very dependant on other countries to dispose of their waste:

•) The mining process leaves behind 97% of the radioactive material as waste that the host country must deal with.
•) The ore is concentrated at a U.S. conversion facility before shipment to France leaving behind high-level waste product that must be disposed of in America.

Other Cowboy Stories

In the mining districts, local stories about the industries reckless practices are common:

- In Karnes County, the companies allowed the tailings waste to be used for driveways, concrete mixes and home foundations. Eventually these sites were quickly dug up by the state after a San Antonio TV station ran a special documentary about the issue.
- To lower liability, most companies did not hire the employees that worked for them. Instead they hired a subcontractor whose sole purpose was to provide an added layer of liability protection.
- Workers that had overexposures were frequently fired to remove any complications with health and liability issues. This caused many workers to falsify exposure levels in order to keep their jobs.
- Workers in the early strip mines wore no mask or protection of any kind. They described the air in the bottom of these pits as being so dusty that they had to drive their equipment in the middle of the day with the headlights on.
- Workers at the early In-Situ processing plants describe working in the drier rooms where the companies used simple open-air peanut roasters to dry out the uranium slurry. The dryers were located in un-insulated metal buildings that would heat up to over 150F in the summer. The workers would work in the nude with no protection. By the end of the day they would be entirely covered in uranium yellow cake.
- During the early years, prospectors used airplanes with sensitive instruments to find ore deposits. One flight over Karnes City recorded a radiation spike. On further investigation, it was discovered that the radiation came from clothes drying on a clothesline. They belonged to a worker from one of the uranium mines.
- For years, some companies would transport their wet yellow cake slurry from the mine to the processing plant. In some cases these plants were located several counties away. The ore was transported in open, unlined dump trucks that leaked the slurry out the tailgate onto the highway. Uranium is electrostatic and cannot be easily removed from surfaces without using acids washes. In some large spills, the state required the pavement to be jack-hammered away in order to remove it for disposal.
- A secretary that worked for one company in Kennedy, Texas explained that they would take orders for uranium over the phone. The yellow cake was stored in brown paper bags in a closet in the main office. The secretaries would have to go into the closet to retrieve the orders. A yellow cloud of dust would float into the room and remain suspended in the air, coating everything in the room. Uranium is electrostatic and will not settle until it becomes grounded on an object. The secretaries were never told of any radiation danger and never wore any protection.
- The industry still demonstrates in schools and public meetings how harmless uranium is by using a Geiger counter and a piece of paper to show how alpha waves can't penetrate the paper. This is supposed to demonstrate how safe uranium is because it can't penetrate human skin.

What they don't tell people is that uranium is a strong emitter of alpha radiation and alpha rays use up all their energy in the first 4 cells of the human body if inhaled or ingested. Once alpha-emitting uranium enters the stomach or lungs, it circulates through the body and eventually

passes through the kidney where it is excreted in the urine. Because of the high energy levels of the alpha radiation, it is considered the most deadly form of radiation inside the human body.

ANALYSIS OF INSITU URANIUM MINES

U.S. Steel / Niagara Mohawk and Westinghouse/Wyoming Minerals

By The Texas Energy Alliance

INTRODUCTION

Uranium IN-SITU solution mining is the process of leaching uranium from an undisturbed underground ore body by injecting leaching solutions into the ore deposit so that the uranium becomes mobile enough that it can be pumped back to the surface for processing. The ore bodies are found locked up in shallow aquifers and it is necessary to nave an impermeable layer above and below the aquifer so that the mining solution can be contained, preventing other areas from becoming contaminated.

This paper describes two of the earliest insitu mines in the world: The U.S. Steel and the Westinghouse. These sites are similar because they both used an ammonia carbonatebicarbonate leaching solution in the mine and as a result have experienced problems associated with the outdated and dangerous use of ammonia.

IN-SITU mining in the state of Texas was regulated by two agencies: the Texas Bureau of Radiation Control (TBRC), and the Texas Water Commission (TWC). The TBRC regulated all issues dealing with radiation and the TWC regulated the parameters for groundwater protection. The information on the U.S. Steel site found in this report comes from the incident files of the TBRC and involves violations of their license. The Westinghouse information comesfrom the TWC files and focuses mostly on the aquifer. These two files give a general picture of the day-to-day problems associated with insitu mining. To comprehend the full extent of the problem, the entire files of the TBRC and the TWC should be studied.

HISTORY OF THE SITES

Utah Construction and Mining Company in 1963, near Shirley Basin, Wyoming, built the first IN-SITU mine. Since that time, most IN-SITU mining has been concentrated in Texas and Wyoming.

In 1971 and 1972, Wyoming minerals, a whollyowned subsidiary of Westinghouse Electric Co., began laboratory studies on IN-SITU mining methods. Westinghouse became involved in the uranium mining business for a particularly unusual reason. Westinghouse was a large builder of nuclear power plants in the early days of the commercial nuclear age. Westinghouse secured construction contracts by guaranteeing to supply the electric utilities with all the nuclear fuel they needed at a fixed price. Westinghouse could do this because the government at the time owned all uranium reserves, and the price was tightly regulated. But in the 60's Congress decided to relinquish ownership of the ore in order to encourage private development by industry. As a result, ore prices skyrocketed and Westinghouse found itself losing millions of dollars trying to meet their fuel contracts.

In an effort to find a cheaper source of uranium, Westinghouse built a pilot insitu plant at Bruni, Texas in 1973, to test their experimental ammonia leaching process. Geoffrey G. Hunkin, P.E., mining engineer, developed this process. In his resume (see 6/2/75) He states that this technology is "comparable in economic importance to the introduction of carbide drill bits and ammonium nitrate blasting agents." and he claims the benefits of insitu mining are "low capital cost, in the range of $5.00 per pound of annual U308 production, coupled with short lead times and low labor requirements, add up to an attractive financial package." Mr. Hunkin was responsible for developing the Bruni plant and from 1971 to 1975 he managed a consortium of Wyoming MineralsWestinghouse, Union Carbide, Pechiney Ugine Kuhlman, Conoco Oil, Pioneer Nuclear, Cleveland Cliffs, and GettySkelly Oil that was established to develop uranium insitu leaching processes in Texas and Wyoming.

In 1973 and 1974, U.S. Steel Co., DALCO Oil Co., and Atlantic Richfield Co. began an experimental ammonia insitu test pilot plant at George West, Texas. In 1975 they opened the Clay West site. This was the first large-scale commercial insitu uranium mine capable of producing over 1,000,000 pounds of uranium a year. U.S. Steel expanded their operation and opened the Burns site adjacent to the Clay West with a rated capacity of 400,000 pounds of uranium a year.

Niagara Mohawk, the electric utility company for upstate New York, became a 50% partner with U.S. Steel by buying a portion of their ore field. They invested $86,000,000 to insure the fuel supply for their two nuclear power plants, Nine Mile One and Two, located in Oswego County, NY. In 1987, a television station in Syracuse, NY, revealed that Niagara Mohawk was charging their customers $40 a pound for uranium from the mine although it could be bought on the open market for less than $15 a pound. Today Niagara Mohawk is on the verge of bankruptcy because of their nuclear ventures.

In 1975, Wyoming MineralsWestinghouse opened the full scale Bruni plant, capable of producing 250,000 pounds of uranium a year. They also started operation at the Lamprecht mine east of Three Rivers, Texas. On 2/18/75 the Texas Water Commission considered taking legal action against Westinghouse for starting a uranium mine "without any concurrence" from the TWC (see 2/18/755). During this time, Wyoming Minerals was in the process of building the Irigaray IN-SITU mine in Johnson County, Wyoming, and the Grover insitu mine in Weld County, Colorado.

Many other ammonia insitu sites exist in Texas and today most of these mines are closed or in the process of closing because of the problems associated with the ammonia process. Serious questions exist about the future safety of these sites.

THE NATURE OF THE ORE BODY

Long ago, volcanic eruptions in Mexico blew volcanic ash into South Texas where it settled on the ground. Over the centuries the uranium in the ash was leached into the groundwater where it migrated out to the Gulf of Mexico. But in some areas the uranium locked up the clays in the aquifers because of the presence of reducing atmospheres (usually caused by hydrogen gases seeping up fault zones from lower oil deposits and displacing the oxygen in the aquifer).

For centuries these isolated and very stable pockets of concentrated uranium have existed in the South Texas aquifers and they have caused few problems when left alone. Most problems develop when humans drill holes into these ore fields. For example, the town of Flatonia, Texas, east of San Antonio, has a radon concentration of 9,000 pCi/l in their municipal water supply. Oil field brines in Panna Maria, Texas, southeast of San Antonio, have shown a radium content of 317 pCi/l. Measurements at some natural gas processing plants have shown readings on the ground higher than 30 uR/h. This situation needs to be studied further to determine the extent of the problem.

The undisturbed ore is usually buried 100 feet or more below ground, making dangerous levels of radiation exposure and radon outgassing impossible. All TBRC environmental assessments completed at mine sites before mining began show levels of background radiation and radioactive products in the environment to be below the average background levels for the entire United States. The Westinghouse ore was located 120 feet below the surface and the U.S. Steel was found below 350 feet. The only area of the state where ore was found close to the surface was the Falls City area. According to a DOE study, rainfall was responsible for washing the surface clean of the high levels associated with an ore body. Commercial grade ore was found several feet below the surface, reducing the amount of radiation and radon outgassing from the ore.

The aquifer surrounding an ore deposit is generally free of the high contamination levels that exist inside the ore body. Westinghouse explains in their permit application "water movement is virtually nil in the ore body because elevated radium concentrations are found only in the ore body and not the aquifer around the ore" (See 3/7/76) .

Samples taken before mining began show low levels of free, unlocked uranium in the groundwater, both inside and outside the ore body. At Westinghouse the average level of uranium in the ore field was between 0.21 mg/l and 0.331 mg/l. 200 feet outside the ore zone, levels were less than 0.06 mg/l (See 8/11/7 chart.) The uranium in the area water wells at U.S. Steel showed levels less than 0.5 mg/l (See 9/14/77 Chart).

THE EFFECTS OF MINING ON THE AQUIFER

The above examples illustrate how stable and isolated the uranium environment is, but when insitu leaching solutions are introduced, this steady state is destroyed. The solutions oxidize the reduced atmosphere in order to make the uranium mobile. Both U.S. Steel and Westinghouse used hydrogen peroxide in their leaching fluids. Before mining began, free uranium levels at Westinghouse averaged 0.692 ppm (See 6/5/85 chart).

The insitu solutions raised the free uranium levels to 160 ppm (See 3/7/75). Westinghouse states that the ammonia carbonatebicarbonate leaching solution is 65% effective at recovering uranium for the ore field, meaning that 35% is still bound up in the aquifer clays after mining is finished, available to migrate at some future date if it becomes unstable (See 3/7/75).

Ninetysix percent of the radioactivity remains in the ore body after the uranium has been removed. Radioactive thorium 230, the parent of radium and radon, half life of 78,000 years, remains in the ore waste. This is exactly the same radioactive waste that remains aboveground in a strip mine mill tailings dump but unlike a mill tailing dump, the IN-SITU waste can not be retrieved or isolated from the groundwater if serious problems develop.

Ammonia in the leach is absorbed by the clays and held tightly. This is the major problem with the ammonia process. This bound ammonia is undetectable by standard monitor well sampling. An estimate by Westinghouse after mining was finished, showed approximately 4.330 pounds of ammonia remained locked up in the clays for every 40' x 40' area of mine zone (see 6/5/85).

Many other toxic elements exist in a uranium ore body (molybdenum, arsenic, selenium, etc.) and their stability is also in question.

Before mining begins, thousands of exploration holes are drilled through the impermeable strata that lie over the ore in order to establish the exact shape of the ore field to determine the most profitable areas for mining. They are supposed to plug all these holes so that contaminants don't migrate out of the ore zone into other strata during mining. But this is hard to achieve and Westinghouse admits that exploration companies from 1960 to 1973 drilled “literally hundreds of holes”. "These holes were not plugged when the companies abandoned the area and therefore, left conduits for leachate migration” (See 12/29/78). The shallow aquifer at Westinghouse has been contaminated. Most other IN-SITU mines in Texas have experienced similar problems with migration. U.S. Steel has contaminated several areas of its shallow aquifer. It is interesting to note that there are no monitor wells allowed below the lower impermeable layer; the amount of damage caused by fluids leaking down into lower aquifers via old oil well holes and fault zones is unknown.

EFFECTS OF MINING ON THE SURFACE

During mining, high levels of radiation and radon from the ore zone are brought to the surface by the leaching solutions. A report by the TBRC "The Uranium District of the Texas Gulf Coastal Plain" written by Lewis M. Cook in 1978, showed that the fluids at the U.S. Steel, Claywest mine, contained a radon content of 167,000 pCi/l, "This implies that very high levels of radon in the air can be expected above the water in tanks." All tanks at insitu plants are vented to the atmosphere.

Westinghouse mentioned in their 1975 permit application the increased radium uptake by the leaching fluids. The mine fluids processed at the plant contained 150 mg/l uranium. The wastewater at the plant was evaporated in five open-air disposal ponds capable of holding 2,169,173 gallons of fluid. Uranium content of the fluid was 15 ppm. Worker radon exposure must have been high.

Part of the procedure for closing an insitu mine is to decontaminate the surface of any excess radiation levels. This includes pipe, machinery, buildings, pond liners, filters, and all contaminated Soil with excess radiation readings. All this waste used to go to the Conoco Conquista mine in Falls City, but this site is now closed and today there is no place in the state licensed to accept IN-SITU mining waste. Thousands of tons of solid radioactive waste exist in South Texas and more waste is being added daily. The exact amount of the waste is unknown and the TBRC needs to study this situation to comprehend the size of the problem.

RESTORATION AND THE LAW

The standard technique used to restore the aquifer at an insitu site is to flush out the contaminates with millions of gallons of fresh water. Westinghouse claimed in their permit application in 1975 that "tests in small well fields have shown that they can restore the aquifer to original condition by simply recirculating the groundwater through the ore zone for a few weeks" (see 3/7/75). Five years later Westinghouse admitted "developments in restoration technology have not advanced as far as was hoped, and after several years experience in mining and restoration, we now have a more realistic understanding of the limitations of the technology." "Original standards were known to be strict but were accepted with the expectation that the state of the art would solve some problems and the standards could be renegotiated (especially the standards for NH4+) in light of further experience and understanding" (See 12/18/80). It was discovered that aquifer clean up was impossible when using untreated groundwater. In order to flush out the pollutants, very clean water was necessary. A reverse osmosis process was developed which removed the contaminates from the water so that clean water could be recirculated in the aquifer. This resulted in a 30% stream of concentrated waste that Westinghouse disposed of in their deep disposal well. Westinghouse estimated it would take 30 changes of clean water in the aquifer, amounting to a waste stream of 270,000,000 gallons of fresh water to lower the ammonia levels to 100 mg/l (See 6/5/85 Testing by Westinghouse has shown that the reverse osmosis technique is capable of lowering the ammonia levels to 32 mg/l after 50 pore volumes, but the TWC license requires the aquifer to be restored to 0.8 mg/l. To achieve this level billions of gallons of water would be irretrievably flushed down the Westinghouse disposal well.

In 1987 the TWC amended the Westinghouse permit allowing them to increase many contaminate levels (see 1/22/87). The Texas Department of Health suggested that the TWC "consider carefully whether to remove the aquifer exemption because of extremely high ammonia levels" (See 12/9/86). The TWC increased the ammonia levels to 5 mg/l above the maximum levels found in each well before mining; this is lOx higher than the original levels (0.514 mg/1). Uranium levels were increased to 5 mg/l, 15x higher than the original levels (0.331 mg/1). Conductivity levels were increased 25% and sulfates were allowed to add 150 mg/l to the original levels. This permit amendment for Westinghouse would allow other sites to do the same.

The state agencies and the companies claim that the contaminates will not migrate very far because of the slow movement of the groundwater in these areas and the migration will eventually lock up again When the contaminants meet another reducing atmosphere down dip. Westinghouse explains that the ammonia will eventually break down to zero levels in 3,000 to 3,500 years and should not migrate more than 3,500 feet from the mine (see 4/12/79). But long-term site stability studies are lacking. This is another example of waiting until a problem develops before doing anything about it. The nuclear industry is famous for this type of problem solving. The most amazing part of this situation is the TWC requirement that the companies plug all monitor wells after the sites are closed. This will allow companies to avoid financial responsibility because there will be no way to determine what is happening underground. Considering the long life of this contamination (780,000 years for radioactivity), the only acceptable method of assuring public safety is to establish longterm monitoring programs. The plugging of the wells is typical of the leastcost/walk away concept designed to prevent continuous expense to the industry.

Companies created this mess and must be held accountable. Cost should not dictate policy. Either the companies should have to pay for the problem now or the taxpayer will have to pay for it later. Future environmental and health consequences will determine the true cost of this threat.

SUMMARY OF INCIDENT FILES
U.S. Steel Niagara Mohawk INSITU uranium mine

WORKER EXPOSURE ---

This report documents 82 workers that were reported by the company as overexposed during an eleven-year period, from 1977 to 1983. An overexposure is a measure of how much uranium, a mine worker has injected or inhaled Once alpha emitting uranium enters the stomach or lungs, it circulates through the body and eventually passes through the kidney where it is excreted in the urine. Because of the high energy levels of the alpha radiation, it is considered the most deadly form of radiation inside the human body. The NRC considers 30 mg/l of uranium to be the overexposure limit. The largest overexposure ever recorded in the TBRC files was a U.S. Steel worker on 8/9/82. Armand Salazar was exposed to 50,494 ug/l uranium in the urine. The company explained that his sample was contaminated and discounted it. They immediately fired Mr. Salazar.

The following paragraphs give us some idea of the working conditions at U.S. Steel.

On 9/15/80 the TBRC required the company to explain the excessive exposures at the Clay West and Burns plants. On 9/23/80 U.S. Steel admitted the uranium dust in the plant loading areas was a problem but they were trying to correct the situation. During an inspection on 9/4/80, the TBRC discovers that radiation levels at the trash pits and storage area around the Burns plant Showed gamma radiation levels so high that it "pegged" the meter, meaning levels were so high that readings could not be taken.

An inspection of the burns plant by the TBRC on 11/17/80 revealed that the company routinely transferred liquid uranium from one plant process to another by dumping the slurry on the concrete floor of the plant. where workers would shovel it into the closest sump pit so that it could be pumped to the next process . The plant was built without any method of product conveyance and this was contrary to the procedures submitted for license approval. The TBRC noted this was a violation of their permit. The TBRC did not fine them.

During the same inspection, the TBRC observed uranium fluid flowing off the concrete pad onto the ground. A solid yellow sheet of dried uranium was observed covering the ground. An inspection of the control room found a chair seat coated with yellow uranium measuring 1,300 count per minute, alpha radiation.

Over time, the acids in the uranium slurry at the Burns plant had eaten away the concrete in the sumps allowing the uranium to leak into the ground. On 9/12/80, during excavations for a foundation at the plant, the company noticed that the holes had filled up with uranium fluid and on further investigation it was discovered that the entire plant was floating on ground saturated with uranium. Monitor wells drilled around the plant on 12/22/80 showed levels of 32 mg/l to 3060 mg/l uranium in the saturated ground. The TBRC required the company on 1/20/81 to correct the problems at the plant and to dispose of the contaminated soil. The TBRC did not fine them. Today, the plant and the soil under the plant still remain in place at the burns site.

On 3/6/81 the TBRC felt that worker overexposure was still too high and required the company to come up with a firm schedule to show when corrective actions to protect the workers would be completed. The company admits on 4/10/81 that uranium dusts at the plants are still a problem. They planned to enclose the buildings that were responsible for the dust so that they will be air tight. Uranium buildup outside the filter buildings was to be kept to a minimum. Several monitoring programs were to be installed. On 10/22/81 the company blamed the workers for the continued high exposure levels at the plants. They said that poor personal hygiene is to blame. On 12/11/81, a year after the TBRC started to investigate the worker exposure problem, the company states that high dust levels were still a problem.

On 8/5/82, U.S. Steel decided to close down the Burns plant in stages and they proposed to "review the prospects for enhanced clean up of the affected subsoils."

On 2/17/82, the company reported they had dumped 500 lbs of radioactive ash in the George West town dump. A survey of the incinerator at the plant showed a reading of 3060 ur/hr. Radioactive material was being disposed of in the plant incinerator and burned. This was very dangerous because the radioactivity became airborne. The company removed the ash at the dump and incinerator, and disposing of it at the Conoco Conquista mill tailings dump in Falls City, Texas.

While digging a pit at the Burns plant on 8/31/83, the company discovered a plastic sewer line that used to service the old employee change room. The interior of the pipe was lined with yellow uranium. On further investigation, the entire drainage field and septic tank were found to be coated with uranium. This must have come from workers washing their hands, indicating the levels of uranium they were actually covered with. A TBRC inspector arrived on 4/17/84 and surveyed the area. The pipe, septic tank, and drainage field pipe had already been removed by the company and disposed of at the Conoco dump. The background reading of this area showed 5,000 counts per minute.

The TBRC writes the company on 11/14/83 and states that they have committed 17 violations of their radioactive material license. The company replies on 11/30/83 and blames the poor radiation safety program, management, and inadequate environmental and occupational monitoring programs as the cause of their problems. They propose to make each employee responsible for their own monitoring. They will assign a clerk to make sure samples are collected and to organize the files so records can be kept track of. The company admits that dust is still a problem and the areas responsible are still not enclosed. They also admit that their radioactive waste is not properly stored. No fines were levied.

On 3/18/85 a TBRC inspector accidentally discovered that three companies in Corpus Christi had been exposed to radioactivity while repairing a machine for U.S. Steel. The company attempted to clean up the uranium contamination that had occurred before the TBRC discovered the problem. The TBRC gave notice of violation to the company on 4/4/85 for releasing radioactive materials into unauthorized areas. No fines were levied.

SPILLS

At insitu mines, miles and miles of plastic pipe carry the fluids to and from the processing plants. All this pipe has plastic or fiberglass because the leaching fluids are corrosive and will eat up metal pipe. The pipes break easily with weathering expansion and contraction. Over 22 spills have been reported Steel at the Clay West and Burns sites. A total of 1,200,000 gallons of radioactive and toxic chemicals have spilled at these sites.

On 6/19/81, the largest spill ever recorded in the state, occurred at the burns site when a fiber glass pipe ruptured spilling 850,000 gallons of leaching fluid. It flowed from 4:00

a.m. to 8:00 a.m. before workers noticed it. The spilled fluid was leaching solution which had most of the uranium already removed. U.S. Steel originally reported to the TBRC that only i00,000 gallons of fluid had spilled (see 7/27/81). The owners of the land were shocked to read about the spill in the newspapers (see 7/l/81). Neither the company nor the TBRC had notified them.

Many spills occurred before the fluids were processed in the plant. These fluids contain high levels of uranium. To give an idea of the radiation levels, a 90,000 gallon spill of uranium rich fluid occurred on 7/l/80. Gamma readings of mud in the area made the radiation meter go off the scale.

EXCURSIONS IN THE AQUIFER

When mining begins at a site, the companies have no idea what is happening with the migration of the mining fluids underground until it is detected in the monitor wells located outside the mining zone.

The U.S. Steel sites had problems with contamination of aquifers above the impermeable layers. that separates the ore zone. On 12/28/77 "bad water" was noticed above the ore zone at the Boots mine area. On 3/17/78 leaking mine fluids were discovered in the upper aquifer on the east side of the Moser I mine area. An abandoned well was allowing leaching fluids to flow up from the ore zone into the upper aquifer. Contamination was noticed on 3/17/78 in the upper aquifer on the west side of the Moser 1. Mining fluids were flowing through a joint separation of the plastic pipe of an injection well.

U.S. Steel discovered on 7/20/79 that uranium had migrated out of the ore field all the way to the far east side of the Moser I perimeter monitor wells. The perimeter wells are the last monitor wells in a field and any migration of pollution beyond these wells is undectable. Because U.S. Steel was going to start mining this area with the expansion of the mine into the Moser 2 area, the TWC allowed them to discount this on 5/16/80, a perimeter monitor well in the Moser 2 area showed an increase in contamination. This was just east of the earlier monitor well contamination of 7/20/79.

On 6/26/80 ammonia and uranium levels rose in a perimeter monitor well at the burns mine area. U.S. Steel said on 9/22/80 and 2/10/81, that the uranium levels were increasing because a natural uranium deposit existed in this area and it was being oxidized either by leaching solution from the mine or because "oxygen diffuses rapidly in this area due to the scarcity of species (mainly reactive forms of marcazite, FcS2) that consume it." Mining in this area began in 1978 and it is unknown why the uranium waited two years to begin migrating.

SUMMARY OF INCIDENT FILES
Wyoming Minerals / Westinghouse IN-SITU Mine, Bruni, Texas

The history of the Wyoming Minerals mine has been one of uranium leachate fluid spills, uncontrolled migration of radioactive water off site and violations of regulations for storage of radioactive materials. Many violations and accidents occurred over the years and ultimately result in a large fine for Westinghouse.

One of the primary problems at the Bruni mine has been "excursions" or leaks from well boundaries of uranium leachate fluid. These incidents occurred as soon as mining began. On 12/23/75, an excursion led the Department of Water Resources (TDWR) to order a mine stoppage. Between 12/23/75 and 8/13/81, the TDWR recorded 23 incidents of leachate spills. At one point, the TDWR cited Westinghouse for 14 excursions, of which Westinghouse only reported 5.

The TDWR also noted other spills mostly from wastewater ponds onto the ground or into the shallow zones above the ore. Between November 1978 and August 1981, they note four such spills. The spill for Sept. 18, 1979 states that the wastewater ponds have

damaged plastic liners. The largest pond, Pond 5, began leaking In late 1976 and continued to contaminate groundwater until Oct. 1977, although the company only reported the problem in February 1978.

In addition, the TDWR notes four storage violations in 1978 and 1979. These include Improper storage of radioactive filters, ore storage barrels and waste storage barrels. At least two of the Incidents resulted from the failure of the company to remove an excessive backlog of uranium containing calcite waste barrels from the site within the TDWR designated deadline.

The Westinghouse insitu uranium mine at Bruni is cause for concern about the potential harm to groundwater and soil from this type of operation. During the few years it operated, it leaked and spilled uranium and ammonia numerous times. The same types of accidents recurred, sometimes at the same locations. For all the contamination and violations, the company was only fined once by the TDWR. Cleanup efforts were ineffective and ultimately the company had to request that the standards for restoration be changed to allow higher contamination levels. And after several years, Westinghouse has been unable to meet even those standards.

The following IN-SITU closure information comes from the WISE Uranium Project web site at: http://www.wise-uranium.org/uisl.html#RECLAMPROJ and http://www.wise-uranium.org/udusail.html. (last updated on 11/5/06).

The U.S. Steel amendments changed the clean up requirements by raising the contamination levels allowed to remain in the aquifer for the second time (see RESTORATION AND THE LAW section above). Groundwater concentrations for alkalinity, calcium, nitrate, magnesium, potassium, bicarbonate, sulfate, total dissolved solids, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, and uranium were increased. Please note the volume of water that has been used to clean up the aquifers.

U.S Steel - Burns/Moser, Texas

License termination

The Texas Department of Health (department) gives notice that it has terminated uranium by-product material license L02449 issued to USX Corporation. (Texas Register May 10, 2002)

A written hearing request must be received, from a person affected, **within 30 days from the date of May 10, 2002**.

Release for unrestricted use

The Moser wellfield patterns area was released for unrestricted use. (Texas Register July 13, 2001)

Relaxed Groundwater Standards, Production Area 2

"HAZARDOUS WASTE PERMITS: USX - Texas Uranium Operations (USX) for a production area authorization (PAA) restoration table amendment (RTA) to Burns/Moser Mine Production Area Number 2, Authorization Number UR01890-021, which would change ground-water constituent concentrations that are to be met by the permittee (USX) to achieve successful restoration of the site's mined aquifer in PAA 2. The proposed amendment would change restoration table concentration values for calcium, magnesium, potassium, bicarbonate, sulfate, nitrate, alkalinity, manganese, molybdenum, selenium, uranium, and ammonia. Furthermore, a restoration table concentration value for radium has been added to complete the restoration table in the original PAA issued for Production Area Number 2 on October 12, 1982." [...]

"Uranium mining took place at Burns/Moser Mine Production Area Number 2 from May 1979 to June 1986, after which ground-water restoration of the ore-bearing aquifer began. Since restoration efforts were initiated, approximately **1.633 billion gallons**" [6.181 million cubic meters] "of aquifer water have been removed during the restoration process. Under 30 Texas Administrative Code §331.107(f), the permittee has the option to request an amendment to the PAA Restoration Table, provided that, among other things, an appropriate effort has been made to achieve the permit restoration table values. The Executive Director has prepared a final draft PAA to address USX's RTA request. The Burns/Moser Mine site lies in the south central portion of Live Oak County, approximately ten miles southwest of George West, Texas adjacent to U.S. Highway 59." (TNRCC Items Signed by Executive Director 18 December 1998 - emphasis added)

Relaxed Groundwater Standards, Production Area 3

"HAZARDOUS WASTE PERMITS: USX - Texas Uranium Operations (USX) for a production area authorization (PAA) restoration table amendment (RTA) to Burns/Moser Mine Production Area Number 3, Authorization Number UR01890-031, which would change ground-water constituent concentrations that are to be met by the permittee (USX) to achieve successful restoration of the site's mined aquifer in PAA 3. The proposed amendment would change restoration table concentration values for calcium, magnesium, potassium, bicarbonate, sulfate, total dissolved solids, alkalinity, arsenic, iron, manganese, and uranium." [...]
"Uranium mining took place at Burns/Moser Mine Production Area Number 3 from March 1980 to June 1986, after which ground-water restoration of the ore-bearing aquifer began. Since restoration efforts were initiated, **approximately 409.85 million gallons**" [1.551 million cubic meters] "of aquifer water have been removed during the restoration process. Under 30 Texas Administrative Code §331.107(f), the permittee has the option to request an amendment to the PAA Restoration Table, provided that, among other things, an appropriate effort has been made to achieve the permit restoration table values. The Executive Director has prepared a final draft PAA to address USX's RTA request. The Burns/Moser Mine site lies in the south central portion of Live Oak County, approximately ten miles southwest of George West, Texas adjacent to U.S. Highway 59." (TNRCC Items Signed by Executive Director 18 December 1998 - emphasis added)

Relaxed Groundwater Standards, Production Area 1

"HAZARDOUS WASTE PERMITS: USX Corporation: Texas Uranium Operations (USX) for modification to Production Area Authorization (PAA) UR01890-011, Burns/Moser mine. A PAA is issued as part of the base permit (UR01890-001) to approve the initiation of mining activities. A PAA application contains monitor well locations, water quality data based on pre- mining conditions for use in establishing groundwater restoration targets, and hydrologic test data that shows connection between production wells and production zone monitor wells. The permit and PAA 1 were issued and mining began in 1980. Mining continued until 1986. Restoration, using groundwater sweep and reverse osmosis, was **from 1981 to 1997**.
USX is requesting amendment of the restoration table under 30 TAC §331.107(f)(2). The proposed amendment would change restoration table values specifying groundwater constituent concentrations for calcium, magnesium, potassium, bicarbonate, sulfate, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, uranium. These values are to be met by the permittee (USX) to achieve successful restoration of the mined aquifer in PAA 1. The proposed values will not change the use category of the water. The average water quality present before mining exceeded the TNRCC and EPA primary drinking water standard for radium-226. Before mining commenced, the water in the production area was used for rural domestic, livestock, and industrial purposes. The Burns/Moser site is in Live Oak County approximately ten miles southwest of George West, west of U.S. Highway 59 in the Jacob Cook Survey 171, A-142 and Wesley Sellman Survey 60, A-416. The facility is an in situ uranium mine in the Lower Oakville Formation, 250 to 400 feet below the surface." (TNRCC Items Signed by Executive Director 11 December 1998 - emphasis added)

Relaxed Groundwater Standards, Production Area 4

"HAZARDOUS WASTE PERMITS: USX Corporation - Texas Uranium Operations (USX) for modification to Production Area Authorization (PAA) UR01890-041, Burns/Moser mine. A PAA is issued as part of the base permit (UR01890-001) to approve the initiation of mining activities. A PAA application contains monitor well locations, water quality data based on pre- mining conditions for use in establishing groundwater restoration targets, and hydrologic test data that shows connection between production wells and production zone monitor wells. The permit and PAA 4 were issued and mining began in 1986. Mining continued until 1987. Restoration, using groundwater sweep and reverse osmosis, was **from 1987 to 1997**.
USX is requesting amendment of the restoration table under 30 TAC §331.107(f)(2). The proposed amendment would change restoration table values specifying groundwater constituent concentrations for arsenic, calcium, iron, manganese, magnesium, molybdenum, potassium, alkalinity, ammonia, chloride, conductivity, sulfate, TDS, radium 226, uranium. These values are to be met by the permittee (USX) to achieve successful restoration of the mined aquifer in PAA 4. The proposed values will not change the use category of the water. The average water quality present before mining exceeded the TNRCC and EPA primary drinking water standard for radium-226. The Burns/Moser site is in Live Oak County approximately ten miles southwest of George West, west of U.S. Highway 59 in the Jacob Cook Survey 171, A-142 and Wesley Sellman Survey 60, A-416. The facility is an in situ uranium mine in the Lower

Oakville Formation, 230 to 280 feet below the surface." (TNRCC Items Signed by Executive Director 4 December 1998 - emphasis added)

U.S. Steel - Clay West, Texas

License termination

The Texas Department of Health (department) gives notice that it has terminated uranium by-product material license L02449 issued to USX Corporation. (Texas Register May 10, 2002)
A written hearing request must be received, from a person affected, **within 30 days from the date of May 10, 2002**.

Release for unrestricted use

The Clay West wellfield patterns area was released for unrestricted use. (Texas Register July 13, 2001)

Relaxed Groundwater Standards

"USX Corporation: Texas Uranium Operations (USX) for a modification to Production Area Authorization (PAA) UR02130-011, Clay West mine. A PAA is issued as part of the base permit (UR02130-001) to approve the initiation of mining activities in Production Area 1 within the permit area. The PAA application contains monitor well locations, water quality data based on pre-mining conditions for use in establishing groundwater restoration targets, and hydrologic test data that shows connection between production wells and production zone monitor wells. The permit and PAA were issued and mining began in December 1977. Mining continued until February 1984. Restoration, using ground-water sweep and reverse osmosis, was from March 1981 to May 1997.
USX is requesting amendment of the restoration table under 30 TAC §331.107(f)(2). The proposed amendment would change restoration table values specifying groundwater constituent concentrations for calcium, magnesium, potassium, bicarbonate, sulfate, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, and uranium, which are to be met by the permittee (USX) to achieve successful restoration of this site's mined aquifer in PAA 1. The proposed values will not change the use category of the water. The average water quality present before mining exceeded the TNRCC and EPA primary drinking water standard for radium-226. Before mining commenced, the water in the production area was used for rural domestic, livestock, and industrial purposes. The Clay West site is in Live Oak County approximately eight miles southwest of George West, west of U.S. Highway 59 in the J. Poitevent Survey 67, H. and G.N. R.R. Survey 69, and H. and G.N. R.R. Survey 71. The facility is an in situ uranium mine in the Lower Oakville Formation, at 250 to 400 feet below the surface, undergoing groundwater restoration." [TNRCC Items Signed by Executive Director September 18, 1998 - emphasis added]

Westinghouse - Bruni, Texas

License violations at Bruni ISL restoration site

Radioactive Material Spill - Cogema Mining, Inc. - Bruni, Texas

"On May 11, 1998" [obviously should read 1999] ", the Licensee notified the Agency of a 2000 gallon" (7.6 m^3) "spill of 11.7 parts per million uranium impregnated restoration water due to the failure of a 1" nipple and union on the well field pipe. The spill spread over approximately 1,800 square feet" (167 m^2) "within a restricted area."

[SUMMARY OF INCIDENTS FOR SECOND QUARTER 1999, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Cogema Mining, Inc. - Bruni, Texas
"On May 26, 1998, the Licensee notified the Agency of a uranium spill involving approximately 8,000 gallons" (30 m^3) "of restoration flow solution containing 7.4 parts per million uranium that occurred on May 21, 1998. The spill was caused by a failure at a pipe connection and was contained within the licensed area."
[SUMMARY OF INCIDENTS FOR SECOND QUARTER 1998, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Cogema Mining, Inc. - Bruni, Texas
"On May 4, 1998, the Licensee notified the Agency of a uranium spill involving approximately 20,000 gallons" (76 m^3) "of restoration flow solution containing 8.6 parts per million (5.7 microcuries per gram) uranium that occurred on May 2, 1998. The spill was caused by the failure of a saddle on the lateral line and was contained within the licensed area."
[SUMMARY OF INCIDENTS FOR SECOND QUARTER 1998, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Cogema Mining, Inc. - Bruni, Texas
"On February 5, 1998, the Licensee notified the Agency of a uranium spill involving 2500 gallons" (9.5 m^3) "of disposal well fluid containing 7.2 parts per million uranium that occurred on February 4, 1998. The spill occurred at a waste retention pond transfer pump and was contained in the licensed area."
[SUMMARY OF INCIDENTS FOR FIRST QUARTER 1998, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Westinghouse Electric Corporation - Bruni, Texas
"On December 15, 1997, the Licensee notified the Agency of a uranium spill involving 3000 gallons" (11 m^3) "of restoration solution containing 5.0 parts per million uranium that occurred on December 13, 1997. Cold weather caused a pipe to break resulting in the spill. The spill covered approximately 7350 square feet."
[SUMMARY OF INCIDENTS FOR FOURTH QUARTER 1997, Texas Department of Health, Bureau of Radiation Control]

West Cole, Texas

Application for relaxed groundwater standards (Production Area No. 2)

"COGEMA MINING, INC., West Cole Mine Paa 2, P.O. Box 228, Bruni, Texas 78344, an in situ uranium mine undergoing ground water restoration, has applied for a restoration table amendment to a production area authorization UR02463-021. The West Cole mine is in Webb County 40 miles east of Laredo and two miles north of Bruni on the west side of Farm Road 2050. Mining started in West Cole Production Area No. 2 in January 1982. Restoration began in December 1989 using groundwater sweep, reverse osmosis, and injection of water from an underlying aquifer. Since restoration started, 19.01 pore volumes or approximately 181 million gallons" [0.685 million cubic meters] "of aquifer water have been removed. One pore volume equals 9.6 million gallons. The proposed amendment would change the restoration table in accordance with 30 TAC 331.107." (Texas Register June 4, 1999 - emphasis added)

Relaxed Groundwater Standards (Production Area No. 1)

Excerpt from: TEXAS NATURAL RESOURCE CONSERVATION COMMISSION: June 27, 1997, ITEMS FOR EXECUTIVE DIRECTOR SIGNATURE - emphasis added
HAZARDOUS WASTE PERMITS

Item 18.
"COGEMA MINING, INC. for an amendment to the production area authorization for Production Area No. 1 under existing Permit No. UR02463-011 (West Cole Mine Site). The proposed amendment would revise restoration values for calcium, magnesium, sodium, potassium, bicarbonate, TDS, conductivity, alkalinity, selenium, uranium, molybdenum and radium-226. The proposed values will not change the use category of the water. Prior to mining, the water in the production area was used for livestock. The West Cole Project is located in Webb County, Texas, approximately 40 miles east of Laredo and approximately two miles north of Brunion on the west side of Farm Road 2050. The production zone is the Soledad member of the Catahoula formation at a depth of appoximately 225 to 270 feet."

SIGNED JUNE 27, 1997

SURFACE IRRIGATION AT THE EVEREST EXPLORATION, MT. LUCAS IN-SITU SITE

By The Texas Energy Aliance

(This report was written several years ago. The current standing of the site is unknown.)

On October 1983, Everest Exploration was illegally given permission to begin an untested concept for disposing untreated radioactive wastewater from their Mt. Lucas Insitu uranium mine on Lake Corpus Christi. This experiment allowed Everest to economically dispose of its process plant waste stream by simply spraying it on top of the ground. For three years, until April, 1986, Everest surface irrigated a 22.5 acre plot located less than 900 feet from the shoreline of Lake Corpus Christi. Today, levels of radioactivity in the soil are 47 times above normal, this is 6 times above the limit allowed by the Mt. Lucas License.

In some areas the levels have risen to 173 times above normal. Half of the irrigation water used at the site has percolated into the water table. Government experts have expressed their concern about surface and ground water pollution.

In March 1986, Everest was again given permission to begin irrigating on a new 83-acre plot adjoining the original site. The permit was granted by the Bureau of Radiation Control against the advice of the agency's own experts.

Currently Everest Minerals is attempting to convince the Bureau of Radiation to raise the pollution limits for the site so they will not be in violation of the law.

Enclosed are letters from the Bureau of Radiation Control license files and an excerpt from the 1986 Mt. Lucas Environmental Assessment Report. The agencies personal express their concerns for the public's safety and they question the legality of the surface irrigation. It is apparent after reading the files and interviewing individuals at the Bureau that surface irrigation is a dangerous practice and it should never have been allowed

To understand the many problems with this site, it is necessary to explain how this situation came about.

Mt. Lucas mines for uranium using the "insitu" method. This process injects solvents into underground ore deposits in order to unlock the uranium and make it mobile enough to be sucked out of the ground for processing. The insitu process creates a stream of radioactive wastewater that must be disposed of.

The Mt. Lucas license required that Everest use deep well disposal at the site but Everest proposed to use surface irrigation instead in order to save money. The Texas Department of Water Resources and the Texas Department of Health, Bureau of Radiation Control apparently granted permission (See exhibit A).

Apparently it was some time before the Bureau of Radiation Control inspected the site. They reported the company was irrigating with wastewater containing high levels of radioactivity, up to 8,000 pCi/I (picocurries per liter). In August 1984, agency personnel found gamma radiation levels in the test plot of 20 to 60 uR/hr compared to 9uR/hr average background.

Two years later, the agency discovered that the company had failed to adequately monitor for migration of radioactivity into the groundwater. Joseph Thiel, Director of Environmental Programs, and Stephen Eiter, Hydrological/Geotechnical Programs, estimated that roughly <u>50% of the irrigation water had become part of the shallow ground water</u> (Exhibit B, page 5 and 16).

The 1986 Mt. Lucas Environmental Assessment Report states that contamination of surface water, especially Lake Corpus Christi, is difficult to access (Page 142 and 143). Information about shallow aquifers is limited but reportedly <u>"There are waterbearing units within a few tens of feet of the land surface at Mt. Lucas." These ground water levels vary with the water level of the lake.</u>

Joseph Thiel expressed concern over the lack of surface runoff control from the site (Exhibit B, page 6, par. 9). The 1986 Environmental Assessment Report states the berm built to protect Lake Corpus Christi from the test plot is devoid of vegetation and is susceptible to erosion. The emergency gates were partially buried from disuse. The same environmental report states, "In the long term, movement of contaminated sediments down slope into the surface water drainage network is inevitable". In other words waste was migrating toward Lake Corpus Christi.

During a site visit in December 1984, TDH personnel discovered Everest had cut and bailed the radioactive hay growing on the test plot (Environmental Assessment Report, 1986). The company was in the process of shipping and storing the bailed hay at its Hobson Facility in Falls City, Texas, with the intention of using it for feeding cattle. Plants easily take up radioactivity and cattle are bio-accumulators of radioactive materials.

From 1983 to 1985 it appears the Bureau gave Everest Exploration the responsibility for acting as its own environmental watchdog.

In 1985, Everest expressed interest in expanding the size of the irrigation beyond the original 22.5-acre experimental plot. An interoffice memo by concerned agency personal (see Exhibit B page 2) explained the legality of the original site was in question for two reasons:

1) The Texas Department of Health never gave permission for irrigation at the site, and

2) The Mt. Lucas License (Lic. No. 83068, Par.16) specifically required disposal of liquid waste by deep well injection.

Two months later, the legal counsel of the Bureau of Radiation Control informed the agency that the Everest irrigation project was in violation of its license (Exhibit B, page 8).

On October 3, 1985 the Bureau amended the Mt. Lucas license to include liquid waste disposal by irrigation on the 22.5-acre site. The legality of this action remains to be explained by the Bureau.

This amendment also sets a 5pCi/g radium 266 limit for allowable radioactive pollution levels in the soil at the site. The average radium content in the soil across the nation is .6 pCi/g. Excess above the .5pCi/g limit requires remedial action. Current studies show that the average radium 226 levels in the soil at the site is 27 pCi/g, 6 times above the limit (Exhibit C, Page 10). Portions of the site contain levels of radium 20 times above the limit (Exhibit C, page 16). This means 22.5 acres of soil must be dug up and transported to a site licensed for radioactive waste. The only site in Texas licensed for this is the Conquesta site in Falls City, Texas, and it will probably be closed in the near future because of lawsuits and site problems.

In October 1985, Everest Exploration met with the Bureau to discuss the irrigation process used at the site. The Bureau authorized the pretreatment of the wastewater to remove excess radioactivity. Limits for radioactivity in the irrigation water were set at 400pCi/l. IT IS IMPORTANT TO REALIZE THAT CURRENT ENVIRONMENTAL PROTECTION AGENCY LIMITS FOR SURFACE DISCHARGE FROM URANIUM INSITU MINES IS SET AT 10 pCi/l.

It is noted that Joseph Thiel, Director of Environmental Programs, requested the record reflect that he did not approve of the 400pCi/I authorization (Exhibit B, page 12, par. 1). Mr. Thiel also noted that Everest's proposal for an 83-acre extension to the original 22.5-acre irrigation project was probably two to four times too small because of underestimation of pumpage, high discharge concentration of 400pCi/l irrigation water, and inadequate pretreatment design (Exhibit b, page 13, par. 7). The meeting closed with the vicepresident of Everest Minerals stating that Bermuda grass would be planted so that cattle could be grazed on the area. (Exhibit B, page 13, par. 7). Increasing radiation in the food chain is unacceptable.

A week later, Stephen Eiter, Hydrological/Geotechnical Programs, in an interoffice memo, echoed Theil's opposition to surface irrigation and asks whether the Texas Water Commission should determine whether or not water percolating downward from irrigation and recharging groundwater deserves protection under the law. (Exhibit B, page 15, par. 5) Eiter states he is fundamentally opposed to the wholesale "dilutionisthesolution" philosophy of surface irrigation. He goes on to argue Everest Minerals' apparent lack of public responsibility.

In November, Thiel states aerosolization/evaporation of irrigation wastewater at 400pCi/I of radium266 could contribute significantly to public exposure to radioactivity. (Exhibit B, page 20, par. 1).

Other officials in the Bureau added their concern to the license file: Timothy Dziuk, Environmental Assessment Branch; Gary Smith, Radiological Assessments Program; Mary Shannon, Ecological Evaluation Program; Warren Snell, Uranium and Nuclear Waste Management Program.

Expansion of the irrigation plot from 22,5 acres to a total of 105 acres was granted in December 1985, as an amendment to the Mt. Lucas license.

The expansion permit was granted against the expert advice of the staff and agency personnel felt the top management of the Bureau of Radiation Control and the Texas Dept. of health were hindering the professionalism and quality of their work.

The agency granted a permit for expansion before any indepth studies were completed on the original 22.5-acre plot. Analysis of the site in December 1985 (Exhibit C, page 1) showed radium266 contamination to be 4 to 93 times higher than the 5pCi/g limit set by the license amendment. Contamination was shown to spread beyond the 22.5-acre plot. Irrigation water showed radium266 levels of 1420 pCi/g and contained a uranium concentration of 17,900 pCi/q. For comparison, the E.P.A. limits for surface discharge of radium and uranium are 30 pCi/I and 4 mg/l (40 CFR 440 daily maximum). In October 1986 irrigation water showed levels of uranium at 41,400 pCi/g (Exhibit C, page 14).

In February, March, and September of 1986 inspectors noted irrigation water flowing south out of the irrigation plot and draining close to the dike and the lake (Exhibit c, page 6,7). Cattle with calves and large flocks of geese were observed feeding in this area. Radium levels were above the 5pCi/g limit. In September, an inspector noted that Everest had begun to plow an area outside the irrigation plot, toward the lake. The Bureau allows Everest to plow the irrigation area in order to mix radioactive hot spots over a large area. But Everest was plowing outside the site in an attempt to lower the radium levels that have migrated off site.

The permit for enlargement of the irrigation plot required that the radioactive wastewater meet the 400pCi/I limit for radium266. Everest decided to use two barium-settling ponds at the site in order to help lower the radiation levels in the fluids before irrigating it on the ground (the cheapest form of treatment). Settling time ranges from 2 to

60 days. The agency did not require the company to install a synthetic liner under the pond, against the wishes of Joseph Thiel (Exhibit B, page 12, par. 2). As pointed out by the Environmental Assessment Report, 1986, Everest Minerals did not follow the license requirements when they built the settling ponds. No testing for subsoil type, permeability, depth to groundwater, sampling, or laboratory testing was performed. The agency has estimated the subsoil under the ponds to be sandy with high permeability, and the base of the pond will be within 5' of an unconfined water table (page 137, par. 7). The clay liner of the ponds (5′ from the aquifer) will eventually contain very high levels of concentrated radium and uranium that have settled out of the irrigation water.

The report also states that irrigation will create adverse impacts on soil waters, and to a lesser extent local air quality. Irrigation will result in an increased potential for contamination by direct runoff, leaks from pipelines, contaminated sediment from irrigated areas, movement of contaminated groundwater into the surface water system.

This 105-acre irrigation dumpsite will remain radioactive for thousands of years and an environmental and biological threat to present and future generations. Corpus Christi and 38 communities depend on Lake Corpus Christi as their only source of water. Questions of groundwater pollution, surface runoff, air quality, and plant process integrity still remain unanswered.

It is our opinion that this entire situation has been a massive bureaucratic mistake, Everest Minerals should be responsible for the damage created to the environment and Corpus Christi's drinking water, and their license should be revoked and the Mt. Lucas uranium mine shut down.

Addendum:

In June 1987, the Bureau of Radiation Control discovered that Everest Exploration's Mt Lucas plant had not removed the clay liner of its barium sediment pond for disposal. The permit required the liner to be removed yearly because radioactive particulates settle out of the waste stream onto the pond bottom and the clay liner builds up high levels of radioactivity. This must be disposed at a licensed nuclear dump.

In August the bureau discovered that Everest use the wrong type of clay to build the liner of the sediment pond (against the advise of the Bureau). The French drain monitor system under the pods had been showing elevated continuous leaking out of the ponds since May 1987.

The sediment ponds are built on top of highly permeable sands and the bottom of the ponds are 5′ above the water table. This water table rises and lowers with the level of the lake showing that it is connected to the lake. These ponds are located 900′ from the shoreline of the lake.

No action has been taken because the Bureau says the responsibility belongs to the Texas Water Commission.

TEXAS DEPARTMENT OF HEALTH
Bureau of Radiation Control
Division of Compliance and Inspection
1100 West 49th Street
Austin, Texas 78756-3189

Compliance No. L870655

*** NOTICE OF VIOLATION ***

LICENSEE/REGISTRANT

Everest Exploration, Inc.
Attn: Mr. Lawrence C. McGonagle
P.O. Box 1339
Corpus Christi, Texas 78403

DATE OF NOTICE

June 18, 1987

DATE OF INSPECTION

May 13, 1987

INSPECTOR(S)

Thomas C. Cardwell

LICENSEE/REGISTRANT REPRESENTATIVE

Michael Lueders, Plant Supervisor

INSPECTION LOCATION

Mt. Lucas Project
3 miles south of Dinero, Texas

STAFF REVIEWER

Myrl E. Wilson

Please refer to the above COMPLIANCE NUMBER when responding to this notice.

The following violation was found during the inspection of operations under License No. 8-3068:

Violation of License Condition 16.b.2.:

The solids and sludge have not been removed from the treatment ponds at intervals that do not exceed one year. (The treatment ponds were placed in operation in April 1986.)

This is a Severity III Violation.

bcc: File, Inspector's File (Region - Austin), Board, Compliance, RLG
MEW: emr

Addendum: Current status

The following IN-SITU closure information comes from the WISE Uranium Project web site at: http://www.wise-uranium.org/uisl.html#RECLAMPROJ and http://www.wise-uranium.org/udusail.html. (last updated on 11/5/06).

Mt. Lucas, Tex-1, and Hobson, Texas

State issues Agreed Order replacing Emergency Order for cleanup of uranium in-situ leach sites

"On February 25, 2002, the director of the Bureau of Radiation Control (bureau), Texas Department of Health, approved the settlement agreement between the bureau and Everest Exploration, Inc. (licensee-L03626) of Corpus Christi. The licensee has agreed to conduct specified decontamination and decommissioning activities at the uranium processing facilities located at its Hobson, Mt. Lucas and Tex-1 sites no later than July 15, 2002. The Agreed Order substitutes for the Emergency Order issued by the bureau to the licensee on January 14, 2002." (Texas Register Mar. 22, 2002, notice)

BRC authorizes soil homogenisation at irrigation sites

"The Texas Department of Health (department) gives notice that it has amended uranium by-product material license L03626 issued to Everest Exploration, Incorporated (mailing address: P.O. Box 1339, Corpus Christi, Texas, 78403). Amendment seven authorizes the licensee to remediate three former irrigation projects utilizing soil homogenization, and updates standard conditions.
The department's Bureau of Radiation Control, Division of Licensing, Registration and Standards has determined, pursuant to 25 Texas Administrative Code (TAC), Chapter 289, that the licensee has met the standards appropriate to this amendment. [...]" (Texas Register, March 8, 2002)

A written hearing request must be received, from a person affected, **within 30 days from March 8, 2002**.

State issues Emergency Order to Everest Exploration, Inc. for cleanup of uranium in-situ leach sites

"Notice is hereby given that the Bureau of Radiation Control (bureau) ordered Everest Exploration, Inc. (licensee-L03626) of Corpus Christi to immediately complete decontamination and decommissioning of the uranium processing facilities located at its Hobson, Mt. Lucas, and Tex-1 sites. The bureau determined that failure to timely and adequately decommission these facilities constitutes an emergency that requires immediate action to protect the public health and safety and the environment. [...]" (Texas Register Feb. 8, 2002, notice)

State issues notice of violation and proposal to assess an administrative penalty of $100,000

"Notice is hereby given that the Bureau of Radiation Control (bureau), Texas Department of Health (department), issued a notice of violation and proposal to assess an administrative penalty to Everest Exploration, Inc. (licensee-

L03626) of Corpus Christi. A total penalty of $100,000 is proposed to be assessed to the registrant for alleged violations of 25 Texas Administrative Code, §§289.252 and 289.260. [...]" (Texas Register Sep 21, 2001)
Note:
25 TAC §289.252: Licensing of Radioactive Material
25 TAC §289.260: Licensing of Uranium Recovery and Byproduct Material Disposal Facilities

Hobson, Texas

Texas Commission on Environmental Quality considers Agreed Order imposing $41,500 penalty with $40,900 deferred on violations at Hobson

"Texas Commission on Environmental Quality
Enforcement Orders
An agreed order was entered regarding Everest Exploration, Incorporated, Docket No. 2001-0828-UIC-E on May 16, 2003 assessing $41,500 in administrative penalties with $40,900 deferred.
Filed: May 27, 2003" (Texas Register June 6, 2003)

Texas Commission on Environmental Quality issues Agreed Order imposing $600 penalty on violations at Hobson

"UNDERGROUND INJECTION CONTROL ENFORCEMENT AGREED ORDER
Item 23. Docket No. 2001-0828-UIC-E. Consideration of an Agreed Order assessing administrative penalties and requiring certain actions of Everest Exploration, Incorporated in Karnes County; TCEQ Waste Disposal Well Permit No. 168; for underground injection control violations pursuant to chs. 7 and 27 of the Tex. Water Code and the rules of the Texas Commission on Environmental Quality. (Laurencia Fasoyiro, Gloria Stanford)
Issue agreed order, RM/KW. All Agree" (TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, Marked Agenda May 14, 2003)

"Notice of Opportunity to Comment on Settlement Agreements of Administrative Enforcement Actions
[...]
(1) COMPANY: Everest Exploration, Incorporated;
DOCKET NUMBER: 2001-0828-UIC-E;
TCEQ ID NUMBER: 168;
LOCATION: approximately one mile south of Hobson along Farm-to-Market Road 81, Karnes County, Texas;
TYPE OF FACILITY: uranium production;
RULES VIOLATED:
TCEQ Waste Disposal Well Permit Number 168, Sections XII. C - E, by failing to inspect the pond liner and pond monitor well on a weekly basis, the dikes on a quarterly basis, and the pond freeboarding and piping on a daily basis, and failing to notify the executive director when the freeboard decreased to less than two feet;
30 TAC §331.64(f)(1) and TCEQ Waste Disposal Well Permit Number 168, Section VIII.A and H, by failing to monitor the annulus fluid levels and the corrosion of the well materials;
TCEQ Waste Disposal Well Permit Number 168, Section V.D. by failing to measure the specific gravity of the injected waste at 78 degrees Fahrenheit;
30 TAC §331.64(c), and TCEQ Waste Disposal Well Permit Number 168, Section VII.A, by failing to maintain continuous recording devices in proper operating condition;
30 TAC §331.64(c)(1), by failing to install an automatic alarm system at the well designed to sound and shut-in the well when pressures and flow rates exceed range and/or gradient specified in the permit;
30 TAC §331.63(f), by failing to calibrate gauges, pressure sensing devices, and recording devices on a quarterly basis;
30 TAC §37.21 and §37.201(c), by failing to revise its trust agreement to conform to the wording requirements of 30 TAC §37.301(a) and (b);
PENALTY: $600;
STAFF ATTORNEY: Laurencia Fasoyiro, Litigation Division, MC R-12, (713) 422-8914;

REGIONAL OFFICE: San Antonio Regional Office, 14250 Judson Road, San Antonio, Texas 78233-4480, (210) 490-3096." (Texas Register March 14, 2003)

Hobson In Situ Leach mine (Texas)

License Renewal for Everest Exploration Hobson In Situ Leach mine (Texas)

"Everest Exploration for renewal of an Underground Injection Control (UIC) Well, Permit No. WDW-168. The Executive Director has prepared a draft permit.
The applicant currently operates an in-situ uranium mine. Wastes generated on-site are non-hazardous. The injected wastes include: barren solution bleed, restoration waste stream, process waste streams, and tailings or wastes produced by or resulting from the extraction or concentration of uranium, other associated wastes such as ground water and rainfall contaminated by the above authorized wastes, spills of the above authorized wastes, and wash waters and solutions used in cleaning and servicing the waste disposal well system equipment which are compatible with the permitted waste streams, reservoir and well materials. WDW-168 was initially put in service in 1979. The facility is located 0.5 mile southwest of Hobson on Farm-Market Road 81, Karnes County, Texas.
SIGNED MAY 7, 1999" (TNRCC Items Signed by Executive Director 7 May 1999)

Everest Exploration Company Links

(last updated 11 Jan 2006)

Everest Exploration, Inc.

Head Office

Everest Exploration, Inc.
500 N Water St
Corpus Christi, TX 78471
USA
Tel. +1-361-883-2831

Other Offices

Everest Exploration, Inc.
1 1/2 Mile Farm-Market Road 81
Hobson TX 78117

USA
Tel. +1-830-780-3377, Fax: +1-830-887-7301

Subsidiaries

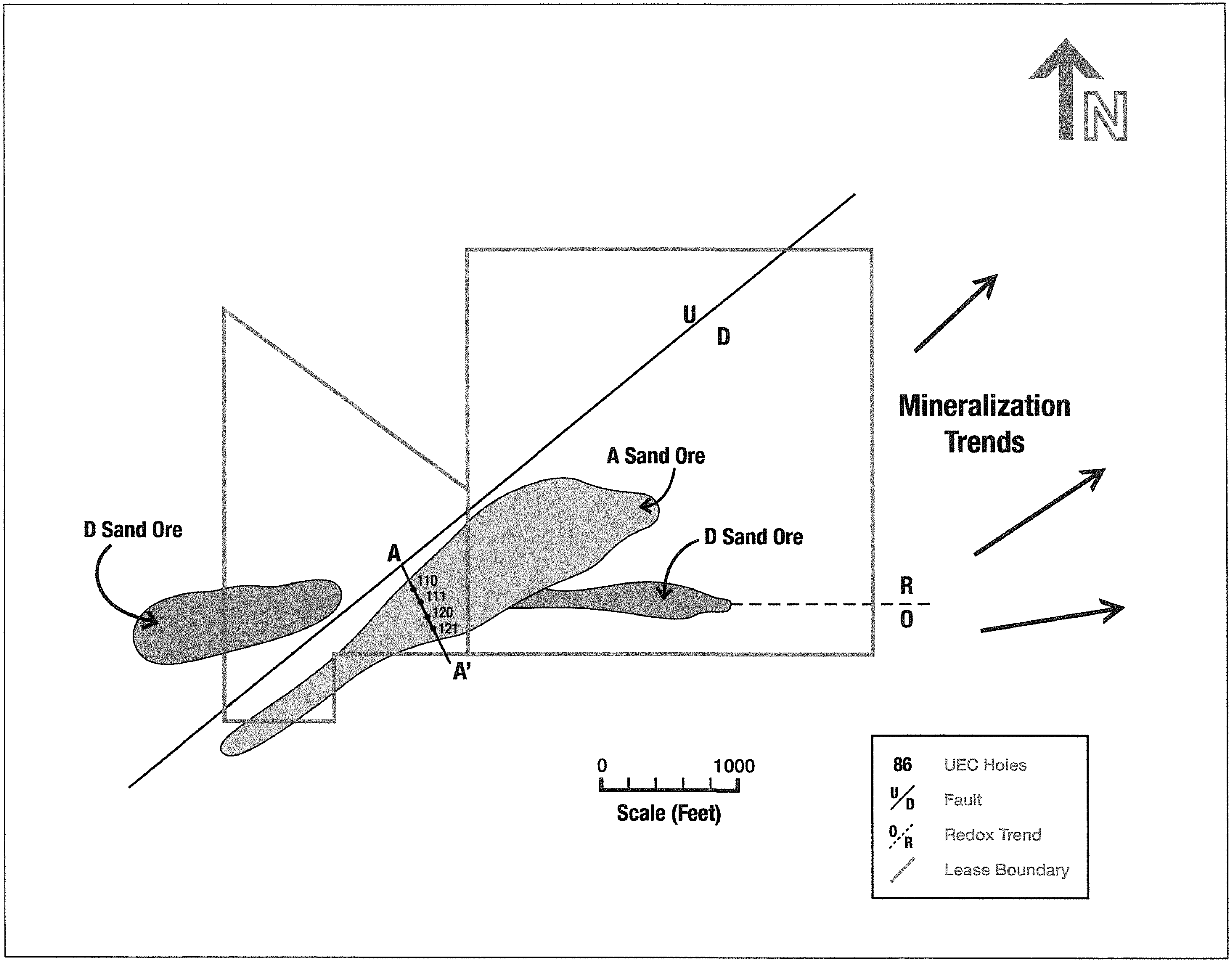
- 1% - Hobson uranium processing plant, Texas
- 1% - Palangana Mine Property, Texas
- Las Palmas, Texas
- Mt. Lucas, Texas
- Tex-1, Texas

Uranium Mine Ownership – USA

Hobson uranium processing plant (ISL), Karnes County

TNRCC Permit No. WDW-168
South Texas Mining Venture, LLP
- 99% - URN South Texas Project, Ltd.
- 1% - Everest Exploration, Inc.

UEC GOLIAD PROJECT



UR 03075

JEFF SIBLEY
414 MADISON ST.
SAN ANTONIO, TX 79204

UEC PERMIT # UR03075

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Questions or Comments >>

Choose a Different Permit   TCEQ Home

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You have chosen this pending permit number:

Regulated Entity:
RN105304802 - GOLIAD PROJECT

TCEQ Permit No.: UR03075

TCEQ Docket No: Not Applicable

County: GOLIAD

Principal Name:
CN603228461 - URANIUM ENERGY CORP

Privacy policy: Please be aware the law concerning confidentiality of certain email addresses has recently changed. Effective September 1, 2009, email addresses provided to a governmental body (including the TCEQ) for the purpose of providing public comment on or receiving notices related to an application for a license as defined by Section 2001.003(2) of the Government Code, or receiving orders or decisions from a governmental body are no longer subject to the confidentiality provisions of Section 552.137 of the Act. This means beginning September 1, 2009, email addresses in the possession of the TCEQ that meet the above criteria (set forth in Section 552.137(c)(5)) will be subject to disclosure.
(more ...)

Reviewed By GCW

AUG ~~19~~ 2024
20 GCW

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First Name Jeff
Middle Name (optional)
Last Name Sibley
Suffix (optional)

Company Name (if applicable)

Mailing Address
414 Madison St

Suite/Apt/Room/Building/Mail Code (optional)
jsib75@icloud.com

City San Antonio
State Texas
ZIP Code 78204

Phone Number

Fax Number (optional)

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
2024 AUG 19 AM 9:48
CHIEF CLERKS OFFICE

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Mail to:
Office of the Chief Clerk, MC 105
TCEQ
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Austin, TX 78711-3087

Courier or hand-deliver to:
Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Bldg F
Austin, TX 78753

Fax to: 512-239-3311 * *
* * Note: All comments submitted by fax must be followed by a hard copy in the mail within three days.

Related Links:

Central Registry | Commissioners' Integrated Database | Executive Director's Agenda | Commission Issued Orders | Public Meetings | State Office of Administrative Hearings | Public Notice

File documents

08/17/2024

Response to UEC's Goliad IN-SITU Hearing
Permit Number - UR03075

I am writing this letter to the TCEQ expressing my concerns about UEC's testimony during the hearing. The IN-SITU industry began in Texas and it has a long history of environmental damage. UEC and its predecessor, URI, have been involved in some of the worst IN-SITU disasters in Texas.

I have attached a copy of the Texas Energy Alliance report "Uranium Mining In Texas" which gives a short history of uranium mining and documents many of the failed IN-SITU sites in Texas. For another excellent 144 page Australian report on aquifer problems see: "An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining", by Gavin Mudd, Victoria University of Technology". Go to this website: http://www.sea-us.org.au/pdfs/isl/no2isl.pdf.

Please read these reports because the TCEQ is setting up a long-term nightmare that it is ill-prepared to deal with.

Because my questions and responses were limited to 3 minutes during the hearing, I was not able to ask enough questions or express my full concerns about the site or explain the destructive history of this company. The 3 minute limit is a disservice to the public and this makes your agency look like it is trying to push through the hearing so that the company can get a license.

This is a simple description is for the public and explains IN-SITU mining:

a) The aquifer is an underground, very slow flowing river.
b) Uranium in South Texas is primarily found in sandstone formations throughout the Coastal Plain bordering the Gulf of Mexico
c) Uranium in the aquifer comes from volcanoes that exploded in Mexico eons ago. Molten rock that contained uranium bearing minerals was blown into the atmosphere. This fly ash was carried into South Texas by the trade winds where it settled on the ground several feet thick.
d) Over time, rain washed the fly ash into the ground and carrying it down into the earth until it hit the first aquifer.
e) In the aquifer, the oxygen based atmosphere kept the uranium bearing fly ash mobile. Over time, all the uranium was washed out to sea, except for the

areas where it was trapped in stagnant areas of reduced oxygen. These trapped areas are created by barriers that forced the aquifer to flow around the obstruction, creating an area of zero flow. The reduced atmospheres are the result of gases from coal, deep oil, natural gas or hydrogen sulphide that replaced the oxygen in these areas. These low oxygen areas are called "Redox Zones".

f) At the Goliad formation, methane (natural gas) is seeping up cracks in a fault zones and replacing the oxygen, creating a redox zone.

This reduced oxygen area is where uranium precipitates out of the aquifer. The industry believes that the precipitated uranium forms a coating on the existing sand grains of the sandstone where it has been held for centuries.

This following is new science that describes how bacteria is responsible for locking up the majority of uranium in redox zones.

g) In the stagnant areas, the reduced environment allows anaerobic bacteria to establish.

h) New research shows that uranium is trapped primarily via biological reduction in roll-front deposits. Biological reduction changes the uranium from the $U_{(VI)}$ form of uranium to the $U_{(IV)}$ form.

i) Over the centuries the uranium has been held by the tenuous grip of bacteria. As long as the bacteria remains undisturbed, the uranium ore will stay immobile.

Engineers, like UEC, only understand uranium based on their need to find the lowest cost solutions that can provide the highest profit. Nature is much more than a chemical reaction or a profit centre. During the short time that I had to ask questions during the hearing, UEC "experts" seemed unaware of many important geological aspects of IN-SITU and considerable ignorance about the health effects of radioactivity. During the hearing, UEC demonstrated that they have little knowledge of the existence of the bacterial ecosystem that exist in the mine.

It is important to understand that the Goliad aquifer is a living ecosystem. Nature has created this delicately balanced system and it has protected us over the centuries. No one has ever been able to improve or replace the delicate ecological balance that has taken Mother Nature eons to create.

— UEC History and Current Projects —

The first IN-SITU mine was built by the Utah Construction and Mining Company in 1963 in Shirley Basin, Wyoming. The second and third mines were the Palangana and the Bruni mines in Texas. UEC was involved in both mines. The Palangana and Bruni were disasters from the beginning (see "Uranium mining In Texas" reports, page 36). These mines were allowed to close without ever meeting the clean-up requirements of the permit. Lots of aquifers have been destroyed as the industry experiments with their technologies.

A 2006 article showed that Harry Anthony was the Chef Operating Officer and Director of UEC (I was told by UEC during the hearing that he now retired). Mr Anthony was a mechanical engineer involved in designing the majority of IN-SITU technologies worldwide. This 2006 article also states that Mr Anthony was involved in the Palangana, Bruni, Benavides, Kingsville Dome and Rosita ISR projects in Texas. Anthony's consulting work has taken him to IN-SITU projects in Kazakhstan, Uzbekistan and the Czech Republic. Texas now has the largest collection of IN-SITU mines the world.

The UEC website currently list one operating processing plant and 4 mine sites that are awaiting permitting:

a) The Goliad site exploration was started by Coastal Uranium in 1979 and then it was bought by Moore Energy in 1980. UEC bought the site in 2006.

   The Goliad project leases comprised of 636 acres. The area is about 14 miles north of the town of Goliad.

b) Palangana was originally started as a conventional underground mine by Pittsburgh Plate Glass Corp in 1952 but shut down because of on-going issues with hydrogen sulphide gas.

   Union Carbide Corporation bought the site in 1958, converting it to a test facility for the new method of IN-SITU leaching. It was shut down in 1979 after mining only 314,000 lbs of uranium because of on-going problems with the IN-SITU technology.

   Chevron bought the site in 1981 and in 1991, Chevron transferred ownership of all their mining properties to General Atomics. As detailed in the "Uranium Mining in Texas" report, General Atomics was in the business of providing a "service" of removing the liability of "deep pockets" corporations.

   <u>The site was allowed to close by the regulatory agencies in 1999 after a long and unsuccessful attempt to restore the aquifer back to the permit requirements</u>. This practice of "relaxing" of the permit requirements started with this mine and is an on-going issue with the state agencies (see Agency Problems section below).

   In 2009 UEC bought the site. According to the UEC website, the Palangana produced 563,600 lbs U3O8 from 2010 to 2016. It is unclear if UEC had a license to mine this ore or if this was part of a clean-up process.

   Palangana is comprised of 6,987 acres and is located in Duval County, Texas, 25 miles west of the town of Alice along US Highway 359. The site is 5 miles north of the town of Benavides.

c) Burke Hollow was originally build by Mobil Corporation in 1982, the Total Minerals Corp in 1993 and then by UEC in 2011.

   The site consists of a 19,336-acre lease area. The project area is about 18 miles southeast of the town of Beeville. UEC has completed all the required permitting in order to mine at Burke Hollow.

d) The Salvo site was owned by Mobil Corporation until 1983 when they sold it to Uranium Resources Inc. (URI), a joint venture with Saaberg Interplan Uran

Gmbh. The site was sold to R.B. Smith & Associates Inc. in 2005 and then UEC bought it in 2010.

Salvo mineral lease is 800 acres. The Salvo project area is about 10 miles south of the city of Beeville. Salvo is located in an area of Texas that has extensive farming activity and has a high level of crop cultivation.

e) Hobson CPP was constructed in 1978 when the site was IN-SITU mined. In 2008, the plant was refurbished. The Hobson CPP has previously processing uranium from the Palangana and UEC plans to also process uranium from the Burke Hollow, Goliad and Salvo facilities in the near future

— Site Geology —

1) The Bureau of Economic Geology geologic map of Texas describes the Goliad Formation as clays, sandstones, marls, caliches, limestones and conglomerates with a thickness of 100 ft to 500 ft.

2) During questioning at the Goliad hearing, UEC was not aware if there were fault zones in ore body. The UEC website states that "the Goliad structures include two faults that intersect and offset the mineralized units." I have attached a map of the UEC Goliad uranium ore body (see, "uec_goliad_project_map").

3) UEC talked about an "anomaly" in the aquifer that was creating methane gas that was replacing the oxygen in the aquifer and allowing the uranium to precipitate out in the reduced atmosphere of the ore body but they did not know what this anomaly was or where the methane was coming from or how the methane was being held in place in the aquifer.

Methane is another word for natural gas. UEC's experts did not seem to understand that the current reduced environment is the result of methane leaking up the cracks in the on-site fault zone from deeper oil formations.

4) What is keeping the reduced environment from flushing out to the ocean? I ask this question at the meeting but the UEC experts did not know, they called it the "anomaly".

Some form of physical barrier is needed to create an area of stagnate flow, so that the methane atmosphere does not get flushed away, taking the uranium with it. This barrier can be clay formations, mudstone, claystone, siltstone or calcite concrete formations in the aquifer. In a some aquifers, the fault zone is perpendicular to the flow and acts as a dam.

5) I did not get the opportunity to ask UEC what the barriers above and below the aquifer were. There is an assumption in the industry that there are impermeable layers above and below the aquifer that prevent migration in or out of the aquifer.

It is important to understand that South Texas has an unusually complex geology that is shaped by eons of volcanoes, earthquakes, fault zones and dead seas.

It is the very nature of uranium formations that they must be located in fractured, porous zones. According UEC's website, there are 2 fault zones in the ore zone. Reducing gases use these cracks as a direct routes into the aquifer.

The Goliad area is also full of oil wells both operating and abandoned with unplugged holes. Because of fracking, earthquakes are becoming more common in South Texas. In February 2024, areas around Falls City recorded 27 earthquakes, the largest up to 4.7 magnitude. On May 2nd there was a 3.4 magnitude earthquake and on March 12 there were 3 more earthquakes. These quakes were felt as far away as Round Rock (Austin). These earthquakes have created new fault zones and enlarged old ones providing new pathways for contaminates to travel.

6) During the hearing, UEC appeared to be unaware of the importance of bacteria in the ore body.

According to the 2017 study, "Biogenic non-crystalline U(IV) revealed as major component in uranium ore deposits", (https://www.nature.com/articles/s43247-023-00767-9), the authors state that the industry has historically believed that uranium is locked-up in uranium roll fronts by physical means. But this study shows that bacteria is actually the most common way that uranium is locked-up , "biogenic processes are more important to uranium ore genesis than previously understood" and "biological reduction maybe a dominant process in those systems".

The study says that "Pseudomonas, Geobacter and Clostridium species are capable of reducing U(VI) enzymatically to form non-crystalline U(IV). Our field data are in agreement with recent laboratory-based studies showing that biofilms of Geobacter sulfurreducens were able to immobilize and reductively precipitate U(VI) into non-crystalline U(IV) phase via bonding to carbon ligands." "While abiotically produced uraninite and coffinite were thought to be the major components of uranium ores, and are the basis for estimations of economically recoverable uranium from ores, this study shows that U maybe trapped primarily via biological reduction in roll-front deposits, resulting in high fractions of non-crystalline U(IV) bound to C either from organic functional groups or inorganic carbonate. Thus, non-crystalline U(IV) formed by direct enzymatic U reduction in ore formation maybe more important than previously thought."

Historically, it was believed that uranium was held in the roll front by abiotic reduction by aeration state, pH, organic matter, carbonates and phosphates. UEC's website says, "The formation of roll-front deposits is largely a groundwater process that occurs when uranium-rich, oxygenated groundwater interacts with a reducing environment in the subsurface and precipitates uranium". This new research shows that uranium is mostly trapped by biological processes (active bacterial uranium detoxification mechanisms including uranium reduction, phosphatases, membrane proteins, efflux and regulatory systems).

Biological remediation is considered to be the most promising method, as it is cost-effective and free of secondary pollution (Selvakumar et al., 2018; Lopez-Fernandez et al., 2021), which is mainly implemented through surface adsorption, internal accumulation, mineralization, and reduction (Newsome et al., 2014;

Shukla et al., 2017). Of these, biological reduction has attracted increasing attention in the last 30 years due to the advantages of generating concentrated solid U(IV) since its first adoption to prevent the migration of uranium into soil and groundwater (Lovley et al., 1991).

The solubility and mobility of U(VI) are significantly higher than those of U(IV) that makes it more environmentally harmful, particularly if it accumulates in the food chain. Biological reduction changes the uranium from U(VI) to the U(IV) form of uranium.

A quick search on-line shows there are many studies that demonstrate how microorganisms influence the mobility and toxicity of uranium through processes like biosorption, bioreduction, biomineralization, and bioaccumulation.

7) There are many studies showing how bacteria can be used to clean up an aquifer. This website from Michigan State University shows how geobacter can be used to trap uranium. It has a video explaining what geobacter does it and how it can be used to cleanup uranium:
   a) "These bacteria clean up radioactive waste I MSUToday I Michigan State University": https://msutoday.msu.edu/news/2021/bacteria-clean-up-radioactive-waste.

8) Studies of the inflow and outflow of an undisturbed ore bodies showed that the radiation levels of the water leaving the bacterial zone was lower than the water entering the zone. This illustrates that <u>bacteria not only traps radioactive contaminates but also acts as an on-going natural radioactive filter in the environment.</u> The bacterial process is similar to what a home reverse osmosis water filter does.

   This natural filter has protected the environment for millions of years because it is a living being that is capable of reproducing itself. And it will continue to do so as long as it remain undisturbed.

9) During the hearing, UEC appeared to be unaware of the importance of bacteria in the ore zone. They seemed to only understand the mechanics of the IN-SITU process.

   It is uncertain that man can returned what took nature eons to create. This is especially true when the people who are doing the restoration are unaware or don't care about the existence of the living ecosystem that has protected us.

— Aquifer Extraction —

10) The industry suggests that they can control the movement of the underground fluids by sucking out excessive fluid from the aquifer. The production wells pump water out of the aquifer creating an area of negative pressure underground known as a "cone of depression". This will theoretically pull in the migrating ore into the production wells before it can flow offsite.

For this to work, it is required to pull more water out than you are injecting into the aquifer. Basically, they are pumping out enough water to create a cone of depression that covers the entire mine area. This "Bleed Stream" will essentially drain the aquifer around the ore zone in order to stop offsite migration. This the same dumb and dangerous technique used by every strip mine and IN-SITU site ever built in Texas. The strip mines dumped their waste water into the nearest river and IN-SITU is dumping it into deep injection wells.

During mining they will extract 70% of the ore body in the shallow aquifer and bring it to the surface for processing. After they have pulled out the U3O8, the remaining ore body will be dumped down the deep disposal well. After closure of the mine, 30% of the original ore body will be left behind in the shallow aquifer and the other 70% dumped down the deep injection well. The means that will be 2 aquifers containing radioactivity and heavy metals that are in a highly mobile state.

11) Because of the oil industry, Texas is the birthplace of deep well disposal and it has the highest number of deep wells in the world. In 2008, Texas had over 32,000 deep well injection sites. Most states have outlawed deep well injection because it is dangerous.

The oil industry wanted a cheap way to dispose of excess saltwater from oil well operations but using deep wells to inject saltwater is not the same as injecting radioactive waste. Because of industry lobbying, the Texas agencies do not allow monitoring of deep well injection sites so we have no idea what is going on.

12) Since the deep aquifers are under high pressure, anything liquid will continuously seek a path to lower pressures, like toothpaste being squeezed out the tube. When the Bruni mine first started injecting into the aquifer, hundreds of fountains appeared immediately because of unplugged exploratory wells. This illustrates how easy it is for high pressure fluids to travel once a path is available.

— Plant Processing —

13) The life of the mine is determined by the market price for uranium. If the market prices are low, then they will process less of the ore and close down the mine sooner. Profits determine the cutoff point for closing the mine.

Typically, IN-SITU only recovers about 70% of the uranium in the aquifer. That means that 30% of the ore remains in the aquifer after closure. They could remove a lot more contaminates from the aquifer if the agency required them to but Texas is a business friendly state and the agency boards are stuffed with pro-industry boosters.

14) The miners add oxygen to the aquifer to make the ore mobile so that they can suck the oxidized uranium out of the aquifer and process it above ground. Extraction is done by chemically exchanging ions inside a processing facility. The ion exchange process is very similar to a home "Culligan" water softener. It removes hardness or calcium from the water by replacing it with sodium, using ion

exchange resins. IN-SITU uses an an-ion exchange resin, which is comprised of little polymer beads that are charged particles having an affinity for uranium anions.

When the resin becomes saturated with uranium, they strip out the uranium from the beads using salt and uranyl dicarbonate, creating a yellowcake slurry. This water in the slurry is then squeeze out and dried to make U3O8 yellow cake.

15) During processing, only the uranium oxide, U3O8, yellow cake is removed. U3O8 equals only 2% of the radioactivity in the ore. The other 98% of the radioactive and heavy metal toxic waste are left behind.

The holding tanks at the processing plant must be vented to atmosphere so that the tanks can be filled. They are a large source of Radon gas to workers and anyone in the downwind direction. At U.S. Steel, leaching fluids contained a radon content of 167,000 pCi/l (pico Curries per litter).

The In-Situ processing plants produce large amounts of solid radioactive sludge, filters, resins, plumbing parts and equipment that must be disposed in a nuclear dump. They are stored onsite until a large quantity can be assembled for shipment to a nuclear dump. Disposal cost are high and the companies frequently allow the waste to pile up to dangerous levels requiring the agencies to force the removal.

This waste used to be disposed of in the tailings ponds at Conquista and Panna Maria but they are now closed. I expect they are currently dumping the waste in West Texas at the low-level dump in Andrews county.

14) UEC permit covers a lease area of 636 acres, this is equal to one square mile in size. This area will be covered with miles of PVC piping that connect the processing plant to the leaching fields. Oxidized water is pumped to injection wells via PVC pipe and the uranium rich ore solution is sucked out of the aquifer and pumped to the processing plant via PVC pipe.

Because the leases are so big, it can take some time before a leak is discovered. Because the flow to and from the wells are so high, leaks can contaminate large areas before they are discovered. PVC breaks are a common occurrence.

The attached "History of Uranium Mining in Texas" and "Analysis of IN-SITU" reports documents some of the worst incidents of spills that have occurred in Texas. At the US Steel IN-SITU mine outside of George West, the state agency records show that their pipes were particularly bad at breaking. US Steel did not report most spills, only the worst incidents were reported. 22 major spills were reported at the U. S. Steel showing a total of 1,200,000 gallons of radioactive spilled.

On 6/19/81, the largest surface spill ever recorded by the regulatory agencies, occurred at the US Steel's site when a fiberglass pipe ruptured spilling 850,000 gallons of leaching fluid. U. S. Steel reported to the agencies that only 100,000 gallons of fluid had spilled. It flowed from 4:00 a.m. to 8:00 a.m. before workers noticed it. It spilled out onto highway 59, forming a shallow lake. The ranchers that owned the land were shocked to read about it in the newspapers. Neither the company nor the agencies had notified them.

To give an idea of the radiation levels involved in these spills, a 90,000-gallon spill of leaching fluid occurred at US Steel on 7/0l/80. Gamma readings of the area pegged the Geiger counter needle, making reading impossible. Leaching fluids at U.S. Steel contained a average radon content of 167,000 pCi/l.

– Monitoring –

15) The state law requires ongoing air and aquifer monitoring while the mines are operating but the agencies do not have the funds to provide full time monitoring, so they require the mining companies to do most of the monitoring themselves and then honestly report the data to the agencies. This is obviously a big problem and the agency incident files confirm it. The files contain hundreds of reports of lost data, falsified samples, altered records, covered-up spills, unreported excursions, illegal dumping, worker overexposure, and so on.

16) The cone of depression technology is flawed because it cannot be monitored. The complex nature of the aquifer geology makes it impossible to predict what is going to happen underground.

During the question period I ask UEC if the geology in the aquifer was a floodplain river or a braided river environment. They said that it was a floodplain environment. A floodplain river environments contain coarse grained deposits of sands and gravels, but are typically dominated by fine grained silty or clay deposits. They are characterised by lower down-dip slopes and smaller flow velocities. The complex channels that are formed are also highly variable and very difficult to characterise with borehole data. These channels have higher porosities that allow faster flow rates. Fault zones are another immediate escape route.

The industry acts like the aquifer is composed of uniform beech sand where all the material is the same size and porosity. In the floodplain river environment, injected fluids will take the route of least resistance, flowing in narrow and torturous paths in a non-homogeneous stratum. It is impossible to monitor the fluids because it is impossible to know where to accurately place the monitor wells. UEC made no effort to find the best locations for the monitor wells, they simply placed all the wells 400' apart.

To illustrate this problem, it is common for contaminates to be discovered in private wells outside the monitoring ring, un-detected by the mine's monitor wells. There has been lots of offsite damage but the public never hears about it because the agencies don't release this information. They do not want to alert an excitable public and they don't want to be blamed for any problems.

17) I did not get a chance to ask the TCEQ about the monitoring requirements but If this site is like the other IN-SITU sites talked about the 2008 "Uranium mining In Texas" report, the permit allows them to walk away from the site after the monitor wells shows "no contamination" for 3 months. All monitor wells will be plugged.

UEC will attempt to return the reducing atmosphere after mining in order to lock-up the remaining ore but this is a temporary fix. Once the 3 month "no contamination" is met, the reducing agents will be shut down, the monitor wells will be plugged and the site closed.

The "no contamination" requirement of the monitor wells does not mean there is no contamination. The agencies currently allows for high levels of contamination at closure. This is because over the years the standards for cleanup have been continuously "relaxed" when sites could not meet their original clean-up requirements (see Agency Problems section below).

Since the agency knows that there is no way to clean up a contaminated underground site, they simply increase the contaminate levels of the original permit so that they could walk away, otherwise they would be working on these sites for forever.

18) These issues raise some serious questions:

a) I was not able to ask the rate of aquifer flow at the meeting but according to Wikipedia, a groundwater flow rate of 1 foot per day is considered to be a high rate for porous aquifers. I am guessing that the flow rate for the Goliad aquifer is around 17' a year. At this rate it could take years for contamination to travel very far.

b) The "3-month, no contamination" requirement is not logical because the aquifer is a very, very slow moving river and the monitor wells are located hundreds of feet away from the ore body in an complex geological strata.

The injection pressure of the reducing agent will force the flow of contaminates into the most porous areas of the aquifer. The tortuous environment of the floodplain river environment provides many narrow, high porosity channels that provide undetectable escape routes for contaminates. Changes in the depositional conditions of sands can cause hydraulic conductivity to vary by a factor of 10 to 100.

The 6" bore hole of monitor wells can only monitor the water thats in its immediate vicinity and since the monitor wells are located 400' apart, it is very easy for contaminates to bypass them.

c) I do not know which wells UEC plans to use to inject the reducing agent but their location is crucial. Any injection wells located between the ore body and the monitor wells will effectively push any contaminates away from the monitor wells.

d) IN-SITU mining oxidises the reduced environment in the ore zone and the 30% of the ore left-over after mining will be highly mobile.

During the hearing UEC was asked about the bacteria in the aquifer and their answer was to suggest that there was some sort of theoretical idea about bacteria.

We now know that it is the bacteria that has been keeping the Goliad aquifer clean for centuries. Oxidation of the ore body during mining kills off the anaerobic bacteria. We will never know if UEC's plan to temporarily replacement of the reducing environment will work because there will be no long-term monitoring.

19) I seems that the UEC's closure plan is a sham to cover up the fact they expect the ore to migrate wherever it wants. Since it will take many years for the contamination to travel to any neighbouring wells where it can be detected, the owners of the mine will have made their money and be long gone.

— Health Effects —

20) Uranium mining only interested in removing U3O8 from the ore and that amounts to less than 2% of the total radioactivity that exist in the ore body. 98% of the radioactivity and heavy metals remain after mining is finished. This includes thorium-232, potassium-40, and thorium 230, radium, radon, molybdenum, arsenic, selenium and other toxic and radioactive substances. These elements have very long half-lives, meaning that after one half-life has passed, only half of the radiation will be gone. Thorium 230 is has a half-life of 78,000 years, meaning that after 78,000 years, only one half of the radiation will be left.

21) UEC told the people at the meeting that it was ok to drink the water from their wells that are located in the vicinity of the ore body. This is absolutely irresponsible, all wells water should be tested before considering it safe to drink. During mining they will make the uranium highly mobile and agency history shows contaminate leakage offsite is common.

They even suggested that it was ok to drink the water in the uranium ore body area??? How can we trust these people to protect us if they don't know what it is that they are suppose to be protecting us from???

a) We are continuously exposed to small levels of radiation from our environment. On page 9 of my "Uranium mining In Texas" report, I explain the health effects of low level radiation exposure.

The earth's crust contains an average of 3 ppm uranium and seawater contains approximately 3 ppb. This natural radiation is known as background radiation and it measures about 0.2 mrem (millirem per hour) of gamma radiation.

It is important to understand that there is no safe level of exposure to radiation. Even at background levels, the EPA estimates that 10,000 to 30,000 people will die each year. Because radiation is invisible, it is necessary to remain aware of the danger in order to insure good health.

In the past, the government attempted to cover up and prevent radiation health studies in the interest of national security. According to many experts, the Federal bomb priority has probably resulted in the killing of more people than all the world wars.

b) The undisturbed ore is usually buried more than 200' below the ground. The tons of earth that cover the ore form a perfect radiation shield. Environmental Assessments completed at several sites sites before mining began, showed surface background radiation levels are lower than the national average. At some sites the levels were 2 times lower than national average. Living on top of an undisturbed ore body in South Texas can be safer than living elsewhere in the U.S in terms of exposure to surface levels of gamma radiation.

c) The migration of radioactive product in the aquifer in an undisturbed ore body can be very low. Assessments completed at mine sites before mining began show that the aquifer surrounding the ore is generally free of the high contamination levels that exist inside the ore deposit.

d) Today, the most serious threat to radiation exposure is not from naturally undisturbed ore bodies but from IN-SITU mining itself. Tightly bound up uranium ore bodies do little harm as long as the public is aware of their location and does not drink directly from the ore body.

During mining, the ore is brought to the surface where it becomes available for direct exposure to the public by wind, water and food. After mining, the ore that remains in the aquifer and will migrate causing a serious long-term invisible threat that is not easy to monitor or repair.

— Agency Problems —

5) The state's regulatory agencies do not consider themselves researchers and they are not receptive to outside advice. In contrast, the agencies are totally accepting (and dependent) on industry-sponsored studies that only show how safe mining is. The uranium industry has existed for 70 years and as far as I know, the agencies have never denied a permit.

6) The agencies have never released any information to the public about the serous problems this industry has created because they do not want to alarm an excitable public and be held accountable for any failures.

The director of the Texas Low Level Waste Authority was caught of TV saying that the public was ignorant about radiation and so its best not to tell them because they only get excited. Because of this, the public is unaware of the damage that this industry has created. This keep the public pacified and the state legislators uninformed.

The uranium industry has always been a secretive industry, publicity is their enemy. They cannot continue making money if the true cost to the public is made public. Many aquifers have been destroyed but the public remains unaware. Because of this the IN-SITU miners have never been held accountable for their actions and have never had to pay the true cost of clean-up.

7) Today, the permit requirements for allowable contamination levels at closing are unsafe because the agencies have a history of simply increasing the contamination levels allowed whenever a company could not meet their permit requirements. This continual "relaxing" of the requirements has allowed

contaminate levels in the aquifer at closing to increase over time. This only helps the IN-SITU miners.

An examination of 32 permits from closed Texas In-Situ mines showed that in each case, companies were permitted to leave behind higher levels of contaminants in the groundwater than were allowed in the permit (Corpus Christi Caller-Times, Nov. 5, 2006). In some cases, companies were able to meet the restoration target for one mineral but reported 10- and 20-fold increases in others.

26) The agency boards are filled with political appointees that are pro-business and anti-public service. The agency personal are trying to do their job but are overruled by industry boosters on the boards.

The state government is run by pro-business politicians that don't understand that all business is not good business. They continue to fill the boards with industry personnel that are supposed to be protecting the public but are only looking out for themselves.

22) The regulatory oversight for IN-SITU projects falls under the jurisdiction of the RRC and TCEQ, which regulates mining operations and the extraction of minerals and provides mine permits and radioactive material licenses. In the past, other agencies had regulatory authority over the uranium industry. The Bureau of Radiation Control and The Low Level Waste Authority have been closed down by the Texas Legislature for poor performance and lack of public oversight. When the ruling political party of Texas is voted out, the agencies will have to show that they were not influenced by uranium industry or they will face the same fate.

— Other Concerns —

27) Oxygen is a very reactive element and UEC is mixing it with methane in the aquifer? Has anyone considered that oxygen and methane are used as rocket fuel and this combination would make an excellent bomb.

— Closing Remarks —

The history of uranium mining in Texas is a gold rush story of an industry cobbled together by prospectors, speculators and wildcat oilmen. Although some have richly benefited from this industry, it has left the local populations poorer and sicker. Uranium mining is a boom and bust industry that provides few jobs and leaves behind enormous long-term problems.

It has been suggested that nuclear power is the answer to our energy problems. It must be understood that nuclear power is not a renewable resource. It is believed that there is only 30 to 60 years of uranium ore left in the ground. To exchange 60 years of nuclear power for hundreds of centuries of environmental contamination makes no sense, especially when other, cleaner alternative energies are available. The hidden cost of mining far exceeds any perceived benefits.

I believe the agency and its personal are trying to do their job but they are being influenced and overruled by industry boosters on the boards and one-sided information from the industry. How does society advance if everyone is only looking out for themselves. The TCEQ must be take responsibility and shut down this dangerous industry.

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28) The UEC's website describes the formation of uranium roll-front deposits as, "largely a groundwater process that occurs when uranium-rich, oxygenated groundwater interacts with a reducing environment in the subsurface and precipitates uranium. The most favorable host rocks for roll-fronts are permeable sandstones with large aquifer systems. Interbedded mudstone, claystone and siltstone are often present and aid in the formation process by focusing groundwater flux. The geometry of mineralization is dominated by the classic roll-front "C" shape or crescent configuration at the redox interface. The highest-grade portion of the front occurs in a zone termed the "nose" within reduced ground just ahead of the alteration front. Ahead of the nose, at the leading edge of the solution front, mineral quality gradually diminishes to barren within the "seepage" zone. Trailing behind the nose, in oxidized (altered) ground, are weak remnants of mineralization referred to as "tails" which have resisted re-mobilization to the nose due to association with shale, carbonaceous material, or other lithologies of lower permeability. Tails are generally not amenable to ISR because the uranium is typically found within strongly reduced or impermeable strata, therefore making it difficult to leach (Davis, 1969 & Rackley, 1972)."

URANIUM MINING IN TEXAS

Overview of Mining in Texas

Texas Energy Alliance
2008

In 1954, a San Antonio oil company was using an airplane to prospect for minerals over the mesquite and cactus terrain of south Texas. During one of the flyovers, the onboard radiometric instruments detected an unusual radiation spike. Once on the ground they were able to narrow the location to a small, brushy patch of farm land just west of Falls City, Texas. To their surprise, the Geiger counter buzzed with activity. On further testing, they discovered that commercial ore-grade uranium existed just a few feet below the surface. This shallow location was unusual because uranium ore is usually found deep underground, not on the surface. Apparently the soils in this area had eroded away over time and exposed the ore.

This site became the Susquehanna mine, the first uranium mine in Texas. Although it was the only place in Texas where uranium was found on the surface, the discovery created a wild "gold rush" fever over the possibility of uranium so plentiful that it could simply be picked off the ground. Lone prospectors, wildcat oilmen, and large energy corporations began frenzied exploration in an effort to stake their claim. They hastily cobbled together makeshift mining operations with little understanding the dangers posed by uranium mining. This era has become known as Texas' second "Spindletop" boom but because of the secret nature of the uranium industry, the public heard little of this activity.

Uranium Mining Sites in Texas.

During the early days of the nuclear age, little was known about the dangers of radioactivity. This was the "cold war" era and the fear over national security was very real. The government retained ownership of uranium in the US and controlled its mining by setting the ore's price. In order to insure the atomic bomb program, the Federal government strictly enforced the National Security Act. This Act stifled public information and limited research on radiation health effects. A special branch of the Federal government actively worked to defeat public lawsuits over nuclear issues. With direct help from the government the mines prospered in secrecy for the first 26 years. Free from public scrutiny and

government regulations, approximately 19 uranium strip mines operated in the state during this time. Very little is known about these early companies or their operations.

Over time, large-scale environmental damage occurred as the companies used the environment to work out their engineering kinks. These abuses increased until public outrage forced the state to pass legislation in 1975 creating government oversight of uranium mining in Texas. The law provided some very needed protection by establishing state agencies to regulate the industry but it did not address any of the problems that had been created by mining. Instead the law required that the state agencies figure out how to deal with the problems (see the "Inadequate Protection" section below). Unfortunately, by providing the specter of government oversight, the regulations served to pacify the public's concerns about uranium and this allowed the industry to use their political power to influence the agencies and continue to grow unabated.

The industry grew and their profits increased until 1984, when the market for uranium "yellow cake" ore crashed due to the decline of nuclear power plant construction and a flood of cheap ore from reprocessed Russian nuclear weapons. Because of the worsening market, many small companies sold out to large energy companies or formed alliances with foreign-owned conglomerates.

According to a report written by the Texas Department of Agriculture (TDA) in the 1990's, a total of 23 uranium-mining companies have operated in Texas. For the first time, this report gave some idea of the size of the industry:

1) Uranium mining operations covered 18 South Texas counties: Atascosa, Bee, Brooks, Duval, Goliad, Gonzales, Hidalgo, Jim Hogg, Jim Wells, Karnes, Kleberg, Live Oak, McMullen, Nueces, Starr, Webb, Wilson, Zavala.
2) 40 strip mine sites were permitted covering over 31,000 acres of land. This included four (4) uranium mill-tailings ponds.
3) 80 In-Situ mining sites were licensed. In-Situ is a new technology that uses surface wells to mine the aquifers with solvents. These sites contained 20,000 individual solution wells.
4) 32 deep well injection sites were permitted for the In-Situ mines in order to dispose of their radioactive waste and contaminates into deeper aquifers.

Current Status

The current energy crisis has created a new push for nuclear power plants. As a result, the price of uranium ore has increased over 500% in the last 5 years. Today, uranium fever has returned to South Texas with a vengeance. Uranium has become the new darling of Wall Street as promoters push uranium as the next get-rich-quick scheme. The exploratory drilling for new ore fields is in full gear. New mines are being permitted and long closed mines are being rushed into permit. New international players have entered the picture.

Foreign influences such as the French Government, have invested heavily in Texas because they need a dependable, non-third world source of fuel for their nuclear power plants. They have hidden their involvement in large multinational conglomerates. The French promote nuclear power as a safe source of energy but in reality, they are not paying the true cost of this technology. The uranium is mined and

refined here before being shipped abroad. This leaves behind massive amounts of perpetually radioactive wastes in the US.

Because of increasing lawsuits, the mining companies are now fully aware of their liability exposure and have become expert at hiding problems and corporation assets. The large energy companies (Mobile, Exxon, Gulf-Chevron, Conoco-Dupont) have closed down their mines and removed them as far as possible from the waste they have created. Chevron has transferred their entire uranium holdings to General Atomics, a company that specializes in "liability conveyance". By shifting ownership they have lowered their exposure to expensive lawsuits.

Mining Problems

A quick overview of the problems with uranium mining:

1) In Texas uranium ore bodies are found underground in aquifers. Here the radioactive and hazardous materials in the ore body are tightly locked up and unable to migrate. Mining exposes the ore to oxygen, which makes the uranium and its toxic byproducts mobile. *This migration threatens the aquifers of South Texas.*
2) Mining for uranium involves the removal of uranium oxide from an underground ore body. The ore body is composed of less than 2% uranium oxide. *The waste that remains after the uranium oxide is removed contains 98% of the radioactive and hazardous materials.* This includes thorium-232, potassium-40, and thorium 230, radium, radon, molybdenum, arsenic, selenium and other toxic and radioactive substances. This material is left behind in the environment.
3) Most strip mines pits were abandoned by the companies and left open to the environment for years. *The state spent over 10's of million of taxpayer dollars filling in abandoned uranium mine pits before the problem of oxidation and migration could be addressed.*
4) There were four uranium-processing mills that serviced the mines in South Texas. The mills used sulfuric acid to dissolve the uranium out of the ore. The radioactive acid waste was dumped into "tailings ponds" which were little more than aboveground enclosures made of mounded earth berms. The four tailing ponds now *contain over 27,000,000-tons of solid hazardous and radioactive waste and untold amounts of radioactive liquid waste.* The state allowed very dangerous out-of-state military and industrial waste to be dumped at these sites. The D.O.E. has expressed concern over the scope of the dumping and the levels of "hot" materials that were allowed.
5) Texas regulators allowed the Conoco-Conquista tailings pond to become the unregulated nuclear dump for the state of Texas. This site was never licensed and was in clear violation of the law because did not contain a suitable geology as required by Federal law; a shallow aquifer existed only feet below the bottom of the pond. Several states were allowed to dump their non-mining, "very hot" nuclear waste at the Conoco pond. Now that the Coquesta is closed this same waste is being sent to the "high level" nuclear site facility in Hanford, Washington.
6) Many more millions of tons of hazardous liquid chemicals were dumped into these tailing ponds but the exact amount of fluids is unknown because the companies were not required to

keep accurate records. All the ponds have leaked and most of the radioactive liquids have entered into the aquifers.

7) The state regulatory agencies have not required the mining companies to properly isolate the nuclear waste stored in the tailings ponds. They have allowed the mining companies to simply cover these aboveground waste mountains with a few feet of clay as the only protection against the elements. This is in spite of the fact that Federal law requires that they meet a 100,000-year intrusion requirement. Further, in order to demonstrate proper enclosure, the Federal Government set the example by reclaiming the Susquehanna tailings pond at Falls City, Texas. This was the first reclamation in the state and includes both a clay cap and a rock bolder cap to help prevent intrusion over the 100,000-year period.
8) The state has not required any cleanup of the aquifers contaminated by the tailings ponds as required by the original mining permit.
9) Texas is the birthplace of the new uranium mining method called In-Situ mining. The technology uses water well technology to inject solvents into the aquifers where the ore bodies are found. The state licensed this technology without any independent studies showing that it was safe to operate. Instead they depended on company data as proof of the technologies dependability. Years later, this data turned out to be completely wrong but it was too late to change the rules because the industry was already too well established (see the "Bruni-Westinghouse" section below). Currently, *Texas has the largest concentration of In-Situ mines in the world.*
10) In-Situ mining oxidizes the uranium ore body the same way strip mining does (see lines 1 and 2 above). This toxic and radioactive material is free to migrate in the aquifers but unlike tailings ponds; this waste is unavailable for direct reclamation because it is located hundreds of feet underground where it is difficult to monitor or access.
11) The In-Situ mines are allowed to dispose of their nuclear waste with deep well injection into lower aquifers. Texas is the birthplace of deep well injection and today has the largest concentration of deep well injection sites in the world. Injection was originally used to dispose of salt water from oil wells but Texas has expanded the use to include the dispose of radioactive waste from uranium mines. Most states have outlawed deep well injection because it is inherently unsafe.
12) As if to insure that no one will find a problem, the regulatory agencies do not allow the monitoring of the aquifers below the In-Situ mining zone. Because of this, no one knows what damage has occurred to the deeper aquifers from deep well disposal.
13) So far, the state has allowed 32 of the In-Situ mines to close down without returning the aquifers to the original levels as required by their permits.
14) Five In-Situ mines were allowed to dispose of their radioactive waste by spraying it directly onto the ground even though the EPA and the employees of the state regulatory agencies opposed the practice. *One of these sites was on the shoreline of Lake Corpus Christi, the drinking water for a million people. The agency personnel estimated that 50% of the radioactive waste wound up in the shallow aquifer that was connected to the lake.*

Inadequate Protection

The state regulators police the industry by writing the rules that the industry has to operate under. These rules have to be continuously rewritten because of the continuous and ongoing problems that occur. This

patchwork of regulations reflects the industries' dangerous trial and error method of mining and demonstrates the problems that are inherent with this technology.

Once the rich ores are removed, the mines are no longer profitable to operate and the companies want to close them down but the ore bodies that remain are now oxidized and the underground waste remains mobile. It has become clear that there are no technologies available that can return the waste to its original lockup state. So far, the state has allowed 32 of the In-Situ mines to close down. *All of them have been allowed to close without returning the aquifers to the original levels required by their permits!* The early In-Situ sites, which used ammonia and acid solvents, were allowed to close down with basically no cleanup. The Bruni mine in Webb County was allowed to close down even though aquifer contained approximately 4,330 lbs of ammonia per 40 square feet of aquifer. The new In-Situ process tries to deal with this problem by using huge amounts of fresh water to flush out the remaining ore from the aquifer and then disposing of it by deep well injection. No only does this waste valuable fresh water aquifers but this technique has shown that it is not capable getting anywhere close to returning the aquifers to their original background levels. The underground geology is so complicated that ore remains in the aquifer, available for future migration.

Today, the agencies deal with these problems by simply changing the rules so that increased contaminate levels are allowed. This allows the companies to close the mines before any further increases in contamination can be noticed.

This waste will remain a threat for hundreds of thousands of years and *yet the state does not require any long-term monitoring of the aquifer so we can determine what level of migration are occurring!*

Because the cost of cleanup is so expensive, the regulatory agencies feel it is necessary to allow cheap, Band-Aid fixes in order to keep the companies from going bankrupt, thus saving the taxpayer the cost of cleanup. But time has shown that these easy fixes do not work and are simply postponing the problem to some future generation. This attitude reflects the agency's pro-nuclear stance. But more important, this illustrates how politically effective the industry has become at installing "business friendly" commissioners on the agency boards in order to enforce industry concerns. These commissioners have the ultimate power to affect agency policy but have repeatedly demonstrated their indifference to the public's concern.

Today the local public and their elected officials are fighting to stop new mines from being built but because the mining is occurring in rural areas with low populations, they cannot raise the political muscle to stop them. As a result, *the agencies have never denied a permit in 60 years of mining.*

Apparently the state agencies cannot decide whether their allegiance is to industry or the public. Their pandering to industry has resulted in the failure to protect the public and the environment. The government must stop propping-up this industry so that it can be exposed for what it really is: unsafe, unsustainable, and unprofitable.

A Warning

It has been suggested that nuclear power is the answer to our energy problems. This opinion is based on industry propaganda, not on facts.

•) The nuclear power generation is a piece of a 3-part cycle:
1) Mining and milling;
2) Nuclear power and bomb making;
3) High- and low-level waste disposal.

•) All these cycles produce waste that cannot be disposed of safely. Once created, the radioactivity cannot be turned off and remains a perpetual threat. Institutions, governments or religions will not last long enough to safeguard future generations from the waste.

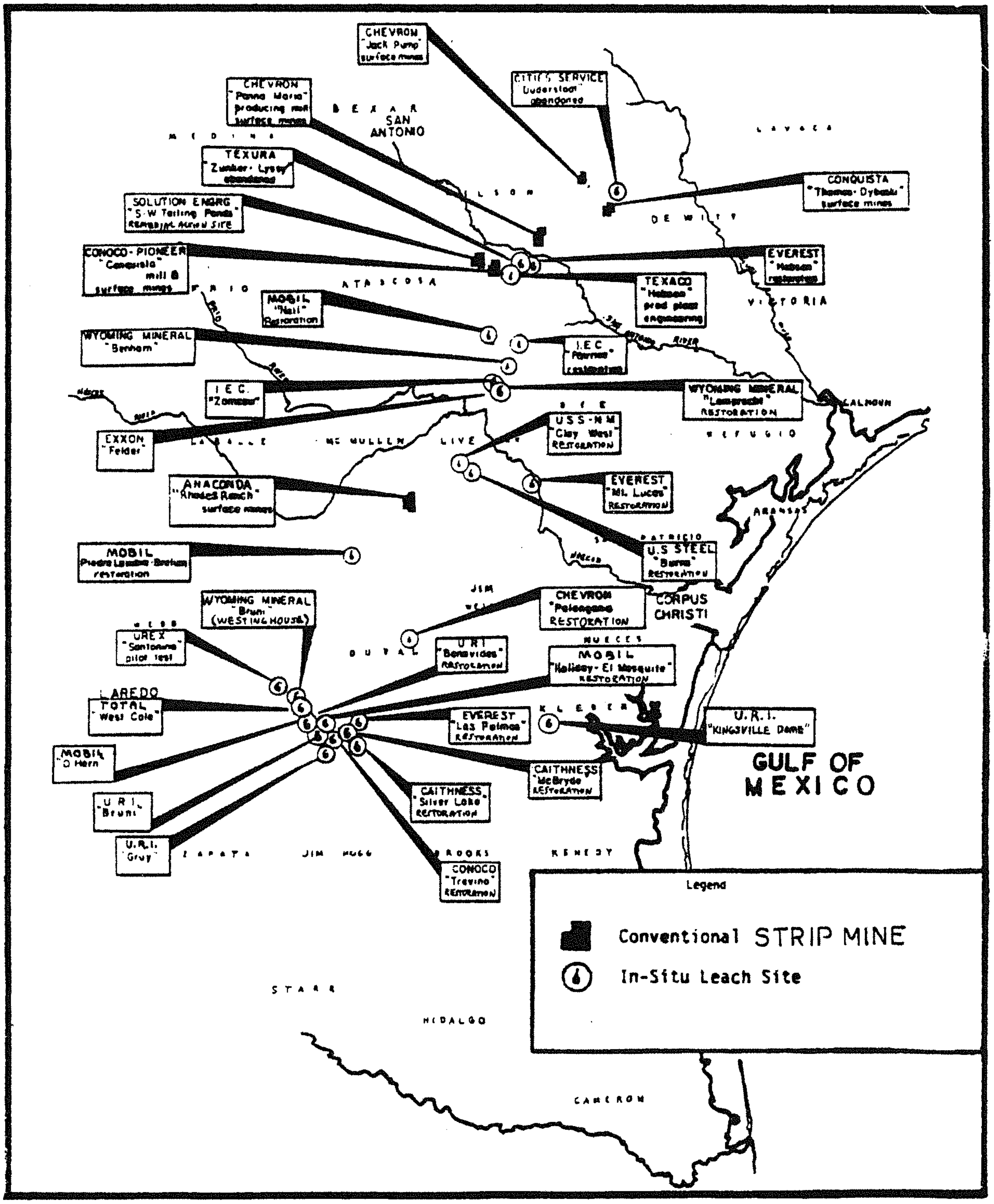
•) There is an estimated 7,000 radioactive contaminated sites in the U.S., containing 1,700,000,000,000 gallons of contaminated water and about 40,000,000-cubic meters of contaminated soil. It was estimated in 1999 to cost between $373 million and $1,694 trillion to cleanup these sites in the U.S. alone.

•) Some estimates say that there is less than 60 years of uranium left in the ground. To exchange a few years of nuclear power for hundreds of thousands of years of environmental problems makes no since especially when there are cleaner and safer alternative energies available.

The Navajo Nation in the four corners area (New Mexico, Utah, Colorado and Arizona) has set an example by banning uranium mining in 2005. This area has some of the richest uranium ore deposits in the world, as well as some of the worst uranium mining devastation.

Uranium mining is a boom and bust industry that provides few jobs and leaves behind enormous environmental problems. The hidden cost of mining far exceeds any perceived benefit. When considering energy sources for the future, it is important to remember:

If it is not sustainable, it's not a solution



Uranium Recovery Facilities

Table 9 - ISL Proposals, Trials and Mine Sites in Texas[1]

Site	Company	Notes & Status
Alta Mesa	Cogema Mining	Announced plans
Benavides	Uranium Resources Inc.	Wellfield undergoing restoration, plant decommissioning
Besar Creek	Rocky Mountain Energy	Early 1970's trial of sulphuric acid
Boots/Brown	U.S. Steel	Unknown
Bruni / Sulfur Creek	Westinghouse	Wellfield restored, plant decommissioning
Burns Ranch / Clay West	U.S. Steel	Wellfields undergoing restoration, plant decommissioning
Dunderstadt	Cities Service	Trial of sulphuric acid ISL, operated from 1969 to 1970.
Hobson / Gruy	Everest Minerals	Wellfield undergoing restoration, plant on standby
Holiday-El Mesquite	Malapai Resources	Wellfield undergoing restoration, plant on standby
Kingsville Dome	Uranium Resources Inc.	Operating facility
Lamprecht / ZamZow	Intercontinental Energy	Wellfield in restoration, plant decommissioning
Las Palmas	Everest Minerals	Wellfield restored, plant decommissioning
Longoria	Uranium Resources Inc.	Unknown
McBride	Caithness Mining	Unknown
Moser	U.S. Steel	Unknown
Mt Lucas	Everest Minerals	Wellfield undergoing restoration, plant decommissioning
Nell	Malapai Resources [3]	Unknown
O'Hern	Malapai Resources [3]	Wellfield and plant on standby
Palangana	Chevron (Union Carbide)	Unknown
Pawlik	U.S. Steel	Unknown
Pawnee	Intercontinental Energy	Unknown
Piedre Lumbre	Malapai Resources [3]	Unknown
Rosita	Uranium Resources Inc.	Operating facility
Santonino	Urex Inc.	Unknown (at trial stage in 1984)
Tex-1	Everest Minerals	Wellfield undergoing restoration, plant decommissioning
Trevino	Conoco Inc.	Unknown
West Cole	Cogema Mining	Wellfield undergoing restoration, plant decommissioning

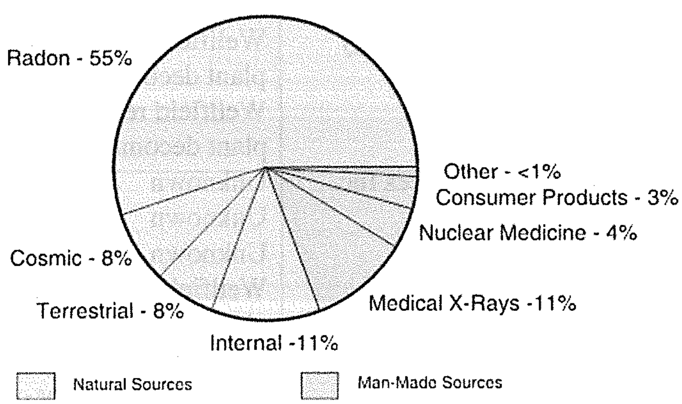
[1] - compiled from Charbeneau (1984), Larson (1981), USEPA 1995, Underhill (1992), Nigbor *et al.*, (1982), USDoE (1995), USDoE (1997) & USDoE (1998).
[3] - Exact current ownership unknown, assumed Malapai Resources acquired the sites when they bought out Mobil's interests in uranium (Moody, 1992).

URANIUM MINING IN TEXAS

What are the Environmental and Health Risk from Uranium Mining?

We are continuously exposed to small levels of radiation from our environment. The earth's crust contains an average of 3 ppm uranium and seawater contains approximately 3 ppb. This natural radiation is known as background radiation and it measures about 0.2 mrem (millirem per hour) of gamma radiation. It is important to understand that there is no safe level of exposure to radiation. Even at background levels, the EPA estimates that 10,000 to 30,000 people will die each year. Because radiation is invisible, it is necessary to remain aware of the danger in order to insure good health.

Sources of Radiation Exposure in the United States*



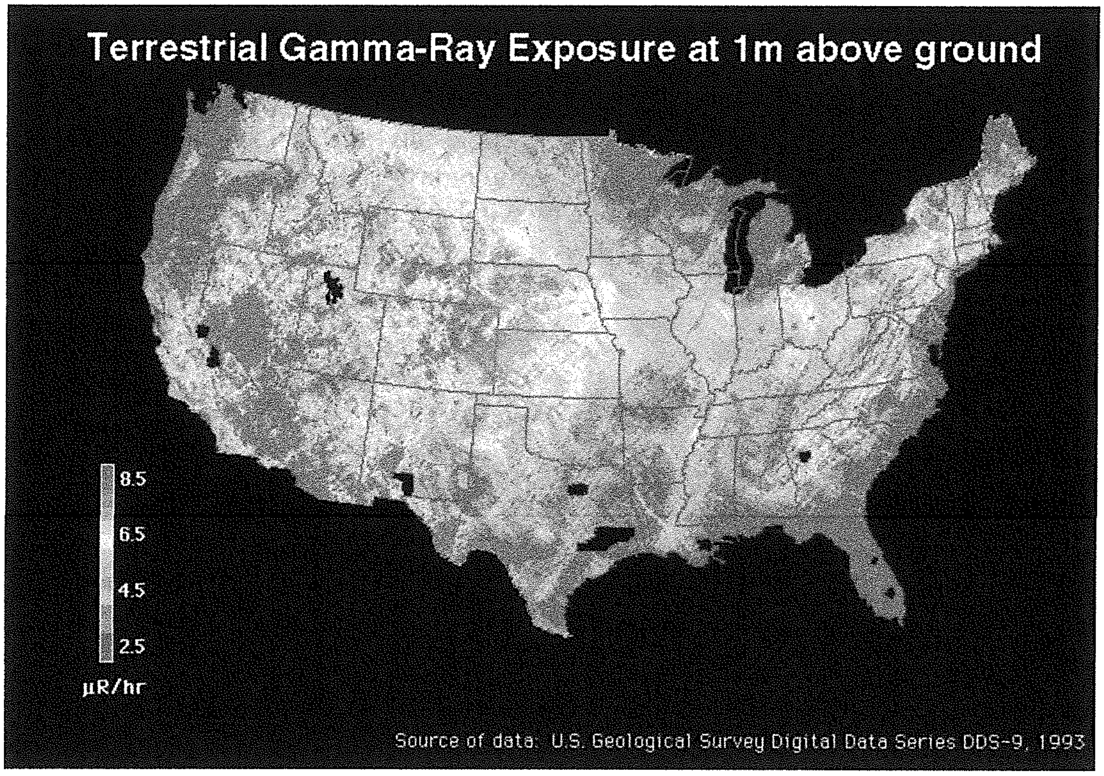
The industry continually stresses that because of the naturally occurring uranium ore bodies in South Texas, background radiation levels are naturally high and because of this, there is no increased health risk form mining. This is misinformation. It is important to realize several things about the South Texas background levels:

1) All aquifers contain small amounts of radioactive daughter products but in Texas, uranium rich deposits exists naturally in the aquifers because volcanic fly ash from exploding volcanoes in Mexico long ago that floated into Texas and covered the land several feet thick. This ash contained uranium and over the years, it washed into the streams or soaked into the aquifers where it was eventually flushed out to the Gulf of Mexico leaving the aquifers free of excess uranium. But in some areas in the aquifer, pockets of concentrated uranium remained because several unique conditions. These conditions tightly locked up the uranium and made it unavailable to migrate in the aquifer.

2) The undisturbed ore is usually buried more than 150' below the ground. The tons of earth that cover the ore form a perfect radiation shield. Environmental Assessments completed at several

mine sites before mining showed that surface background radiation levels are lower than the national average. At some sites the levels were *2 times lower* than national average.

The following map shows that the South Texas has gamma radiation levels of 2.5 to 4.5uR/hr, generally equal to or lower than the average radiation levels of the United States. Living on top of an undisturbed ore body in South Texas can be safer than living elsewhere in the U.S in terms of exposure to surface levels of gamma radiation.



3) The migration of radioactive product in the aquifer around an undisturbed ore body can be very low. If these reduced areas had not tightly locked up uranium, they would have washed out to sea long ago. Assessments completed at mine sites before mining began show that the aquifer surrounding the ore is generally free of the high contamination levels that exist inside the deposit. The South Texas Bruni IN-SITU uranium mine permit application explained that "water movement is virtually nil in the ore body because elevated radium concentrations are found only in the ore body and not the aquifer around the ore".

Although the Bruni mine was a very rich uranium ore body, the levels of free, unlocked uranium in the groundwater before mining was very low. The average level of uranium in the ore field was between 0.21 mg/l and 0.331 mg/l. At 200' outside the ore zone the levels were less than

0.06 mg/l. Uranium mining unlocks ore body allowing the radioactive materials to migrate in the aquifer. *Once mining began levels rose to 150 mg/l outside the ore zone.* This illustrates how In-Situ mining creates high levels of migratory waste.

Problems occur when humans disturb the ore. For example, the town of Flatonia, Texas, east of San Antonio has municipal water wells that are drilled into pockets of elevated radioactivity. The water contains the highest concentrations of radon in Texas, as high as 9,000 pCi/l (Pico Curries per liter) of radon before treatment (the radon is easily removed in the city's water treatment plant). Oil field brines in Panna Maria, Texas, have shown radium content as high as 317 pCi/l (average radium levels in the soil for the U.S. is 0.6 pCi/l radium). Measurements at some natural gas processing plants have shown readings on the ground higher than 30 uR/hr (average South Texas levels are 2.5 to 4.5 uR/hr) because some of the gases processed at the plants have elevated levels of radioactivity.

Today, the most serious threat to radiation exposure is from mining, not from naturally locked up and undisturbed ore bodies. Tightly locked-up uranium ore bodies do little harm as long as the public is aware of their location and the uranium is left alone. Mining brings the ore to the surface where it becomes available for direct exposure to the public by wind, food, and water. After mining, the ore that remains in the aquifer will migrate causing a serious long-term invisible threat that is not easy to monitor or track.

How Low-Level Radiation Affects the Public

Low-Dose, Long-Term Exposures

Uranium mining exposes the public to radiation. Although high exposures do occur, most contact is in the form of low-levels of exposure over long periods of time. Current research shows that constant contact to low levels of radiation is proving to be the most deadly form of radiation.

Since the beginning of the nuclear age researchers have documented the biological threat of radiation but the knowledge that lowlevels of radiation could be dangerous has always been hotly debated and denied by the establishment. In fact, as mentioned earlier, the government has attempted to cover up and prevent radiation health studies in the interest of national security. According to many experts, the Federal bomb priority has probably resulted in the killing of more people than all the world wars.

Today, there is a large body of scientific evidence that supports the fact that low-level radiation causes damage. As far back as 1958 Nobel Laureate McFarland Burnet showed that the worldwide increase of leukemia in three and four year old children could only be caused by radiation exposure around the time of birth. He proved that the rapidly growing cells of the unborn fetuses were the most sensitive of all human cells to the mutagenic effects of radiation.

In 1968, Dr. Stoke and his coworkers at Oslo Cancer Hospital discovered that ingested or inhaled radioactivity, like that from fallout can be 1,000 times more effective at causing cell damage than external radiation exposure. He showed that extremely small internal doses of Strontium90, amounting to 10 to 20 millirads could produce visible damage to the blood forming cells of the bone marrow (average intake of radioactivity from food, water, and air in the U.S. is 24 millirems per year alpha, beta, and gamma). By killing cells and lowering the ability of the immune system to detect and destroy cancer cells, Dr. Stoke showed that bone cancer, leukemia, and other malignant neoplasm can result. This was the first evidence that radiation could destroy the body's immune system.

In 1971, Dr. Abram Petkau of the Whiteshell Nuclear Research establishment in Canada, conducted radiation studies of lipid molecules. These molecules are the principal structural component of all cell membranes. After experimenting with short exposures to high xray radiation, Dr. Petkau found that it took 3,500 rad to break apart and kill the cell membranes. But to his surprise he discovered that if the cells were exposed over a long period of time, it took only one rad of X-rays to kill the same cells. Dr. Petkau found that low-level radiation was more effective at creating unstable free radicals (a toxic negative ion) and these free radicals were the agents responsible for destroying the cells.

Dr. Petkau concluded that the longer the exposure, the smaller the dose needed to damage cells. Subsequent research by Petkau and others have demonstrated that this damage occurs even at levels that exist naturally in the environment. For the first time it could be said that there is no such thing as a safe exposure to radiation. EPA now estimates that 10,000 to 30,000 people die from these unavoidable background levels every year.

In 1990, the National Academy of Science released the "BEIR V" report, a peer reviewed publication considered the bible by both government and industry. The committee concluded that cancer and leukemia risk for the survivors of Hiroshima and Nagasaki were underestimated by a factor of three or four. The HiroshimaNagasaki study has been one of the cornerstones of the scientific communities' understanding for radiation health effects. The regulations for allowable radiation exposure of the public are based in large part on extrapolation from the Hiroshima data. The scientists have miscalculated and the routine environmental releases of radioactivity allowed by law at nuclear facilities could be 100 to 1,000 times too high, especially for infants.

BEIR V state that risks from diagnostic X-rays to be underestimated by a factor of five to six times. BEIR also relates scientific studies that show mental retardation, leukemia, and mortality increased with extremely small doses of radiation.

One very important study in BEIR V deserves further attention. A large British study by Dr. Alice Stewart covering 35 years and involving 16 million women came to the conclusion that *most childhood cancer and leukemia is probably the result of background and or manmade radiation. The study suggests that a fetus exposed to background radiation levels of 150 milli**rad** (normal background levels average 100180 milli**rem** per year) doubles the risk of that child dying of cancer or leukemia before age 15*. Children born to women who received even one abdominal x-ray during pregnancy were four times more likely to suffer childhood cancer as "post-birth defect".

Childhood disease clusters have been found around many nuclear facilities:

1) Increases in childhood leukemia near reprocessing facilities in La Hague, France and at Sellafield in the British Isles and the Krummel nuclear reactor in Germany.
2) Childhood leukemia cases near Sellafield are associated with occupational exposure to the father before conception of the child. Increases in childhood leukemia also occurred Europe-wide after the passage of the Chernobyl radiation cloud.

3) Increases in childhood cancers have been found near nuclear operations in the Navaho Nation from uranium mining, Brookhaven, New York from nuclear weapons, and nuclear power stations in Oyster Creek, NJ and Clinton, Illinois.
4) Increases in Down syndrome are found near Yankee Rowe power station in Massachusetts.
5) Heart defects of various types have been associated with ionizing radiation exposure.

According to the predictions of Nobel Laureate Linus Pauling and Andrei Sakhorov, the inventor of the Soviet H-bomb, *radioactive fallout from atomic bomb testing has killed four to eight million innocent people.*

Diseases That Kill

In the 1920's, Nobel Prize winner Herman Muller showed in experiments with fruit flies that radiation can accelerate the mutation of organisms. Recently Charles Waldren and coresearchers have found that a single human chromosome placed in a hybrid cell and bombarded with very low levels of radiation can produce mutations two hundred times more effectively than at higher radiation levels. It is very possible that half a century of increased environmental radiation levels have created new organisms that can take advantage of our weakened immune systems.

Since the 1950's an enormous increase in pesticideresistant insects and mites have occurred. In 1938 there were only seven such organisms known. By 1984 the number had climbed to 447. Fortyeight species of weeds have gained resistance to chemicals.

According to the book, "Deadly Deceit: Low-level Radiation – High-level Cover Up", by Jay M. Gould & Benjamin A. Goldman; AIDS, chronic Epstein Barr virus, Lyme disease, Candida Albicans, herpes, toxic shock syndrome, septicemia and others, are possibly the result of the Nuclear Age. All these aliments were rare or unknown before 1945.

The Texas Problem

The state regulators do not consider themselves researchers and because of this, they have not provided the basic studies necessary to determine the safety of mining. They have shown that they are not receptive to outside information that does not agree with their own opinions. They have not been forth coming about the industry's problems, preferring to burry the problems in their files instead of releasing it to the public. The director of the Bureau of Radiation Control (now defunct) was once quoted on TV as saying that the public does not understand radiation and only gets excited when they (meaning the Bureau) talk about it, so it is best not to say anything.

It is the responsibility of the state legislators to make the laws that safeguard the public. In order to this, they need information provided by scientific studies, to understand and address the issues. In this most important duty, the state regulatory agencies have failed.

Incomplete Monitoring

Under the original 1975 Texas mining law, Environmental Assessment Reports were required to be completed on every mining application. These report were studies of the environment around the proposed mine that established the baseline pre-mining radiation levels by measuring the soil, plants, and animals in an area. They also provided information on the geology and economic history of the area. But very few of these assessments were completed because *the industry successfully lobbied to change the law and now the agencies are not required to do assessments.*

Without the baseline data provided by the Environmental Assessment, the chain of data is broken. Because the food chain acts to gather and concentrate contaminates in the environment, pre-mining data is crucial in order to understanding how the food chain has been altered. It works this way:

1) Plants and animals need essential minerals to survive and grow. Radioactive elements are similar to minerals in the soil; plants and animals cannot differentiate between the two.
2) At the base of the food chain, plants easily take up the radionuclide found in soil, water, and air. By this action, contaminates in the environment are taken up and concentrated into the plant's cells. The longer the plant lives, the more radiation it can take up. Some plants take up more radioactivity than others.
3) The higher up the food chain, the more concentrated the pollutants become. As an example: in the mining districts, cattle need anywhere from 12 to 40-acres of grass a year to grow. Cattle are sold to market at 16 to 30 months. *This means that over 2.5 years the cow will eat up to 100-acres of grass.* This action serves to collect and concentrate low level contaminates that exist over large areas. The cow's organs and bones take up radioactivity better than it's muscle or milk. Fish and chicken eggs are even better absorbers of radiation (these are the bio-accumulator equivalent of the canary in the coalmine).
4) Because people are at the top of the food chain, this makes us vulnerable to environmental degradation anywhere in the food chain.

This accumulation is called bioaccumulation. Uranium mining increases the radioactive elements in the environment. Because humans are at the top of the food chain, we are the most exposed to contaminates. *Ingestion or inhalation of radioactive material is the most deadly form of exposure.*

The few environmental assessment studies that have been completed show that the pre-mining environment that had low radiation levels in the soil, water, plants and animals (up to 2 times lower than the average US levels in some areas). Studies during and after mining are sadly lacking but one study at the Panna Maria strip mine shows data that windblown radiation from the mine caused an increase in radiation levels in some grasses surrounding the mines as high as 500%. The Bureau of Radiation Control attempted only one post-mining bioaccumulator study. They studied dairy cattle at one site between the Susquehanna and Conoco-Conquista mines to see what effects mining had on the meat and milk. Meat and milk studies are the least effective way to study radiation uptake because meat and milk do not absorb radioactivity easily, the bones and organ meats are much better indicators. Fish, chickens, and eggs are better uptake indicators because they absorb radiation much more effectively and they should have been included with the cattle study. The Bureau claimed that their study showed was no problem with uptake although the results did show an increase in radiation content. A small increase in meat or milk means that all the other accumulators would show higher increases.

Uranium mining in Texas is located in major farming and ranching districts. The grain grown in these districts are shipped all over the state as livestock forage. Many private agricultural wells have been condemned because of elevated contamination in the aquifers from nearby mines. The D.O.E. condemned the aquifer around the Susquehanna and Conoco-Conquista mines. This is the same area where the cattle bioaccumulator study mentioned above was done. It was one of the largest dairies in the state.

It is absolutely necessary to monitor the food chain because it is nearly impossible to correct radiation contamination once it has occurred. Since radiation is invisible, it is impossible for the public to protect themselves. Without monitoring, the public remains blind and defenseless.

Improper Monitoring

Current environmental data at the mines is questionable because of flawed monitoring. The state law requires ongoing air and aquifer monitoring at the mines but the agencies do not have the funds to provide full time monitoring, so *they require the mining companies to do most of the monitoring themselves and then* <u>*honestly*</u> *report the data to the agencies*. This is obviously a big problem and the agency incident files confirm it. The files contain hundreds of reports of lost data, falsified samples, altered records, covered-up spills, unreported excursions, illegal dumping, worker overexposure, and so on.

Accurate data is an essential requirement for safeguarding the environment and health. By allowing the fox to guard the hen house, the agencies have made it impossible to gauge how serious our exposure really is.

Low-Dose, Long-Term Monitoring and Health

Monitoring at the mines is set up to record excursions. This type of monitoring is good for indicating high radiation spikes that occur in the elevated radiation environment of the mine. But this is not a good system for monitoring the environment surrounding the mine where the population lives. This environment is a "low-dose, long-term" scenario. Proper monitoring outside the mines has not been attempted because the agency professionals do not believe that low-dose, long-term exposure causes any health problems.

The state legislators sponsored Dr. William Au of the University of Texas to study the effects of low-level radiation on the people living near the Panna Maria uranium mine in South Texas. Dr Au's study showed that the constant exposure to low-level radiation has caused a large amount of cell damage in the blood of the local population when compared to the cell health of other non-mining populations. This demonstrates the Petkau Effect: low-dose, long-term exposure causes cell damage.

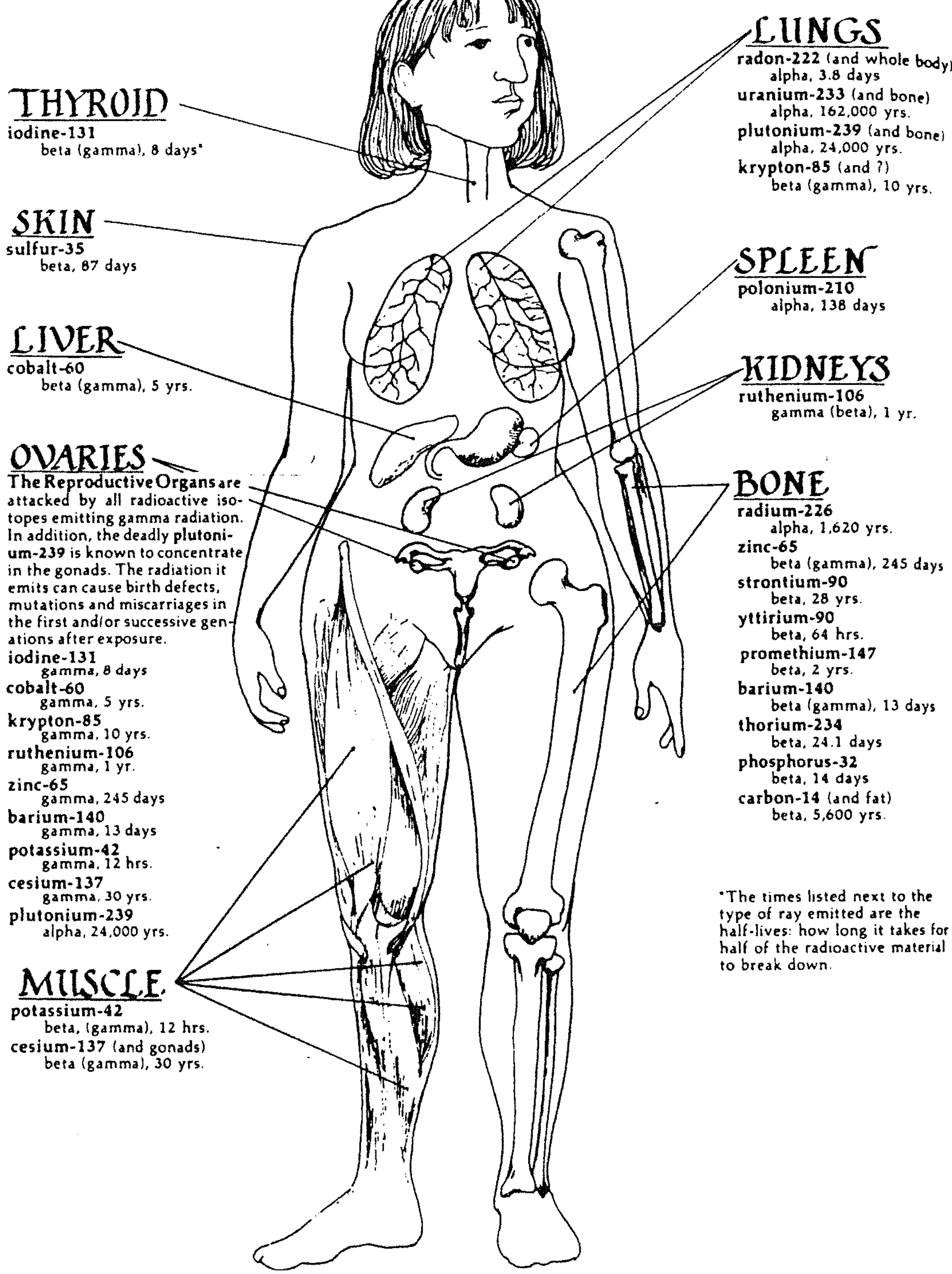
What does this mean to the people living around the mines? Research shows that continuous exposure to low-levels of radiation is a source of continuous free-radical damage. This eventually causes the body's immune system to shut down. Lowered immunity can cause all types of diseases but more importantly, it can also create new and unknown health problems. There is mounting evidence that the bazaar diseases that affect society today are a result of the increased exposure to continuous low-level radiation in our food and environment. Things that we have always been immune to are suddenly becoming life threatening.

Apparently, the state agencies are waiting for an epidemic to occur before dealing with the mining populations health issues. They are waiting for hospital death records to show large increases in cancer and leukemia before taking action. But this will not occur because of the small size of the rural populations and the obtuse nature of the diseases involved. In the mining areas health problems do not fit normal disease patterns, lowered immunity has cause confusing and undetermined health problems. How do you gauge a community's level of health if you can't label their diseases? It used to be common practice in these areas for hospitals to label unknown causes of death as heart failure on the death record, leaving no record of actual death.

The nuclear professionals of the state's regulatory agency are a closed society; they are not receptive to outside advice. In contrast, the *agencies are totally accepting (and dependent) on industry-sponsored studies that only show how safe mining is.*

The current health problems in these mining areas are blamed on other issues. The industry claims that radiation cannot be proven to cause any health problems without direct evidence. This is the same argument the cigarette industry uses to convince people there was no direct link between cigarette smoking and cancer.

IONIZING RADIATION



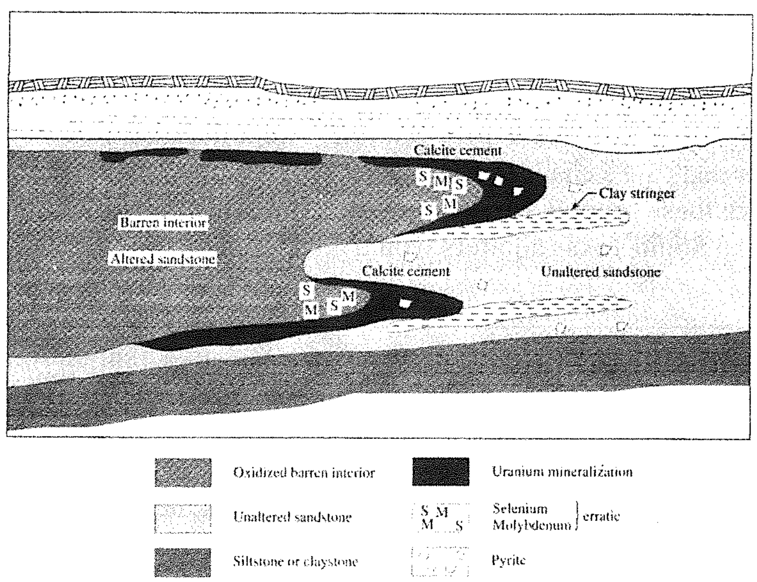
Where does Uranium come from?

In Texas, uranium ore is found in shallow aquifers. These ore bodies are the result of a combination of natural processes that have gathered up very small amounts of radioactive materials spread over large areas of Texas and delivered them to special areas where they were concentrated into uranium rich ore deposits.

Some rocks contain naturally occurring low levels of radioactive materials. It is believed that these materials are left over from the creation of the Earth (so-called primordial radionuclide). They typically have half-lives of hundreds of millions of years and include uranium-235, uranium-238, thorium-232, and potassium-40. Over the years, weathering and plant roots have broken down this primordial rock, contributing to the background levels of radioactive material in the soil and groundwater.

Researchers have suggested that uranium ore bodies in Texas were formed many eons ago when volcanoes in Northern Mexico exploded ejecting lava rock under high pressure, miles into the upper atmosphere. This finely atomized form of lava is known as fly ash and it contained small amounts of radionuclide from the primordial rocks. Fly ash is so lightweight that the prevailing trade winds carried it for hundreds of miles into the southern United States where it settled into the ground many feet thick.

Figure 5 - Typical Roll Front Sedimentary Uranium Deposit (Langmuir, 1997)



Schematic cross-section of an idealised uranium roll-front orebody showing the zonation of elements and primary hydrologic and geochemical features. Oxidised groundwaters flow from left to right. The roll front and associated redox interface moves in the same direction.

Over the years, rainfall washed most of this fly ash into the rivers carrying it into the Gulf of Mexico. But some of the uranium in the ash leached into the ground where it migrated down into the shallow

aquifers. Like the ash, this uranium also flowed out to the Gulf of Mexico except in some areas where the aquifers contained reduced atmospheres (without oxygen). Reduced atmospheres areas can be found in front of fault zones where reducing gasses from lower formations (hydrogen sulfide from oil deposits) seep up the fault line crack and replace the oxidized atmosphere in the shallow aquifer. The lack of oxygen allowed the uranium to precipitate out of solution. The fault zones block the aquifer flow and trap the reduced gasses in a stagnate zone, keeping the oxygen in the aquifer from washing away the uranium. The alkaline environment further helped to trap the uranium by locking up the metals on the clay particles that surround the sand granules in the aquifers. In the 1990's it was discovered that the bio-film created by certain anaerobic soil bacteria also play an important part in trapping the uranium.

The Mining Environment

Because uranium moves freely in an oxidized environment, it has long since washed out of the South Texas aquifers. As mentioned above, the ore bodies are only found in specific oxygen-free atmosphere areas where the ore is tightly locked up deep underground, safe from public exposure.

Strip mining removes the overburden exposing the ore to atmospheric oxygen, allowing the uranium to unlock and migrate in the aquifer. In-Situ mining pumps oxygen down into the aquifers in order to make the uranium mobile. Currently, there is no technology available to stop the migration. Because of the long-lived nature of this toxic material, this is a threat to many future generations.

The companies are suggesting that is not a problem because the waste will migrate to a new reduced atmosphere underground and eventually lockup. The state regulators are accepting this "do nothing" concept because they want an easy fix; they are too dependent on industry-sponsored studies that promote the cheapest possible solutions.

There are many unanswered questions with the "do nothing" approach. The original ore bodies have remained lockup securely by Mother Nature for centuries because these sites are extremely stable and isolated from conditions that cause changes. Finding new down-dip lockup sites, as proposed by the industry, is unlikely since these original lockup sites are now being mined for uranium. New lockup sites are unlikely otherwise the South Texas aquifers would have uranium ore bodies locked up everywhere, and it doesn't!

There are apparently many conditions that are necessary for lockup. Uranium forms where fault zones allow hydrogen sulfide to seep up from deeper oil formations, replacing the oxygen in the aquifer and creating the necessary reduced atmosphere. Current studies show that the reduced atmosphere allows certain anaerobic soil bacteria to create chemicals and bio-films that lockup uranium naturally. Aquifer pH plays a roll; high pH will lock up some of the heavy metals on the aquifer clays while other low pH will lockup other metals but no condition exist that will lockup all of them at once. Then there is the necessity of finding an area in the aquifer with a stagnate flow (which is caused by the damming effect of the fault zones) to prevent washout.

Even if lockup site can be found, long-term stability is questionable. Research has shown that uranium can re-oxidize from rainwater seeping down into the groundwater along the fault lines. Only Mother Nature has proven to have the capability of forming stable sites capable of long-term storage.

Today these contamination plumes are moving underground, the only solution currently available is to provide long-term monitoring in order to safeguard the public but *the regulatory agencies have no plans to provide any perpetual monitoring*.

Strip Mining

In the 1970's, the Corpus Christi Caller newspaper published aerial photos of Karnes County showing what they called a "moonscape" of deep craters stretching far over the horizon. These were the abandoned uranium strip mining pits. These steep-sided, 300 feet deep canyons formed mile after mile of un-earthly landscapes across South Texas. The combined area of the pits equaled approximately 31,000-acres, spread out over 18 South Texas counties. Although strangely beautiful with their subterranean azure-blue lakes, these pits hid a deadly secret. Neighbors adjoining the pits report of cattle, dogs, and birds dying after drinking or swimming in the ponds.

Strip mining is the process of removing millions of tons of soil, called overburden, in order to mine the underground ore. It was necessary to remove the overburden in order to get to the uranium ore but it was only profitable to dig down to a maximum dept of 300'. Since the uranium ore is found in the shallow aquifers, lakes formed in the bottom of the pits as the aquifer rushes in to fill the hole. In order for the companies to work the mine, it was necessary to pump-out the radioactive water. Pumping resulted in the wholesale draining of a huge portion of South Texas' aquifers and *resulted in the radioactive contamination of the local rivers, of with the San Antonio River was the most affected*. There have been no studies to determine the effects this had on the rivers and estuaries of the Gulf Coast and the Texas fishing industry?

The companies are only interested in extracting uranium oxide content of the ore. This uranium oxide comprises less than 2% concentrations in the ore. During mining, only the ore containing the highest levels of uranium oxide are profitable enough to be removed from the mine. Once the profitable ore was removed from the aquifer, the miners moved on leaving the mining pit abandoned. The ore left behind contained lower levels of uranium oxide and 98% of all the other radioactive and toxic materials common to radioactive ore bodies, including thorium-232, potassium-40, and thorium 230, radium, radon, arsenic, cadmium, chromium, lead, mercury, molybdenum, selenium, zinc and other toxic and radioactive substances.

The low grade ore left behind was left to oxidize. The excavated pits filled up with water as the unearthed aquifers continued their flow. The uranium flowed with the oxidized aquifers waters, destroying any reduced atmospheres in front of it. In the 1980's, the state spent 10's of millions of taxpayer dollars filling in these abandoned mining pits. No studies were attempted to find out the extent of the migration.

Tailings Ponds

During strip mining the ore was extracted from the mine and brought to the processing mill where the uranium oxide (also known as "yellow cake") was leached out of the ore. Less than 2% of ore is composed of high-grade uranium oxide. After the ore is milled and the uranium oxide is removed, *the*

unwanted material contains 98% of the radioactive and toxic materials including all the toxic and radioactive substances mentioned above. Large volumes of sulfuric acid were used in the mills to leach the uranium oxide from the ore. The spent acid and left over solid uranium waste was disposed of in aboveground holding ponds called "tailings ponds". Tailings ponds are aboveground holding ponds made by mounding up large earthen berms that are meant to confine the solids and liquids produced by the milling process.

<u>Today these ponds contain over 27,000,000 tons of solid radioactive waste.</u>

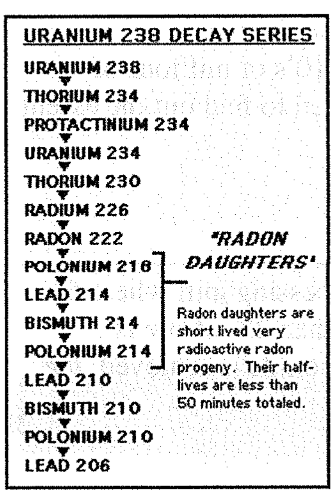
The idea of using tailings ponds for waste storage came from the oil industry. They wanted a cheap way to hold the excess saltwater that resulted form oil well drilling operations. They would mound up dirt mounds forming an aboveground tank to hold the saltwater. Someone got the great idea that these dirt embankments would be a cheap way to hold the uranium waste. The engineers were expecting the tailings ponds to hold the sulfuric acid until the sun could evaporate the liquids leaving behind only the solid waste. Apparently they did not know that *sulfuric acid does not evaporate after a certain concentration is reached.*

The engineers were also expecting the high clay content of the soil to prevent the fluids from leaking offsite but no one ever tested to see if the clays were compatible with the chemicals involved. During the 1980's, the government released studies showing that the sulfuric acid altered clay soils. *The acid changed the physical makeup of the clay, turning it into a non-plastic powder that actually increase the migration of the tailings waste out of the pond.* Basically these ponds had no holding capability at all.

Over the years, the companies dumped more liquid into these tailings ponds than they were designed to hold. This was possible because the liquids were leaching directly into the aquifer. The companies were aware of this discrepancy but continued on. The total amount of liquids is unknown because the companies were not required to keep records.

The 27,000,000-Ton Problem

The DOE spent $35,000,000 in 1984 to entomb the contaminated waste the Susquehanna mine into a massive flat-toped mountain. The Federal standards requires that the mesa was covered with a layer of clay and a layer of rock boulders in order to meet the Federal 100,000-years intrusion requirement that is necessary to insure the radioactivity solids and radon gas could not escape by erosion or intrusion.



But there is a unique problem with entombing radioactive waste; during this material radioactive lifespan, it transmutes from a solid, to a gas, and back to a solid again making it particularly difficult to contain. Uranium transmutes into Thorium; Thorium transmutes into Radium; Radium into Radon (a gas); and so on until it winds up as lead. This process is known as the "daughter product chain". These elements have very long half-lives, meaning that after one half-life has passed, only half of the radiation will be gone. Thorium 230 is has a half-life of 78,000 years, meaning that after 78,000 years, only one half of the radiation will be left.

Since Radon is a gas, it can travel for many miles before changing back into a solid radioactive element again. Because of this, Radon can cause areas in the downwind path to have elevated in radioactive levels.

The following examples illustrate how difficult it will be to keep the waste isolated from the public using only dirt as the tailings cap:

•) Plant roots can easily penetrate through the clay cap and take up radioactivity. As time goes by, radiation levels at the surface will increase as the plants die and leave behind their radioactive remains.
•) Animal will graze the site and burrow into the cover. This is an easy way for contamination to leave the site.
•) Wind and rain will eventually eroded the cap. Erosion is severe in South Texas. There are natural mesas in nearby McMullen County that were formed centuries ago when erosion leveled the surrounding clay soils and left behind the gravel mesas standing 100-feet above the surrounding plains.

Entombment with rock and clay is far from a perfect solution but by cleaning up the Susquehanna, the federal government set the example for tailings ponds. The state should have followed this example but because this was the smallest tailings pond in the state and it cost so much to clean up, the state regulators basically ignored the Federal example and allowed the mining companies to simply cover their tailings ponds with a single layer of clay. Although this saved the companies lots of money, dirt alone cannot survive the long-term threat of erosion, intrusion and out-gassing.

The waste will remain a danger for hundreds of thousands of years. How do you safeguard future generation when history shows that most governments do not survive longer than a couple of hundred years? In order to extend the isolation of the waste as far as possible, the boulder intrusion layer is required.

Denial of The Aquifer Problem

Because of the huge cost involved, the state has not required any company to cleanup of the aquifers contaminated by the tailings ponds.

The industry believes that the alkaline and reducing environment in the aquifers will eventually lockup the waste as it migrates underground. Several private wells have been contaminated next to the tailings ponds and the DOE has condemned the Susquehanna aquifer. The state agencies have argued that the aquifers in these areas are generally brackish and the populations are small, so any environmental or health problems that occur would have minimal impact. The agencies are suggesting that these areas are disposable! There is no acceptable excuse for letting a private company destroy the environment!

The Tailings Pond History

Susquehanna-Western and tailings pond:

The first mining operation in Texas was started in 1959 just west of Falls City, Texas. This was a joint effort by the San Antonio Mining Company, a subsidiary of Climax Molybdenum Company and Susquehanna-Western, Inc. They sold their ore to the Atomic Energy Commission but after that contract ended in 1966, they contracted with the Atomic Energy Commission to sell ore to the West German Government. This mine operated without regulatory oversight.

The mine originally used a solvent-extraction process that involved mounding up large piles of uranium ore and then setting up sprinklers on top of the piles in order to irrigate them with sulfuric acid. This leached the uranium oxide out of the ore. They than collected the uranium rich acid in pipes as it seeped out the bottom of the piles.

A tailings pond at the mine held the spent acid from the leaching process. The waste ore was dumped back into the mine pits. The pond frequently overflowed into the local creek. A large dairy adjoins this creek and their milk cows drank from this creek. They contracted a copper-molydenum imbalance called molydnenosis, turned white, and died of anorexia.

During a hurricane, the tailings dam broke and spilled the entire contents of the pond into the creek. *This was probably the largest radioactive spill to ever occur in the Texas (maybe in the U.S.)* but since the mine was unregulated, the exact details of the spill are unknown. This creek flows for a mile and then joins the San Antonio River where it empties into the river just upstream from the most popular swimming hole in the county. No one in the county was ever notified about the dangers of swimming in this area.

The site had been abandoned for many years when the Federal Government passed the UMTRA law that required the United States government to cleanup the early processing sites. Because of the sever leaking of the Susquehanna tailings pond the D.O.E. eventually condemned the regions aquifer after finding out that all the area wells were unsafe. In 1988 the D.O.E. estimated the price for cleaning up the aquifer was going to cost $350,000,000 but they did nothing to clean it up. Because of the cost involved, the state has made no effort to cleanup any of the other 3 mill tailings aquifers.

The Feds spent $35,000,000 of taxpayer money to build a 60-acre mesa-shaped entombment. To insure long-term isolation of the waste, the mesa was covered with a clay layer, then a layer of granite boulders several feet thick. The rock cover was necessary in order to protect the cap. Originally the feds planned to cover the entire mound with rock but this proved to be too expensive so only the sidewalls were covered. In order to provide this rock, two granite quarries were cleaned out during the building of this gravesite.

This mound contains 7,134,100-tons of radioactive waste. This includes 800-acres of contaminated farmland that surrounded the mine which had to be dug up and entombed. There is a total of 1,277 Curries of Radium-226 buried at this site.

Granite tombstones encircle the site. They are necessary to order to survive the hundreds of thousands of years necessary to warn the public of the danger that exists onsite. What kind of message does this send to future generations?

This mound can be seen at the intersection of Hwy 791 and Ranch Road 1344, a couple of miles west of Falls City, Texas.

Susquehannna Uranium Strip Mine - Radioactive Waste Burial Site
Tombstone Waring to Future Generations

Exxon-Ray Point and tailings pond:

Ray Point is mill tailings pond located east of Three Rivers on Hwy 72, next to the one of the public water supply towers. Little is know about the site because it operated mostly during the unregulated period. Apparently, Exxon covered the pond with dirt in an attempt to quickly close the site but the pond was not thoroughly dried out (concentrated sulfuric acid does not evaporate). Eyewitnesses report that the ground would shake when the cap was walked on.

Dupont / Conoco-Conquista and tailings pond:

During the early years of the Conoco-Conquista, the mine operated without any regulatory oversight. After the mining operations ceased, the Texas Bureau of Radiation Control allowed Conoco (later bought by Dupont) to operated the 256-acre tailings pond for 8 years as the official, unlicensed nuclear dump for the state of Texas.

The local residents were never informed that the site was being used as the nuclear dump for the state of Texas. The director of the Bureau of Radiation Control was quoted on the San Antonio TV news saying, "The public does not understand radioactivity, they just get excited when you talk about it. It's best not to say anything". It took a large public effort and heavy media attention to force the agency to close the site in 1988.

Only mining waste was supposed to be disposed of in the pond but since almost all nuclear waste can be considered a byproduct of mining, the company was allowed to dump all types of waste here. Some of the stuff was so hot that it should have been sent it to the federal high-level dump at Hanford, Washington.

One of the companies allowed to dump at the Conquista was the French company Rhone-Poulenc (now called Sanofi-Aventis). This is the third largest pharmaceutical company in the world. Rhone-Poulenc sold "rare earth" phosphors for TV screen and rare earth magnets. Rare earth refers to lanthanide series of the Periodic Chart, atomic numbers 57-71, plus yttrium, scandium and thorium. These materials contained levels of thorium and uranium *50 to 1,000 times more radioactive than typical South Texas uranium tailings mill waste*. Since the Conquista is now closed, Rhone-Poulenc sends this waste to the high-level nuclear facility in Hanford, Washington. Today, Rare Earth mining in the U.S. has been put on standby because cleaner, thorium-free Rare Earths from China, Brazil, India, and Russia have become available.

Rhone-Poulenc now processes its Rare Earth through its Rhodia Rare Earths division. Parts of the Rhone-Poulenc plant and several areas around the plant in Freeport, Texas was so radioactive that it had to be dug up for disposal at a nuclear dump.

During a regulator hearing on the Conoco-Conquista, a senior researcher with The Southwest Research Institute was going to speak about the possibility of the pond exploding because of the large amounts of ammonia and nitrate waste that was dumped here (this supposedly happened to a tailings pond in Russia). But before he could speak, Dupont apparently offered him a contract to study the situation and that was last time anyone heard from him.

The records show that one worker was sent to the hospital after passing out from fumes that came from a dump truck he was standing next to as it unloaded its waste into the pond.

Conquista was located less than a mile from the Susquehanna and it shared the same aquifer. The monitor wells showed the tailings pond was leaking but the contamination form the Susquehanna made it difficult to monitor the site. Because of this, Dupont claimed that the site could not be proven to be leaking. This was a lame argument because there was only a couple of feet of soil between the bottom of the pond and the aquifer and studies have shown that acids destroy the plasticity of clay and actually aids in the migration of contaminates.

Dupont now owns the Conquista. They have deep pockets and they must be held responsible for all long-term problems.

Chevron- Panna Maria tailings pond:

Chevron owns 3 uranium operations: the Palangana mine and the Panna Maria mine in Texas, and the Mt Taylor mine in New Mexico.

The Palangana was an In-Situ mine started in 1960. More information can be found on this site in the In-Situ section.

In 1979, Chevron opened the Panna Maria uranium strip mine and mill in Hobson, Texas. It was designed to process 2,500 tons of uranium ore a day. The mill and tailings pond covered over 290-acres. The mine closed in 1985 when the ore was exhausted.

The mill was then revamped in 1986 to process the uranium ore from Chevron's Mt. Taylor mine, a conventional underground mine located in northwest New Mexico. Coffinite was the primary ore, a gray colored sandy material. The uranium oxide content ranged from 0.15% to 2.0%. Chevron shipped millions of tons of the unprocessed ore daily in open, uncovered railcars from New Mexico to be milled at the Panna Maria facility. Clumps of this radioactive material could be found along the rails from New Mexico to Texas with a simple Geiger counter. The train tracks passed through several major cities in-route.

The Mt. Taylor mine produced over 8 million pounds of uranium oxide before it was put on standby in 1989. It is currently being considered for In-Situ leaching. It apparently has the largest uranium reserves in America with 100 million pounds of uranium oxide still in the ground.

During this time Chevron also processed the ore from their Rhode Ranch mine in McMullen County. At 800-acres, this was the largest uranium strip mine ever operated in Texas. The ore was shipped in dump trucks through 3 counties before being processed at the Panna Maria mill in Karnes County. The Rhode Ranch mine produced over 6.7 million pounds of uranium oxide.

A total of 10,000,000-tons of solid waste and an unknown amount of liquid waste was dumped into the Panna Maria pond, the largest in the state. Over the years, Chevron dumped all forms of radioactive waste into their tailings pond at the Panna Maria mine. The records show that the following wastes have been dumped at this site:

- •) RCRA hazardous waste.
- •) Uranium Hexafluoride waste from Allied Chemical conversion facility in Illinois.
- •) Radioactive pipe scale from Mississippi.
- •) Depleted uranium artillery shells from the military's Aberdeen Proving Grounds in Oklahoma.

•) When the EPA fined Chevron for trying to illegally dispose of acid waste from their refineries, the company shipped it by the trainloads to Panna Maria where they disposed of it in the tailings pond.

The Federal law requires that the state and federal government jointly take over ownership of a tailings pond when it closes. The Federal Nuclear Regulatory Commission questioned whether the federal government could legally share ownership of Chevron pond because the state of Texas had allowed so much non-mining radioactive waste to be dumped in the tailings pond.

During a public hearing on extending the permit of the Chevron-Panna Maria tailings pond, it was discovered that the company never plugged the hundreds of original exploratory drill holes under the tailing pond. This meant that the pond bottom was a Swiss cheese of holes that were direct paths into the aquifer.

A half-mile from the pond it was discovered that an old hand dug well had suddenly turned radioactive. On further investigation it was discovered that this well was located directly in the old, abandoned path of the San Antonio River. Over the years, the river had changed its course leaving behind a dry, sandy riverbed where the river once flowed. This ancient river flowed directly under the Panna Maria tailings pond where it served to funnel the waste from the pond directly into the ancient sandy river bottom providing a fast-track channel directly into the San Antonio River located less than a mile away.

Not a single monitor well was located in this riverbed. No data is available to determine how much fluid flowed out. No studies have been done showing the affects this contamination had on the river or the estuaries.

In 2005 Chevron bought Unocal Corporation making them the 4th largest energy company in the world. Unocal has a division, Molycorp, Inc, which owns one of the world's largest reserves of Rare Earths materials. These materials are open-pit mined in the Mojave Desert at Mountain Pass, Ca. The mine has been put on stand-by status in 2005 because cleaner, thorium-free Rare Earths have become available from China, Brazil, India, and Russia.

Chevron's transfer to General Atomics:

In1991, Chevron transferred ownership of their mining properties to General Atomics' Rio Grande Resources division. With this transfer Chevron also conveyed ownership of the Mt. Taylor, Rhode Ranch and Palangana uranium mines to General Atomics.

This transfer of ownership effectively put a layer of separation between Chevron and their direct responsibility of the radioactive waste. As shown below, General Atomics has provided this "service" to other troubled "deep pocket " corporations. General Dynamics is a conglomeration of other companies' liabilities.

Because of the recent push for nuclear energy, the Mt Taylor ore is now worth

billions.

General Atomics is a major player in Washington D.C. politics and is responsible for affecting many of the laws governing the nuclear industry.

More General Atomics history:

•) General Atomics was established in 1955 with a founding mission to find commercial uses for nuclear energy. They began building small research reactors, the TRIGA reactors. 65 TRIGA reactors were built during the next 40 years (including the University of Texas's nuclear reactor in downtown Austin).
•) After many years of problems with the TRIGA reactors and other lawsuits, Gulf Oil bought General Atomics in 1982.
•) In 1984, Chevron bought Gulf oil.
•) In 1984, after settling a 10-year litigation by Westinghouse over a uranium price-fixing conspiracy by General Atomics and 23 other companies, General Atomics paid out over $200 million in claims (for more information see the Bruni-Westinghouse section below).
•) In 1986, two brothers, Neal and Linden Blue, bought General Atomics from Chevron for $60 million. This was an incredibly cheap purchase price and some business annalist considered this the bargain of the century.
•) As CEO, Neil Blue shifted the company into nuclear waste cleanup operations. During the 80's, Kerr McGee Corp. transferred ownership of the Sequoia Fuels facility in Oklahoma to General Atomics. Sequoia is the nuclear fuel conversion facility made famous in the movie "Silkwood". This site was extremely contaminated. It was eventually closed down, dismantled, and dumped in a nuclear waste dump. *It is possible that the Sequoia facility was dumped in the Panna Maria tailings pond since General Atomic now owns the site (see next).*
•) In 1991, Chevron transferred their liabilities for the second time, by conveying ownership of their mining properties to General Atomics.
•) General Atomics had set up an "advisory council" to trawl for taxpayer dollars. The Council featured the former Secretary of State Alexander Haig and ex-U.S. Joint Chief of Staffs chairman General John Vessey. The brothers became big contributors to both the Republicans and Democrats.
•) In 2001, the U.S. Attorney and Sam Kholi, a former General Atomics employee, claimed that the two brothers had conspired to defraud federal taxpayers of millions of dollars by rigging contracts, padding payroll cost, and presenting false claims for payment. At the time, General Dynamics had over $210 million worth of government contracts. From 1998 to 2003, General Atomics has had a total of $981,366,405 in defense contracts.
•) In 2005 alone, General Atomics spent $2,420,000 on total lobbying expenditures in Congress. General Atomics is the single biggest corporate underwriter of Congressional trips between 2000 and 2005. The company spent more than $666,000 on 86 trips by members of Congress, their aids and families.

The In-Situ Problem

Strip mining dominated the industry until the 1970's when it was replaced by a newer, unproven form of underground mining, called In-Situ. It is currently the only process that is currently being licensed by the regulatory agencies.

In-Situ involves injecting a leaching solution into the underground aquifer where the uranium is locked-up on the sand and clay particles. The ore is sucked back to the surface where it is separated from the mining fluids. This process transfers the isolated, underground ore body to the surface where it increases the public's exposure. After processing, the radioactive liquids are pumped into deep aquifers for disposal. These waste liquids contain the same levels of radioactivity and hazardous materials associated with the ore bodies. This process results in the contamination of two (2) aquifers and the creation of large volumes of solid radioactive waste that must be disposed of.

In-Situ offers two main advantages to the industry:

1) It is much cheaper than strip mining.
2) It takes place underground, offering an "out-of-sight, out-of-mind" solution to their liabilities.

Texas is the birthplace of commercial In-Situ mining and today has the largest concentration of In-Situ mines in the world. The state agencies were forced to cobble together the first In-Situ regulations in 1975 when they licensed the illegally built Westinghouse designed Bruni In-Situ mine (see Bruni section below). The state was originally going to close down the mine and prohibit the technology but after studying information provided Westinghouse, they decided to license the technology. Years later they found out the information provided by Westinghouse was badly flawed and promises made could not be meet. But it was too late to change the law because the industry was firmly established.

Because of the premature birth of this industry, South Texas has been used as a large-scale experiment for In-Situ technologies. This ongoing experiment has resulted in a patchwork of In-Situ regulations that are a reflection of the problems inherent with this technology. Over the years, whenever In-Situ problems developed, the regulators would simply change the regulations allowing the miners to try other techniques in the hope that they would finally get it right. As a result:

- Many shallow aquifers have been damaged as companies cycled through different chemical solvents and oxidizers.
- Deep aquifer are threatened by unproven disposal technologies.
- Permits have been changed in order to allow for increasing contaminate levels in the aquifers.
- Large amounts of land have been contaminated by spills and untested surface disposal techniques.
- Workers have been injured by unsafe work practices and jerry-rigged equipment.
- Future generations are threatened by this long-term, mobile threat.

Although the public as actively worked to stop the permitting of new sites, the agencies have never denied a permit in the 60 years that the industry has existed. Since Texas has allowed the industry to become established, companies all over the world have been given the green light to use In-Situ mining.

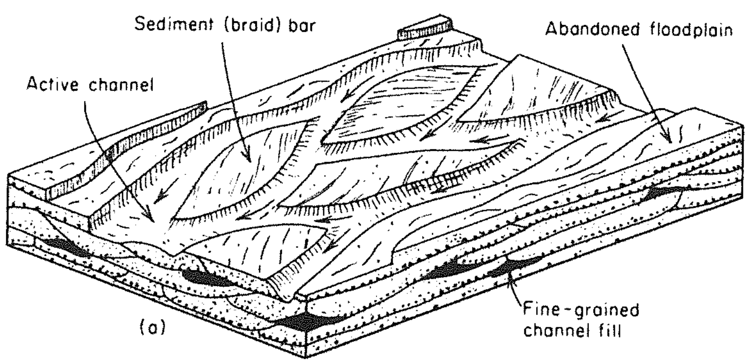
Groundwater Geology

Groundwater is commonly found in the materials laid down by river channels and floodplains. This includes gravel, sand, silt or clays. A layer of sand might be deposited under a particular environment, and over time, water accumulates forming an aquifer or groundwater reservoir. They are known as alluvial deposits or aquifers, and due to the inherent complexity of shifting river channels and everchanging flow velocities, the exact layering and connection of sands or clays can be difficult to determine, even with an extensive number of boreholes. Two distinct types of alluvial deposits are recognized: braided river and floodplain alluvial deposits.

Floodplain river environments also contain coarsegrained deposits of sands and gravels, but are typically dominated by finegrained silty or clay deposits. They are characterized by lower slopes and smaller flow velocities. The complex channels that are formed are also highly variable and very difficult to characterize with borehole data.

Braided river environments generally occur in settings where the sediment available for transport has considerable coarsegrained sand or gravel and where river velocities are large due to steep regional topography. Sequences of sands and gravels can develop, with only minor zones of silty or clayey sediments. The flow of groundwater through an old braided riverbed can often thus be unpredictable due to complex channels and bars (braids) that are formed during deposition.

Figure 2 - Braided River Environment (Freeze & Cherry, 1979)

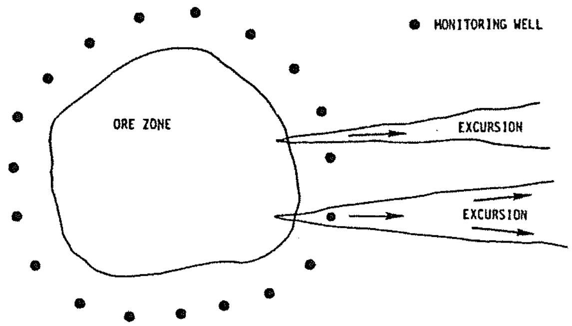


Other types of sedimentary type groundwater systems are formed by the action of winds (aeolian deposits) or glaciers. They are also highly variable, and are characterized by fractures and variable properties. Fractures, or lines where the sediments are discontinuous, often provide avenues for groundwater flow to escape.

Monitoring by Guessing

The industry suggests that by sucking excess water out of the aquifers, they can control the movement of the underground fluids. To achieve this, the mines dispose of 10% of the leaching fluid that is sucked out of the ore field; this fluid is called the "bleed stream". Newer mines claim that by leaching sander formations, they can use bleed streams that are less than the 10% average. The bleed stream creates an area of negative pressure underground around the suction wells; know as the "cone of depression". It is

suggested that this continuous, excess suction can control the flow of the leaching fluids by pulling the injected fluids back into the suction wells before they can migrate offsite.

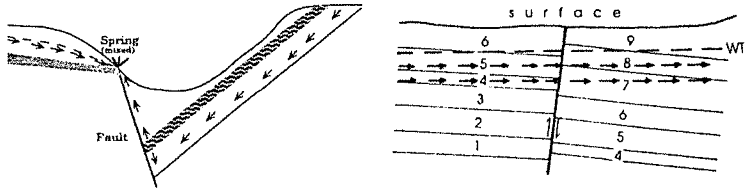


But this cone of depression technique is flawed because the complex nature of the aquifer geology makes it impossible to predict what is going to happen underground. The industry acts like the aquifer is composed of uniform beech sand where all the material is the same size and porosity. As described above, these strata are full of rocks, clay and sand lenses of different sizes and porosities. The injected fluids take the route of least resistance, flowing in narrow and torturous paths in a non-homogeneous stratum. It is impossible to monitor the fluids because it is impossible to know where to accurately place the monitor wells. The monitor wells can be isolated from the fluids by impermeable barriers or stagnate zones. To illustrate this problem, it is common for contaminates to be discovered in private wells outside the monitoring ring, un-detected by the mine's monitor wells.

No Such Thing as Impermeable

The key requirement of In-Situ technology depends on an impermeable layer above and below the injection aquifer. The presence of fractures can cause unpredictable contaminant migration away from a site. South Texas is a hot bed of oil and gas exploration, the geology is a Swiss cheese of abandoned oil well exploration holes. These holes are direct access into other aquifers. During the early years the In-Situ, the industry drilled thousands of holes exploring for uranium and then thousands more holes defining the shape of the ore bodies. None of the early holes were plugged. At the Bruni site, when the injection pumps were turned on for the first time, hundreds of open holes suddenly became fountains. The same thing happened at U.S. Steel when several upper aquifers were also contaminated from open holes.

Figure 17 - Idealised View of Some Typical Faults (Mazor, 1997)



Natural fault zones exist in these areas. These faults are what caused the uranium to lockup in the first place because they allowed the reducing gasses from lower formations to seep up the fault cracks and replace the oxygen in the upper aquifers, and this created the reduced atmosphere necessary for uranium to lockup. The very nature of uranium formations requires the ore bodies to be located in fractured, porous zones.

Mining changes the stable, steady-state environment of the uranium by making it mobile so that it can be remove from the aquifer. This mobility allows the uranium to freely travel on its on. The industry stresses any contaminates are contained by impermeable layers above and below the ore zone but as explained earlier, this impermeability is unlikely. The industry has tried to recreate the reduced atmosphere underground but they have not been successful. No technology currently exist that can return the uranium to its safe, reduced state.

For an excellent 144 page Australian report on aquifer problems see: "An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining", by Gavin Mudd, Victoria University of Technology". Go to this website: http://www.sea-us.org.au/pdfs/isl/no2isl.pdf

Disposing of the Waste

During processing, only the uranium oxide is removed leaving behind 98% of the radioactive and heavy metal toxic waste that must be disposed of.

Early mines tried to dispose of this waste in surface evaporation ponds. Heavy rains and broken float valves caused the ponds to overflow frequently. The solvents used in early mines became progressively harder to evaporate as the chemicals in the solutions became more concentrated. The radon out-gassing from the millions of gallons of radioactive water stored in the ponds was very high. The solid radioactive waste that remained after evaporation was simply stockpiled onsite. All these problems increased worker exposures.

Five sites were allowed to dispose of their radioactive wastewater by irrigating it directly on top of the ground. The EPA stated that this type of disposal was not acceptable and the Texas agency personnel fought to prevent the practice, but agency permitted the sites anyway.

One of the most notorious sites was the 105-acre Everest Exploration irrigation site was located 900' from the shoreline of Lake Corpus Christi, the drinking water supply for 1,000,000 people. The agency personnel suggested that *approximately 50% of the fluids dropped on the ground at the site wound up in the lake*. Eventually, after 4-years of operation, the agencies realized this technology was a mistake and outlawed the practice (see the "Everest Exploration" section).

Because of the problems caused by early disposal techniques, the state has allowed the industry to use deep well injection to dispose of their wastewater into lower aquifers. This has caused a whole new set of problems.

Other states consider deep well injection to be a questionable practice and most have outlawed the practice but in Texas there are over 32,000 thousand deep well injection sites. Texas is the birthplace of the deep well injection technique and it has the largest concentration in the world. It came about because

the oil industry wanted a cheap way to dispose of excess saltwater from oil well operations. Using deep wells to inject saltwater is not the same as injecting radioactive waste.

Deep well injection pumps the waste into the lower aquifers *basically transferring the ore body to a deeper aquifer.* Deep well injection creates two contaminated sites: the original shallow aquifer and the newer deep aquifer, both are oxidized and migratory.

The deep aquifer waters are under great pressure from the inflow of fresh water into the water column. Given any chance, they will flow into and contaminate upper aquifers. *The agencies do not allow monitoring of any strata below the mined ore field.* Because of this, we have no idea how much damage has been done to the lower aquifers.

The agencies feel that allowing monitor wells to penetrate below the "impermeable" layer of the mining zone would increase the risk of contaminates migrating past the impermeable cap. This is a reasonable concern but there are already many possible natural and artificial excursion paths in the cap including the fault zones. The dangers posed by deep injection require monitoring of all the lower aquifers.

Aquifer Protection

Over the years, the industry has tried many types of leaching fluids in an attempt to find one that would work properly. These fluids have included: ammonia, sulfuric acid, hydrogen peroxide, carbonated water, baking soda, and oxygen. The worst of these was the ammonia used in the early mines. It was found to lock up on the clays in the aquifer and was impossible to flush it out of the aquifer (see the "Bruni" section below).

Current technology involves the use of oxygen in the leaching fluid to oxidize the ore atmosphere and make the uranium mobile. The industry claims that this is safer than older techniques. But concerns exist because oxidization unlocks the uranium and allows it to migrate.

Large amounts of uranium waste products remain in the aquifer after mining. In public hearings the companies promised the local communities that they would cleanup the aquifer to the baseline levels and originally, all mining permits required that the aquifers to be cleaned up to the original pre-mining levels. But over the years it became clear that the companies could not do this, so the state changed the rules and allowed increased contaminates in the aquifers. Even at these increased levels, companies could not meet permit requirements. An examination of 32 permits from closed Texas In-Situ mines showed that *in each case*, companies were permitted to leave behind higher levels of contaminants in the groundwater than were allowed in the permit (Corpus Christi Caller-Times, Nov. 5, 2006). These included elevated levels of contaminates such as calcium, nitrate, magnesium, potassium, bicarbonate, sulfate, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, and uranium. In some cases, companies were able to meet the restoration target for one mineral but reported 10- and 20-fold increases in others. Older mines tended to require more drastic permit amendments; some mines had to have their contaminate levels increased several times and some mines were closed without ever getting anywhere close to cleanup requirements.

After the companies finish mining, the oxidized atmosphere that remains underground continues to leach

the ore field. The industry tries to remove the remaining ore by flushing the aquifer with billions of gallons of clean water. But when the flushing stops, the oxidizing action continues on unlocking the large volume of ore that remains. At the Bruni In-Situ, mine 35% of the profitable uranium remained in the aquifer after the wells were plugged and the mine had shut down. U.S. Steel used over 2,000,000,000-gallons of water without being able to reach the permit requirements.

Currently, the companies are allowed to close down an In-Situ site if during restoration, the monitor wells in the aquifer do not show significant increasing contamination for a 3-month period. 3 months is a ridiculously small amount of time. Since the ore is located in stagnate flow zones, movement of contaminates will not show up in the wells in 3 months. But the oxidation does not go away and the waste will eventually will find their way into the faster flowing aquifer.

At the end of the 3-month period the agencies allow the companies to plug all the onsite wells. At this point there is no way to detect any increases. That is until they show up in down-dip private wells. The agency has no plans to monitor these wells

Exposure Levels

In-Situ mining is a process of removing the uranium ore bodies in the aquifer and delivering them to the surface. The leaching fluids sucked out of the ore fields contain large amounts of radioactivity. Once on the surface, the public is exposed to the dangers.

Table 6 - Average Leach Solution Composition - Minor Elements (mg/l)
(Underhill, 1992)

Element	Acid	Alkaline
Arsenic	<0.05	<0.05
Copper	1.00	0.04
Zinc	4.30	0.10
Lead	0.70	0.20
Iron	25.40	0.60
Nickel	0.60	0.06
Chromium	0.15	0.07
Strontium	3.70	1.50
Zirconium	3.30	0.90
Selenium		1.60
Manganese	1.20	
Molybdenum		0.90
Radium-226[1]	390	1,750
Vanadium	1.00	
Cobalt	0.20	

[1] - pCi/l

This fluid is pumped from the wellheads to the processing plants by a network of miles of PVC pipe. This fluid is concentrated with very high levels of radioactive and hazardous materials. These pipes frequently break and decouple, releasing thousands of gallons of fluid. Long periods of time can elapse before workers discover and repair the leaks. The worst site is the U.S. Steel plant and even though they were fined many times for not reporting their spills, the incident files of the Bureau of Radiation Control show over 1.2 million gallons of radioactive spills (see the "U.S. Steel / Niagara Mohawk – Clay West" section below).

The holding tanks at the processing plant must be vented to atmosphere in order for the tanks to be filled. They are a large source of Radon gas to workers and anyone in the downwind direction. At U.S. Steel, leaching fluids contained a radon content of 167,000 pCi/l (pico Curries per litter).
The In-Situ processing plants produce large amounts of solid radioactive sludge, filters, resins, plumbing parts and equipment that must be disposed in a nuclear dump. They are stored onsite until a large quantity can be assembled for shipment to a nuclear dump. Disposal cost are high and the companies frequently allow the waste to pile up to dangerous levels requiring the agencies to force the removal. This waste used to be disposed of in the tailings ponds at Conquista and Panna Maria but they are closed. Currently, the companies dump their waste at the Envirocare site in Utah or one of several tailing ponds in Utah and Wyoming that are still open.

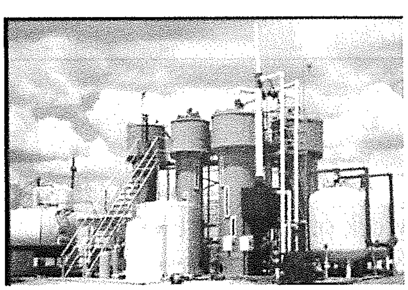
In-Situ Site Examples:

The Utah Construction and Mining Company built the first experimental In-Situ mine in 1963, near Shirley Basin, Wyoming. In was later converted to a conventional strip mine.

Chevron Palangana:

The Palangana is located in Duval County, Texas. Originally started as a conventional underground mine in 1960, it was converted to a test facility for a new mining technique called "In-Situ" leaching. This was the earliest experimental In-Situ site in Texas. Because of on-going problems with the In-Situ process, the project was shut down in 1979 after mining only 314,000 pounds of uranium. There is still 5.6 million pounds of uranium in the ground. The site was allowed to close by the regulatory agencies in 1999 after a long and unsuccessful attempt to restore the aquifer back to the permit requirements. We are investigating this site and will have further information available in the future.

Bruni-Westinghouse:



In 1971 Wyoming Minerals, a wholly owned subsidiary of Westinghouse Electric Co. (now a division of Siemens) began laboratory studies on In-Situ mining methods.

Westinghouse became involved in the uranium mining business for a particularly unusual reason. During the early days of the nuclear age, the government wanted to commercialize nuclear power, as a source of electricity but no utility would build a plant because they felt the technology was too dangerous.

The government's Atomic Energy Commission (AEC) had a monopoly on uranium sales in the U.S. and they had fixed the price of the ore. This allowed Westinghouse to offer the utilities long-term contracts to

supply them with fuel at a fixed cost. Fixing the fuel price was a good deal for the utilities because it allowed them to stabilize the consumer's electric rates.

In the beginning, this worked well for Westinghouse and they built several plants. But in 1970 the AEC released their market controls on uranium and this caused the cost of the ore to skyrocketed. Westinghouse found itself going bankrupt trying to supply fuel to the utilities.

In an effort to find a cheaper source of uranium, Westinghouse went into the In-Situ uranium mining business. They built the pilot In-Situ plant in Bruni in 1973 to test an unproven, experimental ammonia leaching process. It was a consortium of Wyoming Minerals-Westinghouse, Union Carbide, Pechiney Ugine Kuhlman, Conoco Oil, Pioneer Nuclear, Cleveland Cliffs, and Getty-Skelly Oil.

Geoffrey G. Hunkin, a mining engineer, developed this process. In his resume he states that this technology is "comparable in economic importance to the introduction of carbide drill bits and ammonium nitrate blasting agents," and he claims the benefits of In-Situ mining are low capital cost, short lead times, and low labor requirements. Mr. Hunkin was responsible for developing the Bruni plant and running it. The plant was designed to produce 250,000 lbs of uranium a year.

The Bruni-Westinghouse was unlicensed and operating for 4 years until 1975 when the Texas Water Commission (TWC) learned of the site. The TWC decided to take legal action against Westinghouse for starting a uranium mine "without any concurrence" from the TWC. But after a couple of weeks, for some unknown reason, the Bureau decided to license it instead. The industry wanted this cheaper technology and since it was clear that strip mining had many problems, the agency probably felt that it was necessary to promote newer and hopefully safer technologies. But the agency based its decision on faulty information provided by Westinghouse and by the time the agency realized their error, the industry was already well established.

Westinghouse claimed in their permit application in 1975 "test in small well fields have shown that they could restore the aquifer to original condition by simply reticulating the groundwater through the ore zone for a few weeks". Five years later Westinghouse admitted, "Developments in restoration technology have not advanced as far as was hoped, and after several years experience in mining and restoration, we now have a more realistic understanding of the limitations of the technology". They estimated that it would take 30 changes of very clean water to clean the aquifer. This amounted to 270,000,000-gallons of fresh water required to lower the levels to 100mg/l ammonia. The TWC permit required the aquifer to be returned to 0.8mg/l ammonia. To achieve this level billions of gallons of very clean water would be required.

In 1987 the Texas Water Commission (TWC) amended the permit to increase the aquifer exemption for ammonia to 5 mg/l. Uranium levels were increased 15 times and conductivity increased to 25 times. The Texas Department of Health warned the TWC to "consider carefully whether to remove the aquifer exemption because of extremely high ammonia levels". This was the beginning of the practice of increasing contamination levels whenever a company could not meet their clean-up requirements.

Westinghouse suggested that the ammonia would eventually breakdown in 3,000 to 3,500 years and should not migrate more than 3,500' during this period. There were no independent studies to back up this statement.

They were never able to clean up the aquifer; it is still loaded with ammonium. Westinghouse estimated that the ammonia carbonate-bicarbonate leaching solution was 65% effective at recovering uranium for the ore field, meaning that 35% still remains in the aquifer, available to migrate. Westinghouse estimates that for every 40 square feet of the ore body, approximately 4,330 lbs of ammonia remained in the aquifer. Eventually the site was closed down with the blessing of the Bureau. They removed all the monitor wells so that it is impossible to determine what is going on underground.

Bruni used five (5) evaporation ponds capable of holding 2,169,173 gallons of fluid in order to evaporate the excess leaching bleed stream. Uranium content in the leaching fluid was 15%. Workers were exposed to high levels of Radon out-gassing form the ponds. The workers were exposed to frequent pond overflows and to the evaporated solid waste that was piled up next to the ponds.

The state licensed In-Situ as a technology before anyone knew if it was safe! There was no public input, no independent studies, and no idea if Westinghouse could ever make the system work. Once the Bruni site was licensed it opened the door for every other company to use this technology and today we are paying for this mistake with the flood of new IN-SITU mines all over the world.

The history of Bruni is one of radioactive fluid spills, uncontrolled migration of radioactive water off site and worker overexposure. Despite this, Westinghouse received only one fine during this time.

For more detail, see the Texas Energy Alliance report: "Analysis of In-Situ Uranium Mines U.S. Steel / Niagara Mohawk and Westinghouse / Wyoming Minerals".

U.S. Steel / Niagara Mohawk – Clay West:

In 1973 the U.S. Steel Co, DALCO Oil Co, and Atlantic Richfield Co. began an experimental ammonia IN-SITU test pilot plant between George West and Freer on Hwy 59. In 1975 they opened the Clay West site. This was the first, large-scale commercial In-Situ uranium mine capable of producing over 1,000,000 lbs of uranium a year. U.S. Steel expanded their operation and opened the Burns site adjacent to the Clay West with a rated capacity of 4,000,000 lbs of uranium a year.

Niagara Mohawk, the electric utility company for upstate New York, became a 50% partner with U.S. Steel by buying a portion of their ore field. They invested $86,000,000 to insure the fuel supply for their two nuclear power plants, Nine Mile One and Two, located in Oswego County, NY. In 1987, a television station revealed that Niagara Mohawk was charging their customers $40 a pound for uranium that could be bought on the open market for $15 a pound. This launched an investigation that showed Niagara Mohawk was on the verge of bankruptcy because of bad investments.

The agencies documented 82 worker overexposures during U. S. Steel's 11-year operation. Overexposure was routine at this plant and could not be avoided because of the plants design:

•) The plant was designed with no conveyance system. The liquid uranium was routinely transferred between processes by dumping it on the floor of the plant where workers would then

use shovels to scoop it into the nearest sump pit so that it could be pumped to the next process. This was contrary to the original design allowed by the permit.

•) It was discovered that the concrete sump pits had been eaten away by the acids in the uranium slurry. During excavations for a foundation at the plant, it was discovered that the entire plant was floating on uranium-saturated ground. Test show that the soil contained from 32mg/l to 3060mg/l uranium concentrations.

•) During an inspection of the U. S. Steel trash pit and storage areas in 1980, a gamma radiation survey showed levels so high that it "pegged" the Geiger counter needle and readings could not be taken.

•) According to a report "The Uranium District of the Texas Gulf Coastal Plain" written by Lewis M. Cook in 1978, the fluids at U.S. Steel showed a radon content of 167,000 pCi/l. "This implies that very high levels of radon in the air can be expected above the water in tanks". All the tanks at In-Situ plants are vented to atmosphere. Worker at U. S. Steel were exposed to high radon levels.

•) During an agency inspection, uranium was observed flowing off the plant floor onto the ground. A solid yellow sheet of dried uranium was observed covering the ground beside the plant foundation.

•) An inspection of the control room found a chair seat coated with yellow cake measuring 1,300 counts per minute, *alpha radiation.*

•) On 8/22/81 the company blamed the workers for the high exposure levels at the plants. They said that poor personal hygiene is to blame.

•) The company reported on 2/17/82 that they had dumped 500 lbs of radioactive ash in the George West town dump. A survey of the incinerator at the plant showed a reading of 30-60 ur/hr. Radioactive material was being disposed of by burning. This was very dangerous because the radioactivity does not burn and it becomes airborne. Inhalation is the most deadly form of radiation exposure.

•) While digging a pit at the Burns plant on 8/31/83, the company discovered a plastic sewer line that used to service the old employee change room. On further investigation, the entire drainage field and septic tank was found coated with uranium. The uranium came from workers washing off the yellow cake that coated their bodies at the end of the workday. A TBRC inspector arrived on 4/17/84 and surveyed the area. Even though all of the pipe, septic tank, and drainage field pipe had been removed, the background Geiger counter reading showed 5,000 counts per minute, gamma radiation (average is 8 counts per minute).

•) During an attempt to clean up a uranium spill that had occurred, workers from three companies in Corpus Christi were overexposed to radioactivity while repairing a machine for U.S. Steel. A TBRC inspector accidentally discovered this on 3/18/85 while inspecting the Corpus companies.

•) The largest overexposure ever recorded in the TBRC files was a U.S. Steel worker on 8/9/82. Armand Salazar was exposed to a uranium level in his urine at a level of 50,494ug/l (30mg/l is the overexposure limit). The company suggested that his sample was contaminated and discounted it. They immediately fired Mr. Salazar in order to eliminate any future liability. This effectively caused the other workers to cover-up overexposures.

Because of the unplugged exploration holes at U.S. Steel, all the upper aquifers were contaminated.

In-Situ processing plants are connected to the well field by miles of PVC plumbing. The agency records show that U.S. Steel's pipes were particularly bad at breaking. Over 22 spills were reported at the U. S. Steel. A total of 1,200,000 gallons of radioactive spilled.

On 6/19/81, the largest surface spill ever recorded by the regulatory agencies, occurred at the burns site when a fiberglass pipe ruptured spilling 850,000 gallons of leaching fluid. It flowed from 4:00 a.m. to 8:00 a.m. before workers noticed it. It flowed out and covered highway 59. U. S. Steel reported to the agencies that only 100,000 gallons of fluid had spilled. The owners of the land were shocked to read about the spill in the newspapers. Neither the company nor the agencies had notified them.

To give an idea of the radiation levels involved in these spills, a 90,000-gallon spill of leaching fluid on 7/01/80 showed gamma readings in the area made the Geiger counter needle go off the scale, making measurements impossible. As shown earlier, the leaching fluids at U.S. Steel contained a radon content of 167,000 pCi/l.

Current update of regulatory action:

- •) The Texas Natural Resources Commission (TNRCC) allowed U. S. Steel to relax the restoration standards in 1998 at the Clay West and Burns/Moser sites allowing for increased contaminates in the aquifer.
- •) In 2001 they released the sites for unrestricted use.
- •) In 2002 the Texas Department of Health terminated the license for U. S. Steel.

U. S. Steel used over *2 billion gallons of water* trying to lower contaminate levels in the aquifer but was never able to reach the permit requirements.

During this time, *the agencies never levied a fined against U. S. Steel!*

For more info see the report, "Analysis of IN-SITU Uranium Mines U.S. Steel / Niagara Mohawk and Westinghouse / Wyoming Minerals".

Everest Exploration:

Everest Exploration's Mount Lucas site was a 9000-acre IN-SITU mine on the west shoreline of Lake Corpus Christi, the drinking water supply for a million people. Everest was allowed to irrigate a 105-acre irrigation site with radioactive wastewater. This is one of 5 sites in the state that were allowed to dispose of radioactive wastewater by surface irrigation. It is probably the worst site because it affected so many people.

The original permit for the mine required the radioactive waste water from the processing mill to be disposed of by deep well injection but Everest wanted to use the cheaper irrigation disposal method. The personal of the Texas Bureau of Radiation Control (TBRC) opposed the idea of radioactive wastewater disposal by irrigation. But on October 1983, the TBRC gave Everest permission to begin the untested

irrigation project on 22.5-acres located 900 feet from the shoreline of Lake Corpus Christi. The law required the Texas Department of Health (TDH) to give its permission for the project but they never did.

From 1983 to 1985 Everest was allowed to monitor the site by themselves. In 1984, the TDH personal discovered Everest had cut and bailed the radioactive hay growing on the test plot. The company intended to sell the hay for cattle feeding.

In 1985, TBRC allowed Everest to expand its irrigation site an additional 88-acres although the original 22-acre site was already showing radium-266 contamination levels 4 to 93 times higher than the permit allowed.

They were required to pre-treat the waste by using barium-settling ponds to remove the excess radioactivity from the water before irrigation. The TRBC set In-Situ limits on the treated irrigation water at 400 pCi/l radium, even though the EPA had set limits for In-Situ mine water discharge at 10 pCi/l radium. Again the TBRC personal voiced their opposition to irrigation. They opposed the "dilution-is-the-solution" disposal method and argued Everest's apparent lack of public responsibility. They pointed out that the aerosolizing / evaporation of 400pCi/l radium water would contribute significantly to the public exposure.

An inspection in 1986 noted irrigation water flowing south out of the irrigation plot and draining close to the edge of the lake. Cattle and geese were observed feeding in this area. Radium levels in the soil in this area were above the 5pCi/l remedial action limit. Another inspection that year noticed that Everest had begun to plow inside and outside the irrigation area in an attempt to spread the radiation over a larger area in order to lower the radium levels below the 5 pCi/l remediation limit.

It was reported in the 1986 Environmental Assessment report that the barium-settling pond had been built with no soil testing and no liner under the pond. The soil under the ponds was described as high permeability and the base of the pond was within 5' of the water table.

In 1986, the TRBC discovered that the company never monitored the aquifer at the site. According to the agency personal, <u>50% of the irrigation water used at the site had percolated into the shallow water table at the site.</u> According to the 1986 Environmental Assessment, the 10' deep water table was shown to rise and lower with the lake meaning it was directly connected to the lake 900-feet from the irrigation plot.

In 1987, it was discovered that Everest had not periodically removed the clay bottom as required in the permit. This was necessary to insure that the radioactive particulates that settle out of the waste stream do not build up to high levels on the pond bottom. The clay liner must be disposed of yearly at a licensed nuclear dump. That same year the TBRC discovered that Everest had used the wrong type of clays when building the ponds and the French drain monitor system under the ponds had been showing increased leaking out of the ponds.

From the beginning, the agency personal opposed this disposal but the agency licensed it anyway. After years of violating the permit requirements, the Bureau of Radiation Control closed down the site, admitting that it should never have been licensed. *The agencies never informed the citizens of Corpus Christi about the problems at the site.*

On 2/25/2002 the state issued an Emergency Order for cleanup of three Everest Exploration's sites including the Mt Lucas site. Everest also owns the Palangana, Rosita, Hobson, Tex 1 and Las Palmas IN-SITU mines.

It is interesting to note that in the 90's, it was discovered that Hugo Berlanga, the Speaker Pro-Tem of the House of Representatives, was discovered to own minerals at the URI Rosita In-Situ mine in Duval County, Texas.

For more detail, see the Texas Energy Alliance report: "Surface Exploration at the Everest Exploration, Mt. Lucas Site".

Total Minerals Corporation/COGEMA/AREVA:

There are foreign influences in Texas that are affecting our laws and contributing to our waste problems.

France is totally dependent on nuclear power plants for its electricity. In order to secure fuel for its plants the France must look to other countries for uranium ore. The French government through the French Atomic Energy Commission and the Electrical Company of France controls all aspects of the nuclear industry in France. In order to secure a stable, non-3rd world source of fuel, France has invested heavily in Texas.

Total Mineral Corporation jointly owns several In-Situ sites in Texas with Areva NC (formally COGEMA), a subsidiary of AREVA, an industrial group. Areva NC is 81% owned by the French State through the French Atomic Energy Commission with Total Minerals Corp. owing 15% and Technip (an engineering firm) 3.5%.

In Texas, Total Minerals owns 71% of the El Mesquite In-Situ mine and the Electrical Company of France owns the other 29%. They also own the Holiday, West Cole and O'Hern mines.

Areva NC provides uranium, conversion and enrichment services to 80% of the nuclear power plants in the United States. They are responsible for 52% of the world reprocessing capacities and over 80% of the MOX fuel fabrication capacities. Areva NC has a history of legally questionable activities and scientifically questionable decision-making in France (for more information see - http://www.bredl.org/pdf/Cogemafile100102.PDF).

The French promote nuclear technology to the world as a safe and clean source of electricity. But in fact, they are very dependant on other countries to dispose of their waste:

- •) The mining process leaves behind 97% of the radioactive material as waste that the host country must deal with.
- •) The ore is concentrated at a U.S. conversion facility before shipment to France leaving behind high-level waste product that must be disposed of in America.

Other Cowboy Stories

In the mining districts, local stories about the industries reckless practices are common:

- In Karnes County, the companies allowed the tailings waste to be used for driveways, concrete mixes and home foundations. Eventually these sites were quickly dug up by the state after a San Antonio TV station ran a special documentary about the issue.
- To lower liability, most companies did not hire the employees that worked for them. Instead they hired a subcontractor whose sole purpose was to provide an added layer of liability protection.
- Workers that had overexposures were frequently fired to remove any complications with health and liability issues. This caused many workers to falsify exposure levels in order to keep their jobs.
- Workers in the early strip mines wore no mask or protection of any kind. They described the air in the bottom of these pits as being so dusty that they had to drive their equipment in the middle of the day with the headlights on.
- Workers at the early In-Situ processing plants describe working in the drier rooms where the companies used simple open-air peanut roasters to dry out the uranium slurry. The dryers were located in un-insulated metal buildings that would heat up to over 150F in the summer. The workers would work in the nude with no protection. By the end of the day they would be entirely covered in uranium yellow cake.
- During the early years, prospectors used airplanes with sensitive instruments to find ore deposits. One flight over Karnes City recorded a radiation spike. On further investigation, it was discovered that the radiation came from clothes drying on a clothesline. They belonged to a worker from one of the uranium mines.
- For years, some companies would transport their wet yellow cake slurry from the mine to the processing plant. In some cases these plants were located several counties away. The ore was transported in open, unlined dump trucks that leaked the slurry out the tailgate onto the highway. Uranium is electrostatic and cannot be easily removed from surfaces without using acids washes. In some large spills, the state required the pavement to be jack-hammered away in order to remove it for disposal.
- A secretary that worked for one company in Kennedy, Texas explained that they would take orders for uranium over the phone. The yellow cake was stored in brown paper bags in a closet in the main office. The secretaries would have to go into the closet to retrieve the orders. A yellow cloud of dust would float into the room and remain suspended in the air, coating everything in the room. Uranium is electrostatic and will not settle until it becomes grounded on an object. The secretaries were never told of any radiation danger and never wore any protection.
- The industry still demonstrates in schools and public meetings how harmless uranium is by using a Geiger counter and a piece of paper to show how alpha waves can't penetrate the paper. This is supposed to demonstrate how safe uranium is because it can't penetrate human skin.

What they don't tell people is that uranium is a strong emitter of alpha radiation and alpha rays use up all their energy in the first 4 cells of the human body if inhaled or ingested. Once alpha-emitting uranium enters the stomach or lungs, it circulates through the body and eventually

passes through the kidney where it is excreted in the urine. Because of the high energy levels of the alpha radiation, it is considered the most deadly form of radiation inside the human body.

ANALYSIS OF INSITU URANIUM MINES

U.S. Steel / Niagara Mohawk and Westinghouse/Wyoming Minerals

By The Texas Energy Alliance

INTRODUCTION

Uranium IN-SITU solution mining is the process of leaching uranium from an undisturbed underground ore body by injecting leaching solutions into the ore deposit so that the uranium becomes mobile enough that it can be pumped back to the surface for processing. The ore bodies are found locked up in shallow aquifers and it is necessary to nave an impermeable layer above and below the aquifer so that the mining solution can be contained, preventing other areas from becoming contaminated.

This paper describes two of the earliest insitu mines in the world: The U.S. Steel and the Westinghouse. These sites are similar because they both used an ammonia carbonatebicarbonate leaching solution in the mine and as a result have experienced problems associated with the outdated and dangerous use of ammonia.

IN-SITU mining in the state of Texas was regulated by two agencies: the Texas Bureau of Radiation Control (TBRC), and the Texas Water Commission (TWC). The TBRC regulated all issues dealing with radiation and the TWC regulated the parameters for groundwater protection. The information on the U.S. Steel site found in this report comes from the incident files of the TBRC and involves violations of their license. The Westinghouse information comesfrom the TWC files and focuses mostly on the aquifer. These two files give a general picture of the day-to-day problems associated with insitu mining. To comprehend the full extent of the problem, the entire files of the TBRC and the TWC should be studied.

HISTORY OF THE SITES

Utah Construction and Mining Company in 1963, near Shirley Basin, Wyoming, built the first IN-SITU mine. Since that time, most IN-SITU mining has been concentrated in Texas and Wyoming.

In 1971 and 1972, Wyoming minerals, a whollyowned subsidiary of Westinghouse Electric Co., began laboratory studies on IN-SITU mining methods. Westinghouse became involved in the uranium mining business for a particularly unusual reason. Westinghouse was a large builder of nuclear power plants in the early days of the commercial nuclear age. Westinghouse secured construction contracts by guaranteeing to supply the electric utilities with all the nuclear fuel they needed at a fixed price. Westinghouse could do this because the government at the time owned all uranium reserves, and the price was tightly regulated. But in the 60's Congress decided to relinquish ownership of the ore in order to encourage private development by industry. As a result, ore prices skyrocketed and Westinghouse found itself losing millions of dollars trying to meet their fuel contracts.

In an effort to find a cheaper source of uranium, Westinghouse built a pilot insitu plant at Bruni, Texas in 1973, to test their experimental ammonia leaching process. Geoffrey G. Hunkin, P.E., mining engineer, developed this process. In his resume (see 6/2/75) He states that this technology is "comparable in economic importance to the introduction of carbide drill bits and ammonium nitrate blasting agents." and he claims the benefits of insitu mining are "low capital cost, in the range of $5.00 per pound of annual U308 production, coupled with short lead times and low labor requirements, add up to an attractive financial package." Mr. Hunkin was responsible for developing the Bruni plant and from 1971 to 1975 he managed a consortium of Wyoming MineralsWestinghouse, Union Carbide, Pechiney Ugine Kuhlman, Conoco Oil, Pioneer Nuclear, Cleveland Cliffs, and GettySkelly Oil that was established to develop uranium insitu leaching processes in Texas and Wyoming.

In 1973 and 1974, U.S. Steel Co., DALCO Oil Co., and Atlantic Richfield Co. began an experimental ammonia insitu test pilot plant at George West, Texas. In 1975 they opened the Clay West site. This was the first large-scale commercial insitu uranium mine capable of producing over 1,000,000 pounds of uranium a year. U.S. Steel expanded their operation and opened the Burns site adjacent to the Clay West with a rated capacity of 400,000 pounds of uranium a year.

Niagara Mohawk, the electric utility company for upstate New York, became a 50% partner with U.S. Steel by buying a portion of their ore field. They invested $86,000,000 to insure the fuel supply for their two nuclear power plants, Nine Mile One and Two, located in Oswego County, NY. In 1987, a television station in Syracuse, NY, revealed that Niagara Mohawk was charging their customers $40 a pound for uranium from the mine although it could be bought on the open market for less than $15 a pound. Today Niagara Mohawk is on the verge of bankruptcy because of their nuclear ventures.

In 1975, Wyoming MineralsWestinghouse opened the full scale Bruni plant, capable of producing 250,000 pounds of uranium a year. They also started operation at the Lamprecht mine east of Three Rivers, Texas. On 2/18/75 the Texas Water Commission considered taking legal action against Westinghouse for starting a uranium mine "without any concurrence" from the TWC (see 2/18/755). During this time, Wyoming Minerals was in the process of building the Irigaray IN-SITU mine in Johnson County, Wyoming, and the Grover insitu mine in Weld County, Colorado.

Many other ammonia insitu sites exist in Texas and today most of these mines are closed or in the process of closing because of the problems associated with the ammonia process. Serious questions exist about the future safety of these sites.

THE NATURE OF THE ORE BODY

Long ago, volcanic eruptions in Mexico blew volcanic ash into South Texas where it settled on the ground. Over the centuries the uranium in the ash was leached into the groundwater where it migrated out to the Gulf of Mexico. But in some areas the uranium locked up the clays in the aquifers because of the presence of reducing atmospheres (usually caused by hydrogen gases seeping up fault zones from lower oil deposits and displacing the oxygen in the aquifer).

For centuries these isolated and very stable pockets of concentrated uranium have existed in the South Texas aquifers and they have caused few problems when left alone. Most problems develop when humans drill holes into these ore fields. For example, the town of Flatonia, Texas, east of San Antonio, has a radon concentration of 9,000 pCi/l in their municipal water supply. Oil field brines in Panna Maria, Texas, southeast of San Antonio, have shown a radium content of 317 pCi/l. Measurements at some natural gas processing plants have shown readings on the ground higher than 30 uR/h. This situation needs to be studied further to determine the extent of the problem.

The undisturbed ore is usually buried 100 feet or more below ground, making dangerous levels of radiation exposure and radon outgassing impossible. All TBRC environmental assessments completed at mine sites before mining began show levels of background radiation and radioactive products in the environment to be below the average background levels for the entire United States. The Westinghouse ore was located 120 feet below the surface and the U.S. Steel was found below 350 feet. The only area of the state where ore was found close to the surface was the Falls City area. According to a DOE study, rainfall was responsible for washing the surface clean of the high levels associated with an ore body. Commercial grade ore was found several feet below the surface, reducing the amount of radiation and radon outgassing from the ore.

The aquifer surrounding an ore deposit is generally free of the high contamination levels that exist inside the ore body. Westinghouse explains in their permit application "water movement is virtually nil in the ore body because elevated radium concentrations are found only in the ore body and not the aquifer around the ore" (See 3/7/76) .

Samples taken before mining began show low levels of free, unlocked uranium in the groundwater, both inside and outside the ore body. At Westinghouse the average level of uranium in the ore field was between 0.21 mg/l and 0.331 mg/l. 200 feet outside the ore zone, levels were less than 0.06 mg/l (See 8/11/7 chart.) The uranium in the area water wells at U.S. Steel showed levels less than 0.5 mg/l (See 9/14/77 Chart).

THE EFFECTS OF MINING ON THE AQUIFER

The above examples illustrate how stable and isolated the uranium environment is, but when insitu leaching solutions are introduced, this steady state is destroyed. The solutions oxidize the reduced atmosphere in order to make the uranium mobile. Both U.S. Steel and Westinghouse used hydrogen peroxide in their leaching fluids. Before mining began, free uranium levels at Westinghouse averaged 0.692 ppm (See 6/5/85 chart).

The insitu solutions raised the free uranium levels to 160 ppm (See 3/7/75). Westinghouse states that the ammonia carbonatebicarbonate leaching solution is 65% effective at recovering uranium for the ore field, meaning that 35% is still bound up in the aquifer clays after mining is finished, available to migrate at some future date if it becomes unstable (See 3/7/75).

Ninetysix percent of the radioactivity remains in the ore body after the uranium has been removed. Radioactive thorium 230, the parent of radium and radon, half life of 78,000 years, remains in the ore waste. This is exactly the same radioactive waste that remains aboveground in a strip mine mill tailings dump but unlike a mill tailing dump, the IN-SITU waste can not be retrieved or isolated from the groundwater if serious problems develop.

Ammonia in the leach is absorbed by the clays and held tightly. This is the major problem with the ammonia process. This bound ammonia is undetectable by standard monitor well sampling. An estimate by Westinghouse after mining was finished, showed approximately 4.330 pounds of ammonia remained locked up in the clays for every 40' x 40' area of mine zone (see 6/5/85).

Many other toxic elements exist in a uranium ore body (molybdenum, arsenic, selenium, etc.) and their stability is also in question.

Before mining begins, thousands of exploration holes are drilled through the impermeable strata that lie over the ore in order to establish the exact shape of the ore field to determine the most profitable areas for mining. They are supposed to plug all these holes so that contaminants don't migrate out of the ore zone into other strata during mining. But this is hard to achieve and Westinghouse admits that exploration companies from 1960 to 1973 drilled "literally hundreds of holes". "These holes were not plugged when the companies abandoned the area and therefore, left conduits for leachate migration" (See 12/29/78). The shallow aquifer at Westinghouse has been contaminated. Most other IN-SITU mines in Texas have experienced similar problems with migration. U.S. Steel has contaminated several areas of its shallow aquifer. It is interesting to note that there are no monitor wells allowed below the lower impermeable layer; the amount of damage caused by fluids leaking down into lower aquifers via old oil well holes and fault zones is unknown.

EFFECTS OF MINING ON THE SURFACE

During mining, high levels of radiation and radon from the ore zone are brought to the surface by the leaching solutions. A report by the TBRC "The Uranium District of the Texas Gulf Coastal Plain" written by Lewis M. Cook in 1978, showed that the fluids at the U.S. Steel, Claywest mine, contained a radon content of 167,000 pCi/l, "This implies that very high levels of radon in the air can be expected above the water in tanks." All tanks at insitu plants are vented to the atmosphere.

Westinghouse mentioned in their 1975 permit application the increased radium uptake by the leaching fluids. The mine fluids processed at the plant contained 150 mg/l uranium. The wastewater at the plant was evaporated in five open-air disposal ponds capable of holding 2,169,173 gallons of fluid. Uranium content of the fluid was 15 ppm. Worker radon exposure must have been high.

Part of the procedure for closing an insitu mine is to decontaminate the surface of any excess radiation levels. This includes pipe, machinery, buildings, pond liners, filters, and all contaminated Soil with excess radiation readings. All this waste used to go to the Conoco Conquista mine in Falls City, but this site is now closed and today there is no place in the state licensed to accept IN-SITU mining waste. Thousands of tons of solid radioactive waste exist in South Texas and more waste is being added daily. The exact amount of the waste is unknown and the TBRC needs to study this situation to comprehend the size of the problem.

RESTORATION AND THE LAW

The standard technique used to restore the aquifer at an insitu site is to flush out the contaminates with millions of gallons of fresh water. Westinghouse claimed in their permit application in 1975 that "tests in small well fields have shown that they can restore the aquifer to original condition by simply recirculating the groundwater through the ore zone for a few weeks" (see 3/7/75). Five years later Westinghouse admitted "developments in restoration technology have not advanced as far as was hoped, and after several years experience in mining and restoration, we now have a more realistic understanding of the limitations of the technology." "Original standards were known to be strict but were accepted with the expectation that the state of the art would solve some problems and the standards could be renegotiated (especially the standards for NH4+) in light of further experience and understanding" (See 12/18/80). It was discovered that aquifer clean up was impossible when using untreated groundwater. In order to flush out the pollutants, very clean water was necessary. A reverse osmosis process was developed which removed the contaminates from the water so that clean water could be recirculated in the aquifer. This resulted in a 30% stream of concentrated waste that Westinghouse disposed of in their deep disposal well. Westinghouse estimated it would take 30 changes of clean water in the aquifer, amounting to a waste stream of 270,000,000 gallons of fresh water to lower the ammonia levels to 100 mg/l (See 6/5/85 Testing by Westinghouse has shown that the reverse osmosis technique is capable of lowering the ammonia levels to 32 mg/l after 50 pore volumes, but the TWC license requires the aquifer to be restored to 0.8 mg/l. To achieve this level billions of gallons of water would be irretrievably flushed down the Westinghouse disposal well.

In 1987 the TWC amended the Westinghouse permit allowing them to increase many contaminate levels (see 1/22/87). The Texas Department of Health suggested that the TWC "consider carefully whether to remove the aquifer exemption because of extremely high ammonia levels" (See 12/9/86). The TWC increased the ammonia levels to 5 mg/l above the maximum levels found in each well before mining; this is lOx higher than the original levels (0.514 mg/1). Uranium levels were increased to 5 mg/l, 15x higher than the original levels (0.331 mg/1). Conductivity levels were increased 25% and sulfates were allowed to add 150 mg/l to the original levels. This permit amendment for Westinghouse would allow other sites to do the same.

The state agencies and the companies claim that the contaminates will not migrate very far because of the slow movement of the groundwater in these areas and the migration will eventually lock up again When the contaminants meet another reducing atmosphere down dip. Westinghouse explains that the ammonia will eventually break down to zero levels in 3,000 to 3,500 years and should not migrate more than 3,500 feet from the mine (see 4/12/79). But long-term site stability studies are lacking. This is another example of waiting until a problem develops before doing anything about it. The nuclear industry is famous for this type of problem solving. The most amazing part of this situation is the TWC requirement that the companies plug all monitor wells after the sites are closed. This will allow companies to avoid financial responsibility because there will be no way to determine what is happening underground. Considering the long life of this contamination (780,000 years for radioactivity), the only acceptable method of assuring public safety is to establish longterm monitoring programs. The plugging of the wells is typical of the leastcost/walk away concept designed to prevent continuous expense to the industry.

Companies created this mess and must be held accountable. Cost should not dictate policy. Either the companies should have to pay for the problem now or the taxpayer will have to pay for it later. Future environmental and health consequences will determine the true cost of this threat.

SUMMARY OF INCIDENT FILES
U.S. Steel Niagara Mohawk INSITU uranium mine

WORKER EXPOSURE ---

This report documents 82 workers that were reported by the company as overexposed during an eleven-year period, from 1977 to 1983. An overexposure is a measure of how much uranium, a mine worker has injected or inhaled Once alpha emitting uranium enters the stomach or lungs, it circulates through the body and eventually passes through the kidney where it is excreted in the urine. Because of the high energy levels of the alpha radiation, it is considered the most deadly form of radiation inside the human body. The NRC considers 30 mg/l of uranium to be the overexposure limit. The largest overexposure ever recorded in the TBRC files was a U.S. Steel worker on 8/9/82. Armand Salazar was exposed to 50,494 ug/l uranium in the urine. The company explained that his sample was contaminated and discounted it. They immediately fired Mr. Salazar.

The following paragraphs give us some idea of the working conditions at U.S. Steel.

On 9/15/80 the TBRC required the company to explain the excessive exposures at the Clay West and Burns plants. On 9/23/80 U.S. Steel admitted the uranium dust in the plant loading areas was a problem but they were trying to correct the situation. During an inspection on 9/4/80, the TBRC discovers that radiation levels at the trash pits and storage area around the Burns plant Showed gamma radiation levels so high that it "pegged" the meter, meaning levels were so high that readings could not be taken.

An inspection of the burns plant by the TBRC on 11/17/80 revealed that the company routinely transferred liquid uranium from one plant process to another by dumping the slurry on the concrete floor of the plant. where workers would shovel it into the closest sump pit so that it could be pumped to the next process . The plant was built without any method of product conveyance and this was contrary to the procedures submitted for license approval. The TBRC noted this was a violation of their permit. The TBRC did not fine them.

During the same inspection, the TBRC observed uranium fluid flowing off the concrete pad onto the ground. A solid yellow sheet of dried uranium was observed covering the ground. An inspection of the control room found a chair seat coated with yellow uranium measuring 1,300 count per minute, alpha radiation.

Over time, the acids in the uranium slurry at the Burns plant had eaten away the concrete in the sumps allowing the uranium to leak into the ground. On 9/12/80, during excavations for a foundation at the plant, the company noticed that the holes had filled up with uranium fluid and on further investigation it was discovered that the entire plant was floating on ground saturated with uranium. Monitor wells drilled around the plant on 12/22/80 showed levels of 32 mg/l to 3060 mg/l uranium in the saturated ground. The TBRC required the company on 1/20/81 to correct the problems at the plant and to dispose of the contaminated soil. The TBRC did not fine them. Today, the plant and the soil under the plant still remain in place at the burns site.

On 3/6/81 the TBRC felt that worker overexposure was still too high and required the company to come up with a firm schedule to show when corrective actions to protect the workers would be completed. The company admits on 4/10/81 that uranium dusts at the plants are still a problem. They planned to enclose the buildings that were responsible for the dust so that they will be air tight. Uranium buildup outside the filter buildings was to be kept to a minimum. Several monitoring programs were to be installed. On 10/22/81 the company blamed the workers for the continued high exposure levels at the plants. They said that poor personal hygiene is to blame. On 12/11/81, a year after the TBRC started to investigate the worker exposure problem, the company states that high dust levels were still a problem.

On 8/5/82, U.S. Steel decided to close down the Burns plant in stages and they proposed to "review the prospects for enhanced clean up of the affected subsoils."

On 2/17/82, the company reported they had dumped 500 lbs of radioactive ash in the George West town dump. A survey of the incinerator at the plant showed a reading of 3060 ur/hr. Radioactive material was being disposed of in the plant incinerator and burned. This was very dangerous because the radioactivity became airborne. The company removed the ash at the dump and incinerator, and disposing of it at the Conoco Conquista mill tailings dump in Falls City, Texas.

While digging a pit at the Burns plant on 8/31/83, the company discovered a plastic sewer line that used to service the old employee change room. The interior of the pipe was lined with yellow uranium. On further investigation, the entire drainage field and septic tank were found to be coated with uranium. This must have come from workers washing their hands, indicating the levels of uranium they were actually covered with. A TBRC inspector arrived on 4/17/84 and surveyed the area. The pipe, septic tank, and drainage field pipe had already been removed by the company and disposed of at the Conoco dump. The background reading of this area showed 5,000 counts per minute.

The TBRC writes the company on 11/14/83 and states that they have committed 17 violations of their radioactive material license. The company replies on 11/30/83 and blames the poor radiation safety program, management, and inadequate environmental and occupational monitoring programs as the cause of their problems. They propose to make each employee responsible for their own monitoring. They will assign a clerk to make sure samples are collected and to organize the files so records can be kept track of. The company admits that dust is still a problem and the areas responsible are still not enclosed. They also admit that their radioactive waste is not properly stored. No fines were levied.

On 3/18/85 a TBRC inspector accidentally discovered that three companies in Corpus Christi had been exposed to radioactivity while repairing a machine for U.S. Steel. The company attempted to clean up the uranium contamination that had occurred before the TBRC discovered the problem. The TBRC gave notice of violation to the company on 4/4/85 for releasing radioactive materials into unauthorized areas. No fines were levied.

SPILLS

At insitu mines, miles and miles of plastic pipe carry the fluids to and from the processing plants. All this pipe has plastic or fiberglass because the leaching fluids are corrosive and will eat up metal pipe. The pipes break easily with weathering expansion and contraction. Over 22 spills have been reported Steel at the Clay West and Burns sites. A total of 1,200,000 gallons of radioactive and toxic chemicals have spilled at these sites.

On 6/19/81, the largest spill ever recorded in the state, occurred at the burns site when a fiber glass pipe ruptured spilling 850,000 gallons of leaching fluid. It flowed from 4:00

a.m. to 8:00 a.m. before workers noticed it. The spilled fluid was leaching solution which had most of the uranium already removed. U.S. Steel originally reported to the TBRC that only i00,000 gallons of fluid had spilled (see 7/27/81). The owners of the land were shocked to read about the spill in the newspapers (see 7/l/81). Neither the company nor the TBRC had notified them.

Many spills occurred before the fluids were processed in the plant. These fluids contain high levels of uranium. To give an idea of the radiation levels, a 90,000 gallon spill of uranium rich fluid occurred on 7/l/80. Gamma readings of mud in the area made the radiation meter go off the scale.

EXCURSIONS IN THE AQUIFER

When mining begins at a site, the companies have no idea what is happening with the migration of the mining fluids underground until it is detected in the monitor wells located outside the mining zone.

The U.S. Steel sites had problems with contamination of aquifers above the impermeable layers. that separates the ore zone. On 12/28/77 "bad water" was noticed above the ore zone at the Boots mine area. On 3/17/78 leaking mine fluids were discovered in the upper aquifer on the east side of the Moser I mine area. An abandoned well was allowing leaching fluids to flow up from the ore zone into the upper aquifer. Contamination was noticed on 3/17/78 in the upper aquifer on the west side of the Moser 1. Mining fluids were flowing through a joint separation of the plastic pipe of an injection well.

U.S. Steel discovered on 7/20/79 that uranium had migrated out of the ore field all the way to the far east side of the Moser I perimeter monitor wells. The perimeter wells are the last monitor wells in a field and any migration of pollution beyond these wells is undectable. Because U.S. Steel was going to start mining this area with the expansion of the mine into the Moser 2 area, the TWC allowed them to discount this on 5/16/80, a perimeter monitor well in the Moser 2 area showed an increase in contamination. This was just east of the earlier monitor well contamination of 7/20/79.

On 6/26/80 ammonia and uranium levels rose in a perimeter monitor well at the burns mine area. U.S. Steel said on 9/22/80 and 2/10/81, that the uranium levels were increasing because a natural uranium deposit existed in this area and it was being oxidized either by leaching solution from the mine or because "oxygen diffuses rapidly in this area due to the scarcity of species (mainly reactive forms of marcazite, FcS2) that consume it." Mining in this area began in 1978 and it is unknown why the uranium waited two years to begin migrating.

SUMMARY OF INCIDENT FILES
Wyoming Minerals / Westinghouse IN-SITU Mine, Bruni, Texas

The history of the Wyoming Minerals mine has been one of uranium leachate fluid spills, uncontrolled migration of radioactive water off site and violations of regulations for storage of radioactive materials. Many violations and accidents occurred over the years and ultimately result in a large fine for Westinghouse.

One of the primary problems at the Bruni mine has been "excursions" or leaks from well boundaries of uranium leachate fluid. These incidents occurred as soon as mining began. On 12/23/75, an excursion led the Department of Water Resources (TDWR) to order a mine stoppage. Between 12/23/75 and 8/13/81, the TDWR recorded 23 incidents of leachate spills. At one point, the TDWR cited Westinghouse for 14 excursions, of which Westinghouse only reported 5.

The TDWR also noted other spills mostly from wastewater ponds onto the ground or into the shallow zones above the ore. Between November 1978 and August 1981, they note four such spills. The spill for Sept. 18, 1979 states that the wastewater ponds have

damaged plastic liners. The largest pond, Pond 5, began leaking In late 1976 and continued to contaminate groundwater until Oct. 1977, although the company only reported the problem in February 1978.

In addition, the TDWR notes four storage violations in 1978 and 1979. These include Improper storage of radioactive filters, ore storage barrels and waste storage barrels. At least two of the Incidents resulted from the failure of the company to remove an excessive backlog of uranium containing calcite waste barrels from the site within the TDWR designated deadline.

The Westinghouse insitu uranium mine at Bruni is cause for concern about the potential harm to groundwater and soil from this type of operation. During the few years it operated, it leaked and spilled uranium and ammonia numerous times. The same types of accidents recurred, sometimes at the same locations. For all the contamination and violations, the company was only fined once by the TDWR. Cleanup efforts were ineffective and ultimately the company had to request that the standards for restoration be changed to allow higher contamination levels. And after several years, Westinghouse has been unable to meet even those standards.

The following IN-SITU closure information comes from the WISE Uranium Project web site at: http://www.wise-uranium.org/uisl.html#RECLAMPROJ and http://www.wise-uranium.org/udusail.html. (last updated on 11/5/06).

The U.S. Steel amendments changed the clean up requirements by raising the contamination levels allowed to remain in the aquifer for the second time (see RESTORATION AND THE LAW section above). Groundwater concentrations for alkalinity, calcium, nitrate, magnesium, potassium, bicarbonate, sulfate, total dissolved solids, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, and uranium were increased. Please note the volume of water that has been used to clean up the aquifers.

U.S Steel - Burns/Moser, Texas

License termination

The Texas Department of Health (department) gives notice that it has terminated uranium by-product material license L02449 issued to USX Corporation. (Texas Register May 10, 2002)

A written hearing request must be received, from a person affected, **within 30 days from the date of May 10, 2002**.

Release for unrestricted use

The Moser wellfield patterns area was released for unrestricted use. (Texas Register July 13, 2001)

Relaxed Groundwater Standards, Production Area 2

"HAZARDOUS WASTE PERMITS: USX - Texas Uranium Operations (USX) for a production area authorization (PAA) restoration table amendment (RTA) to Burns/Moser Mine Production Area Number 2, Authorization Number UR01890-021, which would change ground-water constituent concentrations that are to be met by the permittee (USX) to achieve successful restoration of the site's mined aquifer in PAA 2. The proposed amendment would change restoration table concentration values for calcium, magnesium, potassium, bicarbonate, sulfate, nitrate, alkalinity, manganese, molybdenum, selenium, uranium, and ammonia. Furthermore, a restoration table concentration value for radium has been added to complete the restoration table in the original PAA issued for Production Area Number 2 on October 12, 1982." [...]

"Uranium mining took place at Burns/Moser Mine Production Area Number 2 from May 1979 to June 1986, after which ground-water restoration of the ore-bearing aquifer began. Since restoration efforts were initiated, approximately **1.633 billion gallons**" [6.181 million cubic meters] "of aquifer water have been removed during the restoration process. Under 30 Texas Administrative Code §331.107(f), the permittee has the option to request an amendment to the PAA Restoration Table, provided that, among other things, an appropriate effort has been made to achieve the permit restoration table values. The Executive Director has prepared a final draft PAA to address USX's RTA request. The Burns/Moser Mine site lies in the south central portion of Live Oak County, approximately ten miles southwest of George West, Texas adjacent to U.S. Highway 59." (TNRCC Items Signed by Executive Director 18 December 1998 - emphasis added)

Relaxed Groundwater Standards, Production Area 3

"HAZARDOUS WASTE PERMITS: USX - Texas Uranium Operations (USX) for a production area authorization (PAA) restoration table amendment (RTA) to Burns/Moser Mine Production Area Number 3, Authorization Number UR01890-031, which would change ground-water constituent concentrations that are to be met by the permittee (USX) to achieve successful restoration of the site's mined aquifer in PAA 3. The proposed amendment would change restoration table concentration values for calcium, magnesium, potassium, bicarbonate, sulfate, total dissolved solids, alkalinity, arsenic, iron, manganese, and uranium." [...]
"Uranium mining took place at Burns/Moser Mine Production Area Number 3 from March 1980 to June 1986, after which ground-water restoration of the ore-bearing aquifer began. Since restoration efforts were initiated, **approximately 409.85 million gallons**" [1.551 million cubic meters] "of aquifer water have been removed during the restoration process. Under 30 Texas Administrative Code §331.107(f), the permittee has the option to request an amendment to the PAA Restoration Table, provided that, among other things, an appropriate effort has been made to achieve the permit restoration table values. The Executive Director has prepared a final draft PAA to address USX's RTA request. The Burns/Moser Mine site lies in the south central portion of Live Oak County, approximately ten miles southwest of George West, Texas adjacent to U.S. Highway 59." (TNRCC Items Signed by Executive Director 18 December 1998 - emphasis added)

Relaxed Groundwater Standards, Production Area 1

"HAZARDOUS WASTE PERMITS: USX Corporation: Texas Uranium Operations (USX) for modification to Production Area Authorization (PAA) UR01890-011, Burns/Moser mine. A PAA is issued as part of the base permit (UR01890-001) to approve the initiation of mining activities. A PAA application contains monitor well locations, water quality data based on pre- mining conditions for use in establishing groundwater restoration targets, and hydrologic test data that shows connection between production wells and production zone monitor wells. The permit and PAA 1 were issued and mining began in 1980. Mining continued until 1986. Restoration, using groundwater sweep and reverse osmosis, was **from 1981 to 1997**.
USX is requesting amendment of the restoration table under 30 TAC §331.107(f)(2). The proposed amendment would change restoration table values specifying groundwater constituent concentrations for calcium, magnesium, potassium, bicarbonate, sulfate, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, uranium. These values are to be met by the permittee (USX) to achieve successful restoration of the mined aquifer in PAA 1. The proposed values will not change the use category of the water. The average water quality present before mining exceeded the TNRCC and EPA primary drinking water standard for radium-226. Before mining commenced, the water in the production area was used for rural domestic, livestock, and industrial purposes. The Burns/Moser site is in Live Oak County approximately ten miles southwest of George West, west of U.S. Highway 59 in the Jacob Cook Survey 171, A-142 and Wesley Sellman Survey 60, A-416. The facility is an in situ uranium mine in the Lower Oakville Formation, 250 to 400 feet below the surface." (TNRCC Items Signed by Executive Director 11 December 1998 - emphasis added)

Relaxed Groundwater Standards, Production Area 4

"HAZARDOUS WASTE PERMITS: USX Corporation - Texas Uranium Operations (USX) for modification to Production Area Authorization (PAA) UR01890-041, Burns/Moser mine. A PAA is issued as part of the base permit (UR01890-001) to approve the initiation of mining activities. A PAA application contains monitor well locations, water quality data based on pre- mining conditions for use in establishing groundwater restoration targets, and hydrologic test data that shows connection between production wells and production zone monitor wells. The permit and PAA 4 were issued and mining began in 1986. Mining continued until 1987. Restoration, using groundwater sweep and reverse osmosis, was **from 1987 to 1997**.
USX is requesting amendment of the restoration table under 30 TAC §331.107(f)(2). The proposed amendment would change restoration table values specifying groundwater constituent concentrations for arsenic, calcium, iron, manganese, magnesium, molybdenum, potassium, alkalinity, ammonia, chloride, conductivity, sulfate, TDS, radium 226, uranium. These values are to be met by the permittee (USX) to achieve successful restoration of the mined aquifer in PAA 4. The proposed values will not change the use category of the water. The average water quality present before mining exceeded the TNRCC and EPA primary drinking water standard for radium-226. The Burns/Moser site is in Live Oak County approximately ten miles southwest of George West, west of U.S. Highway 59 in the Jacob Cook Survey 171, A-142 and Wesley Sellman Survey 60, A-416. The facility is an in situ uranium mine in the Lower

Oakville Formation, 230 to 280 feet below the surface." (TNRCC Items Signed by Executive Director 4 December 1998 - emphasis added)

U.S. Steel - Clay West, Texas

License termination

The Texas Department of Health (department) gives notice that it has terminated uranium by-product material license L02449 issued to USX Corporation. (Texas Register May 10, 2002)
A written hearing request must be received, from a person affected, **within 30 days from the date of May 10, 2002**.

Release for unrestricted use

The Clay West wellfield patterns area was released for unrestricted use. (Texas Register July 13, 2001)

Relaxed Groundwater Standards

"USX Corporation: Texas Uranium Operations (USX) for a modification to Production Area Authorization (PAA) UR02130-011, Clay West mine. A PAA is issued as part of the base permit (UR02130-001) to approve the initiation of mining activities in Production Area 1 within the permit area. The PAA application contains monitor well locations, water quality data based on pre-mining conditions for use in establishing groundwater restoration targets, and hydrologic test data that shows connection between production wells and production zone monitor wells. The permit and PAA were issued and mining began in December 1977. Mining continued until February 1984. Restoration, using ground-water sweep and reverse osmosis, was from March 1981 to May 1997.
USX is requesting amendment of the restoration table under 30 TAC §331.107(f)(2). The proposed amendment would change restoration table values specifying groundwater constituent concentrations for calcium, magnesium, potassium, bicarbonate, sulfate, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, and uranium, which are to be met by the permittee (USX) to achieve successful restoration of this site's mined aquifer in PAA 1. The proposed values will not change the use category of the water. The average water quality present before mining exceeded the TNRCC and EPA primary drinking water standard for radium-226. Before mining commenced, the water in the production area was used for rural domestic, livestock, and industrial purposes. The Clay West site is in Live Oak County approximately eight miles southwest of George West, west of U.S. Highway 59 in the J. Poitevent Survey 67, H. and G.N. R.R. Survey 69, and H. and G.N. R.R. Survey 71. The facility is an in situ uranium mine in the Lower Oakville Formation, at 250 to 400 feet below the surface, undergoing groundwater restoration." [TNRCC Items Signed by Executive Director September 18, 1998 - emphasis added]

Westinghouse - Bruni, Texas

License violations at Bruni ISL restoration site

Radioactive Material Spill - Cogema Mining, Inc. - Bruni, Texas

"On May 11, 1998" [obviously should read 1999] ", the Licensee notified the Agency of a 2000 gallon" (7.6 m^3) "spill of 11.7 parts per million uranium impregnated restoration water due to the failure of a 1" nipple and union on the well field pipe. The spill spread over approximately 1,800 square feet" (167 m^2) "within a restricted area."

[SUMMARY OF INCIDENTS FOR SECOND QUARTER 1999, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Cogema Mining, Inc. - Bruni, Texas
"On May 26, 1998, the Licensee notified the Agency of a uranium spill involving approximately 8,000 gallons" (30 m^3) "of restoration flow solution containing 7.4 parts per million uranium that occurred on May 21, 1998. The spill was caused by a failure at a pipe connection and was contained within the licensed area."
[SUMMARY OF INCIDENTS FOR SECOND QUARTER 1998, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Cogema Mining, Inc. - Bruni, Texas
"On May 4, 1998, the Licensee notified the Agency of a uranium spill involving approximately 20,000 gallons" (76 m^3) "of restoration flow solution containing 8.6 parts per million (5.7 microcuries per gram) uranium that occurred on May 2, 1998. The spill was caused by the failure of a saddle on the lateral line and was contained within the licensed area."
[SUMMARY OF INCIDENTS FOR SECOND QUARTER 1998, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Cogema Mining, Inc. - Bruni, Texas
"On February 5, 1998, the Licensee notified the Agency of a uranium spill involving 2500 gallons" (9.5 m^3) "of disposal well fluid containing 7.2 parts per million uranium that occurred on February 4, 1998. The spill occurred at a waste retention pond transfer pump and was contained in the licensed area."
[SUMMARY OF INCIDENTS FOR FIRST QUARTER 1998, Texas Department of Health, Bureau of Radiation Control]

Uranium Spill - Westinghouse Electric Corporation - Bruni, Texas
"On December 15, 1997, the Licensee notified the Agency of a uranium spill involving 3000 gallons" (11 m^3) "of restoration solution containing 5.0 parts per million uranium that occurred on December 13, 1997. Cold weather caused a pipe to break resulting in the spill. The spill covered approximately 7350 square feet."
[SUMMARY OF INCIDENTS FOR FOURTH QUARTER 1997, Texas Department of Health, Bureau of Radiation Control]

West Cole, Texas

Application for relaxed groundwater standards (Production Area No. 2)

"COGEMA MINING, INC., West Cole Mine Paa 2, P.O. Box 228, Bruni, Texas 78344, an in situ uranium mine undergoing ground water restoration, has applied for a restoration table amendment to a production area authorization UR02463-021. The West Cole mine is in Webb County 40 miles east of Laredo and two miles north of Bruni on the west side of Farm Road 2050. Mining started in West Cole Production Area No. 2 in January 1982. Restoration began in December 1989 using groundwater sweep, reverse osmosis, and injection of water from an underlying aquifer. Since restoration started, 19.01 pore volumes or approximately 181 million gallons" [0.685 million cubic meters] "of aquifer water have been removed. One pore volume equals 9.6 million gallons. The proposed amendment would change the restoration table in accordance with 30 TAC 331.107." (Texas Register June 4, 1999 - emphasis added)

Relaxed Groundwater Standards (Production Area No. 1)

Excerpt from: TEXAS NATURAL RESOURCE CONSERVATION COMMISSION: June 27, 1997, ITEMS FOR EXECUTIVE DIRECTOR SIGNATURE - emphasis added
HAZARDOUS WASTE PERMITS

Item 18.
"COGEMA MINING, INC. for an amendment to the production area authorization for Production Area No. 1 under existing Permit No. UR02463-011 (West Cole Mine Site). The proposed amendment would revise restoration values for calcium, magnesium, sodium, potassium, bicarbonate, TDS, conductivity, alkalinity, selenium, uranium, molybdenum and radium-226. The proposed values will not change the use category of the water. Prior to mining, the water in the production area was used for livestock. The West Cole Project is located in Webb County, Texas, approximately 40 miles east of Laredo and approximately two miles north of Brunion on the west side of Farm Road 2050. The production zone is the Soledad member of the Catahoula formation at a depth of appoximately 225 to 270 feet."

SIGNED JUNE 27, 1997

SURFACE IRRIGATION AT THE
EVEREST EXPLORATION, MT. LUCAS IN-SITU SITE

By The Texas Energy Aliance

(This report was written several years ago. The current standing of the site is unknown.)

On October 1983, Everest Exploration was illegally given permission to begin an untested concept for disposing untreated radioactive wastewater from their Mt. Lucas Insitu uranium mine on Lake Corpus Christi. This experiment allowed Everest to economically dispose of its process plant waste stream by simply spraying it on top of the ground. For three years, until April, 1986, Everest surface irrigated a 22.5 acre plot located less than 900 feet from the shoreline of Lake Corpus Christi. Today, levels of radioactivity in the soil are 47 times above normal, this is 6 times above the limit allowed by the Mt. Lucas License.

In some areas the levels have risen to 173 times above normal. Half of the irrigation water used at the site has percolated into the water table. Government experts have expressed their concern about surface and ground water pollution.

In March 1986, Everest was again given permission to begin irrigating on a new 83-acre plot adjoining the original site. The permit was granted by the Bureau of Radiation Control against the advice of the agency's own experts.

Currently Everest Minerals is attempting to convince the Bureau of Radiation to raise the pollution limits for the site so they will not be in violation of the law.

Enclosed are letters from the Bureau of Radiation Control license files and an excerpt from the 1986 Mt. Lucas Environmental Assessment Report. The agencies personal express their concerns for the public's safety and they question the legality of the surface irrigation. It is apparent after reading the files and interviewing individuals at the Bureau that surface irrigation is a dangerous practice and it should never have been allowed

To understand the many problems with this site, it is necessary to explain how this situation came about.

Mt. Lucas mines for uranium using the "insitu" method. This process injects solvents into underground ore deposits in order to unlock the uranium and make it mobile enough to be sucked out of the ground for processing. The insitu process creates a stream of radioactive wastewater that must be disposed of.

The Mt. Lucas license required that Everest use deep well disposal at the site but Everest proposed to use surface irrigation instead in order to save money. The Texas Department of Water Resources and the Texas Department of Health, Bureau of Radiation Control apparently granted permission (See exhibit A).

Apparently it was some time before the Bureau of Radiation Control inspected the site. They reported the company was irrigating with wastewater containing high levels of radioactivity, up to 8,000 pCi/I (picocurries per liter). In August 1984, agency personnel found gamma radiation levels in the test plot of 20 to 60 uR/hr compared to 9uR/hr average background.

Two years later, the agency discovered that the company had failed to adequately monitor for migration of radioactivity into the groundwater. Joseph Thiel, Director of Environmental Programs, and Stephen Eiter, Hydrological/Geotechnical Programs, estimated that roughly 50% of the irrigation water had become part of the shallow ground water (Exhibit B, page 5 and 16).

The 1986 Mt. Lucas Environmental Assessment Report states that contamination of surface water, especially Lake Corpus Christi, is difficult to access (Page 142 and 143). Information about shallow aquifers is limited but reportedly "There are waterbearing units within a few tens of feet of the land surface at Mt. Lucas." These ground water levels vary with the water level of the lake.

Joseph Thiel expressed concern over the lack of surface runoff control from the site (Exhibit B, page 6, par. 9). The 1986 Environmental Assessment Report states the berm built to protect Lake Corpus Christi from the test plot is devoid of vegetation and is susceptible to erosion. The emergency gates were partially buried from disuse. The same environmental report states, "In the long term, movement of contaminated sediments down slope into the surface water drainage network is inevitable". In other words waste was migrating toward Lake Corpus Christi.

During a site visit in December 1984, TDH personnel discovered Everest had cut and bailed the radioactive hay growing on the test plot (Environmental Assessment Report, 1986). The company was in the process of shipping and storing the bailed hay at its Hobson Facility in Falls City, Texas, with the intention of using it for feeding cattle. Plants easily take up radioactivity and cattle are bio-accumulators of radioactive materials.

From 1983 to 1985 it appears the Bureau gave Everest Exploration the responsibility for acting as its own environmental watchdog.

In 1985, Everest expressed interest in expanding the size of the irrigation beyond the original 22.5-acre experimental plot. An interoffice memo by concerned agency personal (see Exhibit B page 2) explained the legality of the original site was in question for two reasons:

1) The Texas Department of Health never gave permission for irrigation at the site, and

2) The Mt. Lucas License (Lic. No. 83068, Par.16) specifically required disposal of liquid waste by deep well injection.

Two months later, the legal counsel of the Bureau of Radiation Control informed the agency that the Everest irrigation project was in violation of its license (Exhibit B, page 8).

On October 3, 1985 the Bureau amended the Mt. Lucas license to include liquid waste disposal by irrigation on the 22.5-acre site. The legality of this action remains to be explained by the Bureau.

This amendment also sets a 5pCi/g radium 266 limit for allowable radioactive pollution levels in the soil at the site. The average radium content in the soil across the nation is .6 pCi/g. Excess above the .5pCi/g limit requires remedial action. Current studies show that the average radium 226 levels in the soil at the site is 27 pCi/g, 6 times above the limit (Exhibit C, Page 10). Portions of the site contain levels of radium 20 times above the limit (Exhibit C, page 16). This means 22.5 acres of soil must be dug up and transported to a site licensed for radioactive waste. The only site in Texas licensed for this is the Conquesta site in Falls City, Texas, and it will probably be closed in the near future because of lawsuits and site problems.

In October 1985, Everest Exploration met with the Bureau to discuss the irrigation process used at the site. The Bureau authorized the pretreatment of the wastewater to remove excess radioactivity. Limits for radioactivity in the irrigation water were set at 400pCi/l. <u>IT IS IMPORTANT TO REALIZE THAT CURRENT ENVIRONMENTAL PROTECTION AGENCY LIMITS FOR SURFACE DISCHARGE FROM URANIUM INSITU MINES IS SET AT 10 pCi/l.</u>

It is noted that Joseph Thiel, Director of Environmental Programs, requested the record reflect that he did not approve of the 400pCi/I authorization (Exhibit B, page 12, par. 1). Mr. Thiel also noted that Everest's proposal for an 83-acre extension to the original 22.5-acre irrigation project was probably two to four times too small because of underestimation of pumpage, high discharge concentration of 400pCi/l irrigation water, and inadequate pretreatment design (Exhibit b, page 13, par. 7). The meeting closed with the vicepresident of Everest Minerals stating that Bermuda grass would be planted so that cattle could be grazed on the area. (Exhibit B, page 13, par. 7). Increasing radiation in the food chain is unacceptable.

A week later, Stephen Eiter, Hydrological/Geotechnical Programs, in an interoffice memo, echoed Theil's opposition to surface irrigation and asks whether the Texas Water Commission should determine whether or not water percolating downward from irrigation and recharging groundwater deserves protection under the law. (Exhibit B, page 15, par. 5) Eiter states he is fundamentally opposed to the wholesale "dilutionisthesolution" philosophy of surface irrigation. He goes on to argue Everest Minerals' apparent lack of public responsibility.

In November, Thiel states aerosolization/evaporation of irrigation wastewater at 400pCi/I of radium266 could contribute significantly to public exposure to radioactivity. (Exhibit B, page 20, par. 1).

Other officials in the Bureau added their concern to the license file: Timothy Dziuk, Environmental Assessment Branch; Gary Smith, Radiological Assessments Program; Mary Shannon, Ecological Evaluation Program; Warren Snell, Uranium and Nuclear Waste Management Program.

Expansion of the irrigation plot from 22,5 acres to a total of 105 acres was granted in December 1985, as an amendment to the Mt. Lucas license.

The expansion permit was granted against the expert advice of the staff and agency personnel felt the top management of the Bureau of Radiation Control and the Texas Dept. of health were hindering the professionalism and quality of their work.

The agency granted a permit for expansion before any indepth studies were completed on the original 22.5-acre plot. Analysis of the site in December 1985 (Exhibit C, page 1) showed radium266 contamination to be 4 to 93 times higher than the 5pCi/g limit set by the license amendment. Contamination was shown to spread beyond the 22.5-acre plot. Irrigation water showed radium266 levels of 1420 pCi/g and contained a uranium concentration of 17,900 pCi/q. For comparison, the E.P.A. limits for surface discharge of radium and uranium are 30 pCi/I and 4 mg/l (40 CFR 440 daily maximum). In October 1986 irrigation water showed levels of uranium at 41,400 pCi/g (Exhibit C, page 14).

In February, March, and September of 1986 inspectors noted irrigation water flowing south out of the irrigation plot and draining close to the dike and the lake (Exhibit c, page 6,7). Cattle with calves and large flocks of geese were observed feeding in this area. Radium levels were above the 5pCi/g limit. In September, an inspector noted that Everest had begun to plow an area outside the irrigation plot, toward the lake. The Bureau allows Everest to plow the irrigation area in order to mix radioactive hot spots over a large area. But Everest was plowing outside the site in an attempt to lower the radium levels that have migrated off site.

The permit for enlargement of the irrigation plot required that the radioactive wastewater meet the 400pCi/I limit for radium266. Everest decided to use two barium-settling ponds at the site in order to help lower the radiation levels in the fluids before irrigating it on the ground (the cheapest form of treatment). Settling time ranges from 2 to

60 days. The agency did not require the company to install a synthetic liner under the pond, against the wishes of Joseph Thiel (Exhibit B, page 12, par. 2). As pointed out by the Environmental Assessment Report, 1986, Everest Minerals did not follow the license requirements when they built the settling ponds. No testing for subsoil type, permeability, depth to groundwater, sampling, or laboratory testing was performed. The agency has estimated the subsoil under the ponds to be sandy with high permeability, and the base of the pond will be within 5' of an unconfined water table (page 137, par. 7). The clay liner of the ponds (5' from the aquifer) will eventually contain very high levels of concentrated radium and uranium that have settled out of the irrigation water.

The report also states that irrigation will create adverse impacts on soil waters, and to a lesser extent local air quality. Irrigation will result in an increased potential for contamination by direct runoff, leaks from pipelines, contaminated sediment from irrigated areas, movement of contaminated groundwater into the surface water system.

This 105-acre irrigation dumpsite will remain radioactive for thousands of years and an environmental and biological threat to present and future generations. Corpus Christi and 38 communities depend on Lake Corpus Christi as their only source of water. Questions of groundwater pollution, surface runoff, air quality, and plant process integrity still remain unanswered.

It is our opinion that this entire situation has been a massive bureaucratic mistake, Everest Minerals should be responsible for the damage created to the environment and Corpus Christi's drinking water, and their license should be revoked and the Mt. Lucas uranium mine shut down.

Addendum:

In June 1987, the Bureau of Radiation Control discovered that Everest Exploration's Mt Lucas plant had not removed the clay liner of its barium sediment pond for disposal. The permit required the liner to be removed yearly because radioactive particulates settle out of the waste stream onto the pond bottom and the clay liner builds up high levels of radioactivity. This must be disposed at a licensed nuclear dump.

In August the bureau discovered that Everest use the wrong type of clay to build the liner of the sediment pond (against the advise of the Bureau). The French drain monitor system under the pods had been showing elevated continuous leaking out of the ponds since May 1987.

The sediment ponds are built on top of highly permeable sands and the bottom of the ponds are 5' above the water table. This water table rises and lowers with the level of the lake showing that it is connected to the lake. These ponds are located 900′ from the shoreline of the lake.

No action has been taken because the Bureau says the responsibility belongs to the Texas Water Commission.

TEXAS DEPARTMENT OF HEALTH
Bureau of Radiation Control
Division of Compliance and Inspection
1100 West 49th Street
Austin, Texas 78756-3189

Compliance No. L870655

*** NOTICE OF VIOLATION ***

LICENSEE/REGISTRANT

Everest Exploration, Inc.
Attn: Mr. Lawrence C. McGonagle
P.O. Box 1339
Corpus Christi, Texas 78403

DATE OF NOTICE

June 18, 1987

DATE OF INSPECTION

May 13, 1987

INSPECTOR(S)

Thomas C. Cardwell

LICENSEE/REGISTRANT REPRESENTATIVE

Michael Lueders, Plant Supervisor

INSPECTION LOCATION

Mt. Lucas Project
3 miles south of Dinero, Texas

STAFF REVIEWER

Myrl E. Wilson

Please refer to the above COMPLIANCE NUMBER when responding to this notice.

The following violation was found during the inspection of operations under License No. 8-3068:

Violation of License Condition 16.b.2.:

The solids and sludge have not been removed from the treatment ponds at intervals that do not exceed one year. (The treatment ponds were placed in operation in April 1986.)

This is a Severity III Violation.

bcc: File, Inspector's File (Region - Austin), Board, Compliance, RLG
MEW: emr

Addendum: Current status

The following IN-SITU closure information comes from the WISE Uranium Project web site at: http://www.wise-uranium.org/uisl.html#RECLAMPROJ and http://www.wise-uranium.org/udusail.html. (last updated on 11/5/06).

Mt. Lucas, Tex-1, and Hobson, Texas

State issues Agreed Order replacing Emergency Order for cleanup of uranium in-situ leach sites

"On February 25, 2002, the director of the Bureau of Radiation Control (bureau), Texas Department of Health, approved the settlement agreement between the bureau and Everest Exploration, Inc. (licensee-L03626) of Corpus Christi. The licensee has agreed to conduct specified decontamination and decommissioning activities at the uranium processing facilities located at its Hobson, Mt. Lucas and Tex-1 sites no later than July 15, 2002. The Agreed Order substitutes for the Emergency Order issued by the bureau to the licensee on January 14, 2002." (Texas Register Mar. 22, 2002, notice)

BRC authorizes soil homogenisation at irrigation sites

"The Texas Department of Health (department) gives notice that it has amended uranium by-product material license L03626 issued to Everest Exploration, Incorporated (mailing address: P.O. Box 1339, Corpus Christi, Texas, 78403). Amendment seven authorizes the licensee to remediate three former irrigation projects utilizing soil homogenization, and updates standard conditions.
The department's Bureau of Radiation Control, Division of Licensing, Registration and Standards has determined, pursuant to 25 Texas Administrative Code (TAC), Chapter 289, that the licensee has met the standards appropriate to this amendment. [...]" (Texas Register, March 8, 2002)

A written hearing request must be received, from a person affected, **within 30 days from March 8, 2002**.

State issues Emergency Order to Everest Exploration, Inc. for cleanup of uranium in-situ leach sites

"Notice is hereby given that the Bureau of Radiation Control (bureau) ordered Everest Exploration, Inc. (licensee-L03626) of Corpus Christi to immediately complete decontamination and decommissioning of the uranium processing facilities located at its Hobson, Mt. Lucas, and Tex-1 sites. The bureau determined that failure to timely and adequately decommission these facilities constitutes an emergency that requires immediate action to protect the public health and safety and the environment. [...]" (Texas Register Feb. 8, 2002, notice)

State issues notice of violation and proposal to assess an administrative penalty of $100,000

"Notice is hereby given that the Bureau of Radiation Control (bureau), Texas Department of Health (department), issued a notice of violation and proposal to assess an administrative penalty to Everest Exploration, Inc. (licensee-

L03626) of Corpus Christi. A total penalty of $100,000 is proposed to be assessed to the registrant for alleged violations of 25 Texas Administrative Code, §§289.252 and 289.260. [...]" (Texas Register Sep 21, 2001)
Note:
25 TAC §289.252: Licensing of Radioactive Material
25 TAC §289.260: Licensing of Uranium Recovery and Byproduct Material Disposal Facilities

Hobson, Texas

Texas Commission on Environmental Quality considers Agreed Order imposing $41,500 penalty with $40,900 deferred on violations at Hobson

"Texas Commission on Environmental Quality
Enforcement Orders
An agreed order was entered regarding Everest Exploration, Incorporated, Docket No. 2001-0828-UIC-E on May 16, 2003 assessing $41,500 in administrative penalties with $40,900 deferred.
Filed: May 27, 2003" (Texas Register June 6, 2003)

Texas Commission on Environmental Quality issues Agreed Order imposing $600 penalty on violations at Hobson

"UNDERGROUND INJECTION CONTROL ENFORCEMENT AGREED ORDER
Item 23. Docket No. 2001-0828-UIC-E. Consideration of an Agreed Order assessing administrative penalties and requiring certain actions of Everest Exploration, Incorporated in Karnes County; TCEQ Waste Disposal Well Permit No. 168; for underground injection control violations pursuant to chs. 7 and 27 of the Tex. Water Code and the rules of the Texas Commission on Environmental Quality. (Laurencia Fasoyiro, Gloria Stanford)
Issue agreed order, RM/KW. All Agree" (TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, Marked Agenda May 14, 2003)

"Notice of Opportunity to Comment on Settlement Agreements of Administrative Enforcement Actions
[...]
(1) COMPANY: Everest Exploration, Incorporated;
DOCKET NUMBER: 2001-0828-UIC-E;
TCEQ ID NUMBER: 168;
LOCATION: approximately one mile south of Hobson along Farm-to-Market Road 81, Karnes County, Texas;
TYPE OF FACILITY: uranium production;
RULES VIOLATED:
TCEQ Waste Disposal Well Permit Number 168, Sections XII. C - E, by failing to inspect the pond liner and pond monitor well on a weekly basis, the dikes on a quarterly basis, and the pond freeboarding and piping on a daily basis, and failing to notify the executive director when the freeboard decreased to less than two feet;
30 TAC §331.64(f)(1) and TCEQ Waste Disposal Well Permit Number 168, Section VIII.A and H, by failing to monitor the annulus fluid levels and the corrosion of the well materials;
TCEQ Waste Disposal Well Permit Number 168, Section V.D. by failing to measure the specific gravity of the injected waste at 78 degrees Fahrenheit;
30 TAC §331.64(c), and TCEQ Waste Disposal Well Permit Number 168, Section VII.A, by failing to maintain continuous recording devices in proper operating condition;
30 TAC §331.64(c)(1), by failing to install an automatic alarm system at the well designed to sound and shut-in the well when pressures and flow rates exceed range and/or gradient specified in the permit;
30 TAC §331.63(f), by failing to calibrate gauges, pressure sensing devices, and recording devices on a quarterly basis;
30 TAC §37.21 and §37.201(c), by failing to revise its trust agreement to conform to the wording requirements of 30 TAC §37.301(a) and (b);
PENALTY: $600;
STAFF ATTORNEY: Laurencia Fasoyiro, Litigation Division, MC R-12, (713) 422-8914;

REGIONAL OFFICE: San Antonio Regional Office, 14250 Judson Road, San Antonio, Texas 78233-4480, (210) 490-3096." (Texas Register March 14, 2003)

Hobson In Situ Leach mine (Texas)

License Renewal for Everest Exploration Hobson In Situ Leach mine (Texas)

"Everest Exploration for renewal of an Underground Injection Control (UIC) Well, Permit No. WDW-168. The Executive Director has prepared a draft permit.
The applicant currently operates an in-situ uranium mine. Wastes generated on-site are non-hazardous. The injected wastes include: barren solution bleed, restoration waste stream, process waste streams, and tailings or wastes produced by or resulting from the extraction or concentration of uranium, other associated wastes such as ground water and rainfall contaminated by the above authorized wastes, spills of the above authorized wastes, and wash waters and solutions used in cleaning and servicing the waste disposal well system equipment which are compatible with the permitted waste streams, reservoir and well materials. WDW-168 was initially put in service in 1979. The facility is located 0.5 mile southwest of Hobson on Farm-Market Road 81, Karnes County, Texas.
SIGNED MAY 7, 1999" (TNRCC Items Signed by Executive Director 7 May 1999)

Everest Exploration Company Links

(last updated 11 Jan 2006)

Everest Exploration, Inc.

Head Office

Everest Exploration, Inc.
500 N Water St
Corpus Christi, TX 78471
USA
Tel. +1-361-883-2831

Other Offices

Everest Exploration, Inc.
1 1/2 Mile Farm-Market Road 81
Hobson TX 78117

USA
Tel. +1-830-780-3377, Fax: +1-830-887-7301

Subsidiaries

- 1% - Hobson uranium processing plant, Texas
- 1% - Palangana Mine Property, Texas
- Las Palmas, Texas
- Mt. Lucas, Texas
- Tex-1, Texas

Uranium Mine Ownership – USA

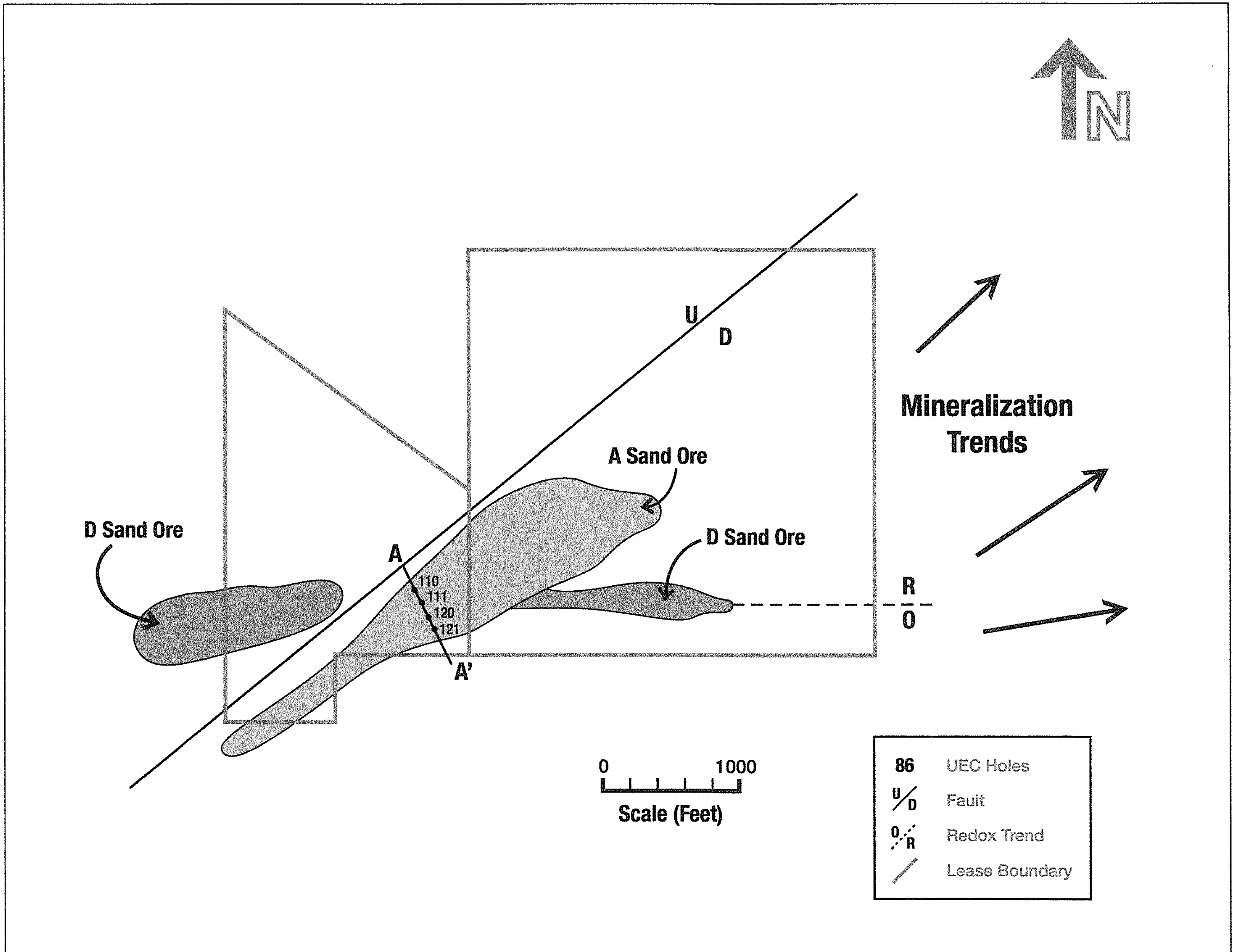
Hobson uranium processing plant (ISL), Karnes County

TNRCC Permit No. WDW-168

South Texas Mining Venture, LLP

- 99% - URN South Texas Project, Ltd.
- 1% - Everest Exploration, Inc.

UEC GOLIAD PROJECT



JEFF SIBLEY
414 MADISON
SAN ANTONIO, TX 78204

OFFICE OF THE CHIEF CLERK, MC 105
TCEQ
P.O. BOX 13087
AUSTIN, TX 78711-3087

6

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: JEFF SIBLEY

Mailing Address: 414 MADISON

Physical Address (if different):

City/State: SAN ANTONIO TX **Zip:** 78204

This information is *subject to public disclosure under the Texas Public Information Act*

Email:

Phone Number: 512-497-7413

- Are you here today representing a municipality, legislator, agency, or group? ☒ Yes ☐ No

  If yes, which one? TEXAS ENERGY ALLIANCE

☐ **Please add me to the mailing list.**

☒ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

URANIUM MINING IN TEXAS

Overview of Mining in Texas

In 1954, a San Antonio oil company was using an airplane to prospect for minerals over the mesquite and cactus terrain of south Texas. During one of the flyovers, the onboard radiometric instruments detected an unusual radiation spike. Once on the ground they were able to narrow the location to a small, brushy patch of farm land just west of Falls City, Texas. To their surprise, the Geiger counter buzzed with activity. On further testing, they discovered that commercial ore-grade uranium existed just a few feet below the surface. This shallow location was unusual because uranium ore is usually found deep underground, not on the surface. Apparently the soils in this area had eroded away over time and exposed the ore.

This site became the Susquehanna mine, the first uranium mine in Texas. Although it was the only place in Texas where uranium was found on the surface, the discovery created a wild "gold rush" fever over the possibility of uranium so plentiful that it could simply be picked off the ground. Lone prospectors, wildcat oilmen, and large energy corporations began frenzied exploration in an effort to stake their claim. They hastily cobbled together makeshift mining operations with little understanding the dangers posed by uranium mining. This era has become known as Texas' second "Spindletop" boom but because of the secret nature of the uranium industry, the public heard little of this activity.

Uranium Mining Sites in Texas.

During the early days of the nuclear age, little was known about the dangers of radioactivity. This was the "cold war" era and the fear over national security was very real. The government retained ownership of uranium in the US and controlled its mining by setting the ore's price. In order to insure the atomic bomb program, the Federal government strictly enforced the National Security Act. This Act stifled public information and limited research on radiation health effects. A special branch of the Federal government actively worked to defeat public lawsuits over nuclear issues. With direct help from the government the mines prospered in secrecy for the first 26 years. Free from public scrutiny and

government regulations, approximately 19 uranium strip mines operated in the state during this time. Very little is known about these early companies or their operations.

Over time, large-scale environmental damage occurred as the companies used the environment to work out their engineering kinks. These abuses increased until public outrage forced the state to pass legislation in 1975 creating government oversight of uranium mining in Texas. The law provided some very needed protection by establishing state agencies to regulate the industry but it did not address any of the problems that had been created by mining. Instead the law required that the state agencies figure out how to deal with the problems (see the "Inadequate Protection" section below). Unfortunately, by providing the specter of government oversight, the regulations served to pacify the public's concerns about uranium and this allowed the industry to use their political power to influence the agencies and continue to grow unabated.

The industry grew and their profits increased until 1984, when the market for uranium "yellow cake" ore crashed due to the decline of nuclear power plant construction and a flood of cheap ore from reprocessed Russian nuclear weapons. Because of the worsening market, many small companies sold out to large energy companies or formed alliances with foreign-owned conglomerates.

According to a report written by the Texas Department of Agriculture (TDA) in the 1990's, a total of 23 uranium-mining companies have operated in Texas. For the first time, this report gave some idea of the size of the industry:

1) Uranium mining operations covered 18 South Texas counties: Atascosa, Bee, Brooks, Duval, Goliad, Gonzales, Hidalgo, Jim Hogg, Jim Wells, Karnes, Kleberg, Live Oak, McMullen, Nueces, Starr, Webb, Wilson, Zavala.
2) 40 strip mine sites were permitted covering over 31,000 acres of land. This included four (4) uranium mill-tailings ponds.
3) 80 In-Situ mining sites were licensed. In-Situ is a new technology that uses surface wells to mine the aquifers with solvents. These sites contained 20,000 individual solution wells.
4) 32 deep well injection sites were permitted for the In-Situ mines in order to dispose of their radioactive waste and contaminates into deeper aquifers.

Current Status

The current energy crisis has created a new push for nuclear power plants. As a result, the price of uranium ore has increased over 500% in the last 5 years. Today, uranium fever has returned to South Texas with a vengeance. Uranium has become the new darling of Wall Street as promoters push uranium as the next get-rich-quick scheme. The exploratory drilling for new ore fields is in full gear. New mines are being permitted and long closed mines are being rushed into permit. New international players have entered the picture.

Foreign influences such as the French Government, have invested heavily in Texas because they need a dependable, non-third world source of fuel for their nuclear power plants. They have hidden their involvement in large multinational conglomerates. The French promote nuclear power as a safe source of energy but in reality, they are not paying the true cost of this technology. The uranium is mined and

refined here before being shipped abroad. This leaves behind massive amounts of perpetually radioactive wastes in the US.

Because of increasing lawsuits, the mining companies are now fully aware of their liability exposure and have become expert at hiding problems and corporation assets. The large energy companies (Mobile, Exxon, Gulf-Chevron, Conoco-Dupont) have closed down their mines and removed them as far as possible from the waste they have created. Chevron has transferred their entire uranium holdings to General Atomics, a company that specializes in "liability conveyance". By shifting ownership they have lowered their exposure to expensive lawsuits.

Mining Problems

A quick overview of the problems with uranium mining:

1) In Texas uranium ore bodies are found underground in aquifers. Here the radioactive and hazardous materials in the ore body are tightly locked up and unable to migrate. Mining exposes the ore to oxygen, which makes the uranium and its toxic byproducts mobile. *This migration threatens the aquifers of South Texas.*
2) Mining for uranium involves the removal of uranium oxide from an underground ore body. The ore body is composed of less than 2% uranium oxide. *The waste that remains after the uranium oxide is removed contains 98% of the radioactive and hazardous materials.* This includes thorium-232, potassium-40, and thorium 230, radium, radon, molybdenum, arsenic, selenium and other toxic and radioactive substances. This material is left behind in the environment.
3) Most strip mines pits were abandoned by the companies and left open to the environment for years. *The state spent over 10's of million of taxpayer dollars filling in abandoned uranium mine pits before the problem of oxidation and migration could be addressed.*
4) There were four uranium-processing mills that serviced the mines in South Texas. The mills used sulfuric acid to dissolve the uranium out of the ore. The radioactive acid waste was dumped into "tailings ponds" which were little more than aboveground enclosures made of mounded earth berms. The four tailing ponds now *contain over 27,000,000-tons of solid hazardous and radioactive waste and untold amounts of radioactive liquid waste*. The state allowed very dangerous out-of-state military and industrial waste to be dumped at these sites. The D.O.E. has expressed concern over the scope of the dumping and the levels of "hot" materials that were allowed.
5) Texas regulators allowed the Conoco-Conquista tailings pond to become the unregulated nuclear dump for the state of Texas. This site was never licensed and was in clear violation of the law because did not contain a suitable geology as required by Federal law; a shallow aquifer existed only feet below the bottom of the pond. Several states were allowed to dump their non-mining, "very hot" nuclear waste at the Conoco pond. Now that the Coquesta is closed this same waste is being sent to the "high level" nuclear site facility in Hanford, Washington.
6) Many more millions of tons of hazardous liquid chemicals were dumped into these tailing ponds but the exact amount of fluids is unknown because the companies were not required to

keep accurate records. All the ponds have leaked and most of the radioactive liquids have entered into the aquifers.

7) The state regulatory agencies have not required the mining companies to properly isolate the nuclear waste stored in the tailings ponds. They have allowed the mining companies to simply cover these aboveground waste mountains with a few feet of clay as the only protection against the elements. This is in spite of the fact that Federal law requires that they meet a 100,000-year intrusion requirement. Further, in order to demonstrate proper enclosure, the Federal Government set the example by reclaiming the Susquehanna tailings pond at Falls City, Texas. This was the first reclamation in the state and includes both a clay cap and a rock bolder cap to help prevent intrusion over the 100,000-year period.
8) The state has not required any cleanup of the aquifers contaminated by the tailings ponds as required by the original mining permit.
9) Texas is the birthplace of the new uranium mining method called In-Situ mining. The technology uses water well technology to inject solvents into the aquifers where the ore bodies are found. The state licensed this technology without any independent studies showing that it was safe to operate. Instead they depended on company data as proof of the technologies dependability. Years later, this data turned out to be completely wrong but it was too late to change the rules because the industry was already too well established (see the "Bruni-Westinghouse" section below). Currently, *Texas has the largest concentration of In-Situ mines in the world.*
10) In-Situ mining oxidizes the uranium ore body the same way strip mining does (see lines 1 and 2 above). This toxic and radioactive material is free to migrate in the aquifers but unlike tailings ponds; this waste is unavailable for direct reclamation because it is located hundreds of feet underground where it is difficult to monitor or access.
11) The In-Situ mines are allowed to dispose of their nuclear waste with deep well injection into lower aquifers. Texas is the birthplace of deep well injection and today has the largest concentration of deep well injection sites in the world. Injection was originally used to dispose of salt water from oil wells but Texas has expanded the use to include the dispose of radioactive waste from uranium mines. Most states have outlawed deep well injection because it is inherently unsafe.
12) As if to insure that no one will find a problem, the regulatory agencies do not allow the monitoring of the aquifers below the In-Situ mining zone. Because of this, no one knows what damage has occurred to the deeper aquifers from deep well disposal.
13) So far, the state has allowed 32 of the In-Situ mines to close down without returning the aquifers to the original levels as required by their permits.
14) Five In-Situ mines were allowed to dispose of their radioactive waste by spraying it directly onto the ground even though the EPA and the employees of the state regulatory agencies opposed the practice. *One of these sites was on the shoreline of Lake Corpus Christi, the drinking water for a million people. The agency personnel estimated that 50% of the radioactive waste wound up in the shallow aquifer that was connected to the lake.*

Inadequate Protection

The state regulators police the industry by writing the rules that the industry has to operate under. These rules have to be continuously rewritten because of the continuous and ongoing problems that occur. This

patchwork of regulations reflects the industries' dangerous trial and error method of mining and demonstrates the problems that are inherent with this technology.

Once the rich ores are removed, the mines are no longer profitable to operate and the companies want to close them down but the ore bodies that remain are now oxidized and the underground waste remains mobile. It has become clear that there are no technologies available that can return the waste to its original lockup state. So far, the state has allowed 32 of the In-Situ mines to close down. *All of them have been allowed to close without returning the aquifers to the original levels required by their permits!* The early In-Situ sites, which used ammonia and acid solvents, were allowed to close down with basically no cleanup. The Bruni mine in Webb County was allowed to close down even though aquifer contained approximately 4,330 lbs of ammonia per 40 square feet of aquifer. The new In-Situ process tries to deal with this problem by using huge amounts of fresh water to flush out the remaining ore from the aquifer and then disposing of it by deep well injection. No only does this waste valuable fresh water aquifers but this technique has shown that it is not capable getting anywhere close to returning the aquifers to their original background levels. The underground geology is so complicated that ore remains in the aquifer, available for future migration.

Today, the agencies deal with these problems by simply changing the rules so that increased contaminate levels are allowed. This allows the companies to close the mines before any further increases in contamination can be noticed.

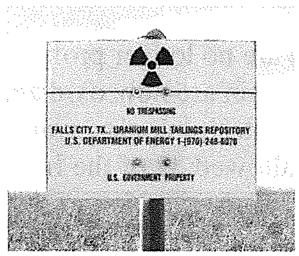
This waste will remain a threat for hundreds of thousands of years and *yet the state does not require any long-term monitoring of the aquifer so we can determine what level of migration are occurring!*

Because the cost of cleanup is so expensive, the regulatory agencies feel it is necessary to allow cheap, Band-Aid fixes in order to keep the companies from going bankrupt, thus saving the taxpayer the cost of cleanup. But time has shown that these easy fixes do not work and are simply postponing the problem to some future generation. This attitude reflects the agency's pro-nuclear stance. But more important, this illustrates how politically effective the industry has become at installing "business friendly" commissioners on the agency boards in order to enforce industry concerns. These commissioners have the ultimate power to affect agency policy but have repeatedly demonstrated their indifference to the public's concern.

Today the local public and their elected officials are fighting to stop new mines from being built but because the mining is occurring in rural areas with low populations, they cannot raise the political muscle to stop them. As a result, *the agencies have never denied a permit in 60 years of mining*.

Apparently the state agencies cannot decide whether their allegiance is to industry or the public. Their pandering to industry has resulted in the failure to protect the public and the environment. The government must stop propping-up this industry so that it can be exposed for what it really is: unsafe, unsustainable, and unprofitable.

A Warning



It has been suggested that nuclear power is the answer to our energy problems. This opinion is based on industry propaganda, not on facts.

•) The nuclear power generation is a piece of a 3-part cycle:
1) Mining and milling;
2) Nuclear power and bomb making;
3) High- and low-level waste disposal.

•) All these cycles produce waste that cannot be disposed of safely. Once created, the radioactivity cannot be turned off and remains a perpetual threat. Institutions, governments or religions will not last long enough to safeguard future generations from the waste.

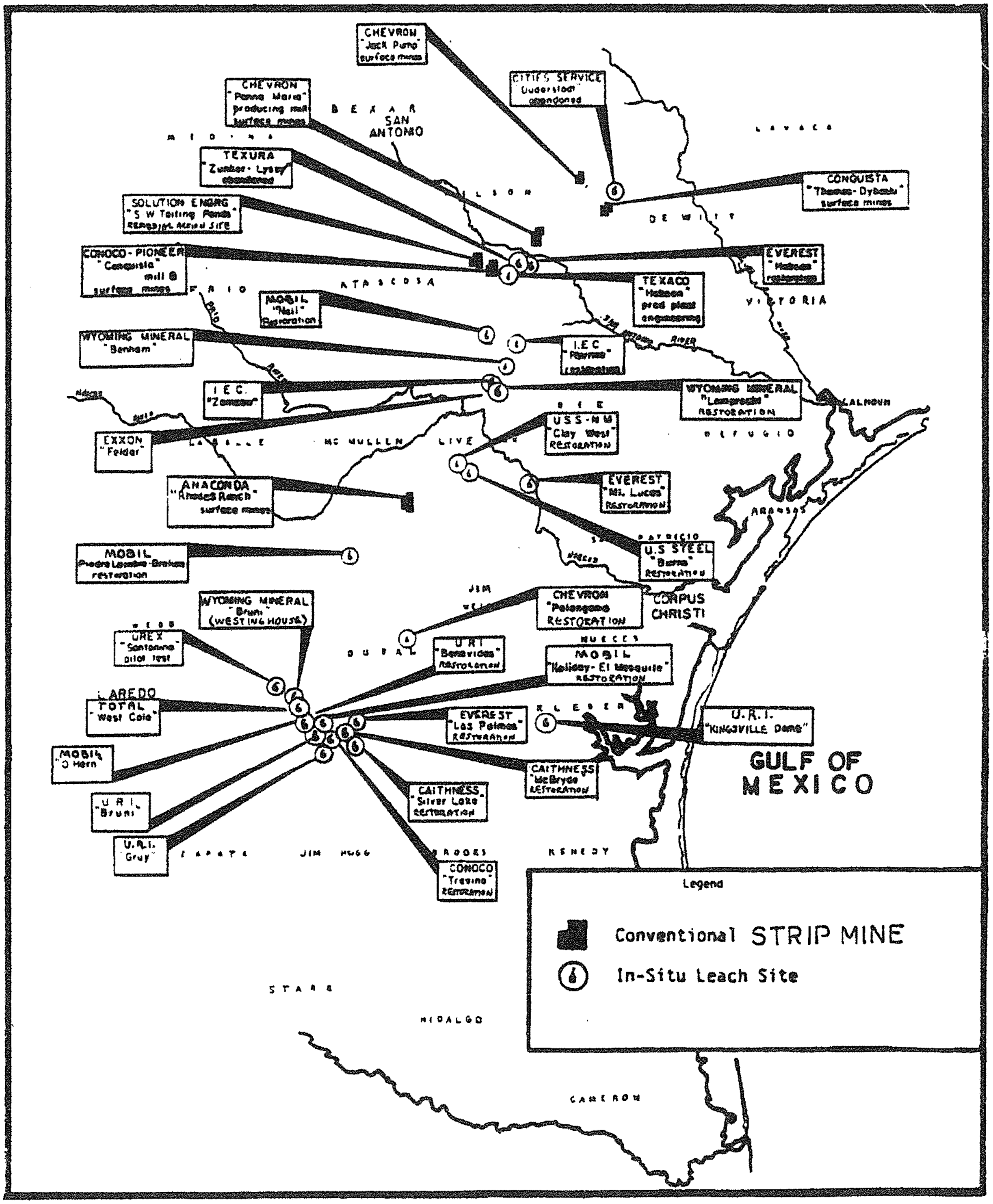
•) There is an estimated 7,000 radioactive contaminated sites in the U.S., containing 1,700,000,000,000 gallons of contaminated water and about 40,000,000-cubic meters of contaminated soil. It was estimated in 1999 to cost between $373 million and $1,694 trillion to cleanup these sites in the U.S. alone.

•) Some estimates say that there is less than 60 years of uranium left in the ground. To exchange a few years of nuclear power for hundreds of thousands of years of environmental problems makes no since especially when there are cleaner and safer alternative energies available.

The Navajo Nation in the four corners area (New Mexico, Utah, Colorado and Arizona) has set an example by banning uranium mining in 2005. This area has some of the richest uranium ore deposits in the world, as well as some of the worst uranium mining devastation.

Uranium mining is a boom and bust industry that provides few jobs and leaves behind enormous environmental problems. The hidden cost of mining far exceeds any perceived benefit. When considering energy sources for the future, it is important to remember:

If it is not sustainable, it's not a solution



Uranium Recovery Facilities

Table 9 - ISL Proposals, Trials and Mine Sites in Texas[1]

Site	Company	Notes & Status
Alta Mesa	Cogema Mining	Announced plans
Benavides	Uranium Resources Inc.	Wellfield undergoing restoration, plant decommissioning
Besar Creek	Rocky Mountain Energy	Early 1970's trial of sulphuric acid
Boots/Brown	U.S. Steel	Unknown
Bruni / Sulfur Creek	Westinghouse	Wellfield restored, plant decommissioning
Burns Ranch / Clay West	U.S. Steel	Wellfields undergoing restoration, plant decommissioning
Dunderstadt	Cities Service	Trial of sulphuric acid ISL, operated from 1969 to 1970.
Hobson / Gruy	Everest Minerals	Wellfield undergoing restoration, plant on standby
Holiday-El Mesquite	Malapai Resources	Wellfield undergoing restoration, plant on standby
Kingsville Dome	Uranium Resources Inc.	Operating facility
Lamprecht / ZamZow	Intercontinental Energy	Wellfield in restoration, plant decommissioning
Las Palmas	Everest Minerals	Wellfield restored, plant decommissioning
Longoria	Uranium Resources Inc.	Unknown
McBride	Caithness Mining	Unknown
Moser	U.S. Steel	Unknown
Mt Lucas	Everest Minerals	Wellfield undergoing restoration, plant decommissioning
Nell	Malapai Resources [3]	Unknown
O'Hern	Malapai Resources [3]	Wellfield and plant on standby
Palangana	Chevron (Union Carbide)	Unknown
Pawlik	U.S. Steel	Unknown
Pawnee	Intercontinental Energy	Unknown
Piedre Lumbre	Malapai Resources [3]	Unknown
Rosita	Uranium Resources Inc.	Operating facility
Santonino	Urex Inc.	Unknown (at trial stage in 1984)
Tex-1	Everest Minerals	Wellfield undergoing restoration, plant decommissioning
Trevino	Conoco Inc.	Unknown
West Cole	Cogema Mining	Wellfield undergoing restoration, plant decommissioning

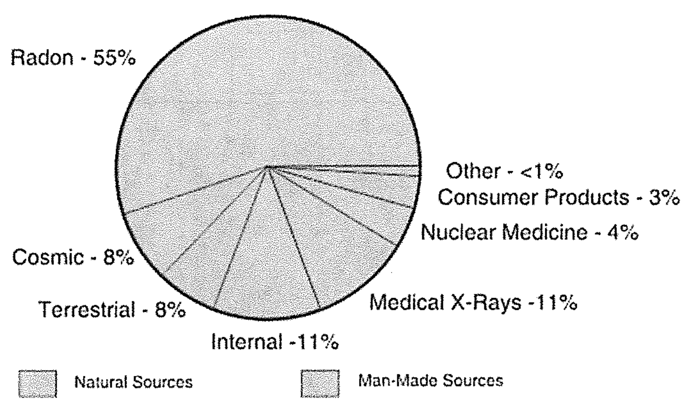
[1] - compiled from Charbeneau (1984), Larson (1981), USEPA 1995, Underhill (1992), Nigbor *et al.*, (1982), USDoE (1995), USDoE (1997) & USDoE (1998).

[3] - Exact current ownership unknown, assumed Malapai Resources acquired the sites when they bought out Mobil's interests in uranium (Moody, 1992).

What are the Environmental and Health Risk from Uranium Mining?

We are continuously exposed to small levels of radiation from our environment. The earth's crust contains an average of 3 ppm uranium and seawater contains approximately 3 ppb. This natural radiation is known as background radiation and it measures about 0.2 mrem (millirem per hour) of gamma radiation. It is important to understand that there is no safe level of exposure to radiation. Even at background levels, the EPA estimates that 10,000 to 30,000 people will die each year. Because radiation is invisible, it is necessary to remain aware of the danger in order to insure good health.

Sources of Radiation Exposure in the United States*

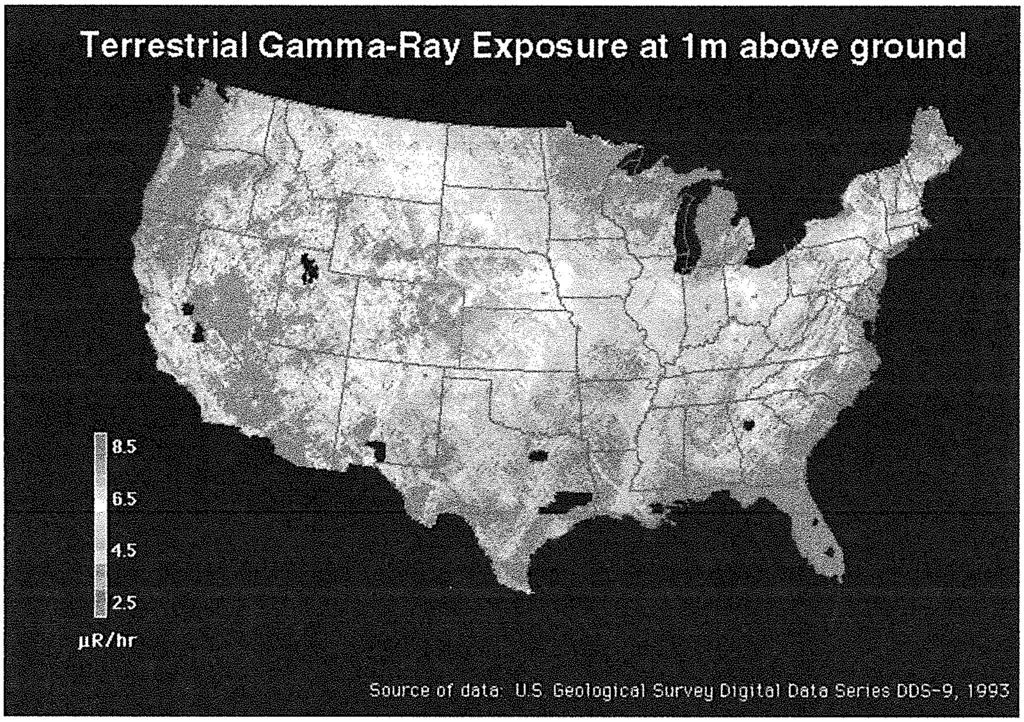


The industry continually stresses that because of the naturally occurring uranium ore bodies in South Texas, background radiation levels are naturally high and because of this, there is no increased health risk form mining. This is misinformation. It is important to realize several things about the South Texas background levels:

1) All aquifers contain small amounts of radioactive daughter products but in Texas, uranium rich deposits exists naturally in the aquifers because volcanic fly ash from exploding volcanoes in Mexico long ago that floated into Texas and covered the land several feet thick. This ash contained uranium and over the years, it washed into the streams or soaked into the aquifers where it was eventually flushed out to the Gulf of Mexico leaving the aquifers free of excess uranium. But in some areas in the aquifer, pockets of concentrated uranium remained because several unique conditions. These conditions tightly locked up the uranium and made it unavailable to migrate in the aquifer.

2) The undisturbed ore is usually buried more than 150' below the ground. The tons of earth that cover the ore form a perfect radiation shield. Environmental Assessments completed at

several mine sites before mining showed that surface background radiation levels are lower than the national average. At some sites the levels were *2 times lower* than national average. The following map shows that the South Texas has gamma radiation levels of 2.5 to 4.5uR/hr, generally equal to or lower than the average radiation levels of the United States. Living on top of an undisturbed ore body in South Texas can be safer than living elsewhere in the U.S in terms of exposure to surface levels of gamma radiation.



3) The migration of radioactive product in the aquifer around an undisturbed ore body can be very low. If these reduced areas had not tightly locked up uranium, they would have washed out to sea long ago. Assessments completed at mine sites before mining began show that the aquifer surrounding the ore is generally free of the high contamination levels that exist inside the deposit. The South Texas Bruni IN-SITU uranium mine permit application explained that "water movement is virtually nil in the ore body because elevated radium concentrations are found only in the ore body and not the aquifer around the ore".

Although the Bruni mine was a very rich uranium ore body, the levels of free, unlocked uranium in the groundwater before mining was very low. The average level of uranium in the ore field was between 0.21 mg/l and 0.331 mg/l. At 200' outside the ore zone the levels were less than 0.06 mg/l. Uranium mining unlocks ore body allowing the radioactive materials to migrate in the aquifer. *Once mining began levels rose to 150 mg/l outside the ore zone.* This illustrates how In-Situ mining creates high levels of migratory waste.

Problems occur when humans disturb the ore. For example, the town of Flatonia, Texas, east of San Antonio has municipal water wells that are drilled into pockets of elevated radioactivity. The water contains the highest concentrations of radon in Texas, as high as 9,000 pCi/l (Pico Curries per liter) of radon before treatment (the radon is easily removed in the city's water treatment plant). Oil field brines in Panna Maria, Texas, have shown radium content as high as 317 pCi/l (average radium levels in the soil for the U.S. is 0.6 pCi/l radium). Measurements at some natural gas processing plants have shown readings on the ground higher than 30 uR/hr (average South Texas levels are 2.5 to 4.5 uR/hr) because some of the gases processed at the plants have elevated levels of radioactivity.

Today, the most serious threat to radiation exposure is from mining, not from naturally locked up and undisturbed ore bodies. Tightly locked-up uranium ore bodies do little harm as long as the public is aware of their location and the uranium is left alone. Mining brings the ore to the surface where it becomes available for direct exposure to the public by wind, food, and water. After mining, the ore that remains in the aquifer will migrate causing a serious long-term invisible threat that is not easy to monitor or track.

How Low-Level Radiation Affects the Public

Low-Dose, Long-Term Exposures

Uranium mining exposes the public to radiation. Although high exposures do occur, most contact is in the form of low-levels of exposure over long periods of time. Current research shows that constant contact to low levels of radiation is proving to be the most deadly form of radiation.

Since the beginning of the nuclear age researchers have documented the biological threat of radiation but the knowledge that lowlevels of radiation could be dangerous has always been hotly debated and denied by the establishment. In fact, as mentioned earlier, the government has attempted to cover up and prevent radiation health studies in the interest of national security. According to many experts, the Federal bomb priority has probably resulted in the killing of more people than all the world wars.

Today, there is a large body of scientific evidence that supports the fact that low-level radiation causes damage. As far back as 1958 Nobel Laureate McFarland Burnet showed that the worldwide increase of leukemia in three and four year old children could only be caused by radiation exposure around the time of birth. He proved that the rapidly growing cells of the unborn fetuses were the most sensitive of all human cells to the mutagenic effects of radiation.

In 1968, Dr. Stoke and his coworkers at Oslo Cancer Hospital discovered that ingested or inhaled radioactivity, like that from fallout can be 1,000 times more effective at causing cell damage than external radiation exposure. He showed that extremely small internal doses of Strontium90, amounting to 10 to 20 millirads could produce visible damage to the blood forming cells of the bone marrow (average intake of radioactivity from food, water, and air in the U.S. is 24 millirems per year alpha, beta, and gamma). By killing cells and lowering the ability of the immune system to detect and destroy cancer cells, Dr. Stoke showed that bone cancer, leukemia, and other malignant neoplasm can result. This was the first evidence that radiation could destroy the body's immune system.

In 1971, Dr. Abram Petkau of the Whiteshell Nuclear Research establishment in Canada, conducted radiation studies of lipid molecules. These molecules are the principal structural component of all cell membranes. After experimenting with short exposures to high xray radiation, Dr. Petkau found that it took 3,500 rad to break apart and kill the cell membranes. But to his surprise he discovered that if the cells were exposed over a long period of time, it took only one rad of X-rays to kill the same cells. Dr. Petkau found that low-level radiation was more effective at creating unstable free radicals (a toxic negative ion) and these free radicals were the agents responsible for destroying the cells.

Dr. Petkau concluded that the longer the exposure, the smaller the dose needed to damage cells. Subsequent research by Petkau and others have demonstrated that this damage occurs even at levels that exist naturally in the environment. For the first time it could be said that there is no such thing as a safe exposure to radiation. EPA now estimates that 10,000 to 30,000 people die from these unavoidable background levels every year.

In 1990, the National Academy of Science released the "BEIR V" report, a peer reviewed publication considered the bible by both government and industry. The committee concluded that cancer and leukemia risk for the survivors of Hiroshima and Nagasaki were underestimated by a factor of three or four. The HiroshimaNagasaki study has been one of the cornerstones of the scientific communities' understanding for radiation health effects. The regulations for allowable radiation exposure of the public are based in large part on extrapolation from the Hiroshima data. The scientists have miscalculated and the routine environmental releases of radioactivity allowed by law at nuclear facilities could be 100 to 1,000 times too high, especially for infants.

BEIR V state that risks from diagnostic X-rays to be underestimated by a factor of five to six times. BEIR also relates scientific studies that show mental retardation, leukemia, and mortality increased with extremely small doses of radiation.

One very important study in BEIR V deserves further attention. A large British study by Dr. Alice Stewart covering 35 years and involving 16 million women came to the conclusion that *most childhood cancer and leukemia is probably the result of background and or manmade radiation. The study suggests that a fetus exposed to background radiation levels of 150 milli**rad** (normal background levels average 100180 milli**rem** per year) doubles the risk of that child dying of cancer or leukemia before age 15*. Children born to women who received even one abdominal x-ray during pregnancy were four times more likely to suffer childhood cancer as “post-birth defect”.

Childhood disease clusters have been found around many nuclear facilities:

1) Increases in childhood leukemia near reprocessing facilities in La Hague, France and at Sellafield in the British Isles and the Krummel nuclear reactor in Germany.
2) Childhood leukemia cases near Sellafield are associated with occupational exposure to the father before conception of the child. Increases in childhood leukemia also occurred Europe-wide after the passage of the Chernobyl radiation cloud.
3) Increases in childhood cancers have been found near nuclear operations in the Navaho Nation from uranium mining, Brookhaven, New York from nuclear weapons, and nuclear power stations in Oyster Creek, NJ and Clinton, Illinois.

4) Increases in Down syndrome are found near Yankee Rowe power station in Massachusetts.
5) Heart defects of various types have been associated with ionizing radiation exposure.

According to the predictions of Nobel Laureate Linus Pauling and Andrei Sakhorov, the inventor of the Soviet H-bomb, *radioactive fallout from atomic bomb testing has killed four to eight million innocent people.*

Diseases That Kill

In the 1920's, Nobel Prize winner Herman Muller showed in experiments with fruit flies that radiation can accelerate the mutation of organisms. Recently Charles Waldren and coresearchers have found that a single human chromosome placed in a hybrid cell and bombarded with very low levels of radiation can produce mutations two hundred times more effectively than at higher radiation levels. It is very possible that half a century of increased environmental radiation levels have created new organisms that can take advantage of our weakened immune systems.

Since the 1950's an enormous increase in pesticideresistant insects and mites have occurred. In 1938 there were only seven such organisms known. By 1984 the number had climbed to 447. Fortyeight species of weeds have gained resistance to chemicals.

According to the book, "Deadly Deceit: Low-level Radiation – High-level Cover Up", by Jay M. Gould & Benjamin A. Goldman; AIDS, chronic Epstein Barr virus, Lyme disease, Candida Albicans, herpes, toxic shock syndrome, septicemia and others, are possibly the result of the Nuclear Age. All these aliments were rare or unknown before 1945.

The Texas Problem

The state regulators do not consider themselves researchers and because of this, they have not provided the basic studies necessary to determine the safety of mining. They have shown that they are not receptive to outside information that does not agree with their own opinions. They have not been forth coming about the industry's problems, preferring to burry the problems in their files instead of releasing it to the public. The director of the Bureau of Radiation Control (now defunct) was once quoted on TV as saying that the public does not understand radiation and only gets excited when they (meaning the Bureau) talk about it, so it is best not to say anything.

It is the responsibility of the state legislators to make the laws that safeguard the public. In order to this, they need information provided by scientific studies, to understand and address the issues. In this most important duty, the state regulatory agencies have failed.

Incomplete Monitoring

Under the original 1975 Texas mining law, Environmental Assessment Reports were required to be completed on every mining application. These report were studies of the environment around the proposed mine that established the baseline pre-mining radiation levels by measuring the soil, plants, and animals in an area. They also provided information on the geology and economic history of the area. But very few of these assessments were completed because *the industry successfully lobbied to change the law and now the agencies are not required to do assessments.*

Without the baseline data provided by the Environmental Assessment, the chain of data is broken. Because the food chain acts to gather and concentrate contaminates in the environment, pre-mining data is crucial in order to understanding how the food chain has been altered. It works this way:

1) Plants and animals need essential minerals to survive and grow. Radioactive elements are similar to minerals in the soil; plants and animals cannot differentiate between the two.
2) At the base of the food chain, plants easily take up the radionuclide found in soil, water, and air. By this action, contaminates in the environment are taken up and concentrated into the plant's cells. The longer the plant lives, the more radiation it can take up. Some plants take up more radioactivity than others.
3) The higher up the food chain, the more concentrated the pollutants become. As an example: in the mining districts, cattle need anywhere from 12 to 40-acres of grass a year to grow. Cattle are sold to market at 16 to 30 months. *This means that over 2.5 years the cow will eat up to 100-acres of grass.* This action serves to collect and concentrate low level contaminates that exist over large areas. The cow's organs and bones take up radioactivity better than it's muscle or milk. Fish and chicken eggs are even better absorbers of radiation (these are the bio-accumulator equivalent of the canary in the coalmine).
4) Because people are at the top of the food chain, this makes us vulnerable to environmental degradation anywhere in the food chain.

This accumulation is called bioaccumulation. Uranium mining increases the radioactive elements in the environment. Because humans are at the top of the food chain, we are the most exposed to contaminates. *Ingestion or inhalation of radioactive material is the most deadly form of exposure.*

The few environmental assessment studies that have been completed show that the pre-mining environment that had low radiation levels in the soil, water, plants and animals (up to 2 times lower than the average US levels in some areas). Studies during and after mining are sadly lacking but one study at the Panna Maria strip mine shows data that windblown radiation from the mine caused an increase in radiation levels in some grasses surrounding the mines as high as 500%. The Bureau of Radiation Control attempted only one post-mining bioaccumulator study. They studied dairy cattle at one site between the Susquehanna and Conoco-Conquista mines to see what effects mining had on the meat and milk. Meat and milk studies are the least effective way to study radiation uptake because meat and milk do not absorb radioactivity easily, the bones and organ meats are much better indicators. Fish, chickens, and eggs are better uptake indicators because they absorb radiation much more effectively and they should have been included with the cattle study. The Bureau claimed that their study showed was no problem with uptake although the results did show an increase in radiation content. A small increase in meat or milk means that all the other accumulators would show higher increases.

Uranium mining in Texas is located in major farming and ranching districts. The grain grown in these districts are shipped all over the state as livestock forage. Many private agricultural wells have been condemned because of elevated contamination in the aquifers from nearby mines. The D.O.E. condemned the aquifer around the Susquehanna and Conoco-Conquista mines. This is the same area where the cattle bioaccumulator study mentioned above was done. It was one of the largest dairies in the state.

It is absolutely necessary to monitor the food chain because it is nearly impossible to correct radiation contamination once it has occurred. Since radiation is invisible, it is impossible for the public to protect themselves. Without monitoring, the public remains blind and defenseless.

Improper Monitoring

Current environmental data at the mines is questionable because of flawed monitoring. The state law requires ongoing air and aquifer monitoring at the mines but the agencies do not have the funds to provide full time monitoring, so *they require the mining companies to do most of the monitoring themselves and then honestly report the data to the agencies*. This is obviously a big problem and the agency incident files confirm it. The files contain hundreds of reports of lost data, falsified samples, altered records, covered-up spills, unreported excursions, illegal dumping, worker overexposure, and so on.

Accurate data is an essential requirement for safeguarding the environment and health. By allowing the fox to guard the hen house, the agencies have made it impossible to gauge how serious our exposure really is.

Low-Dose, Long-Term Monitoring and Health

Monitoring at the mines is set up to record excursions. This type of monitoring is good for indicating high radiation spikes that occur in the elevated radiation environment of the mine. But this is not a good system for monitoring the environment surrounding the mine where the population lives. This environment is a "low-dose, long-term" scenario. Proper monitoring outside the mines has not been attempted because the agency professionals do not believe that low-dose, long-term exposure causes any health problems.

The state legislators sponsored Dr. William Au of the University of Texas to study the effects of low-level radiation on the people living near the Panna Maria uranium mine in South Texas. Dr Au's study showed that the constant exposure to low-level radiation has caused a large amount of cell damage in the blood of the local population when compared to the cell health of other non-mining populations. This demonstrates the Petkau Effect: low-dose, long-term exposure causes cell damage.

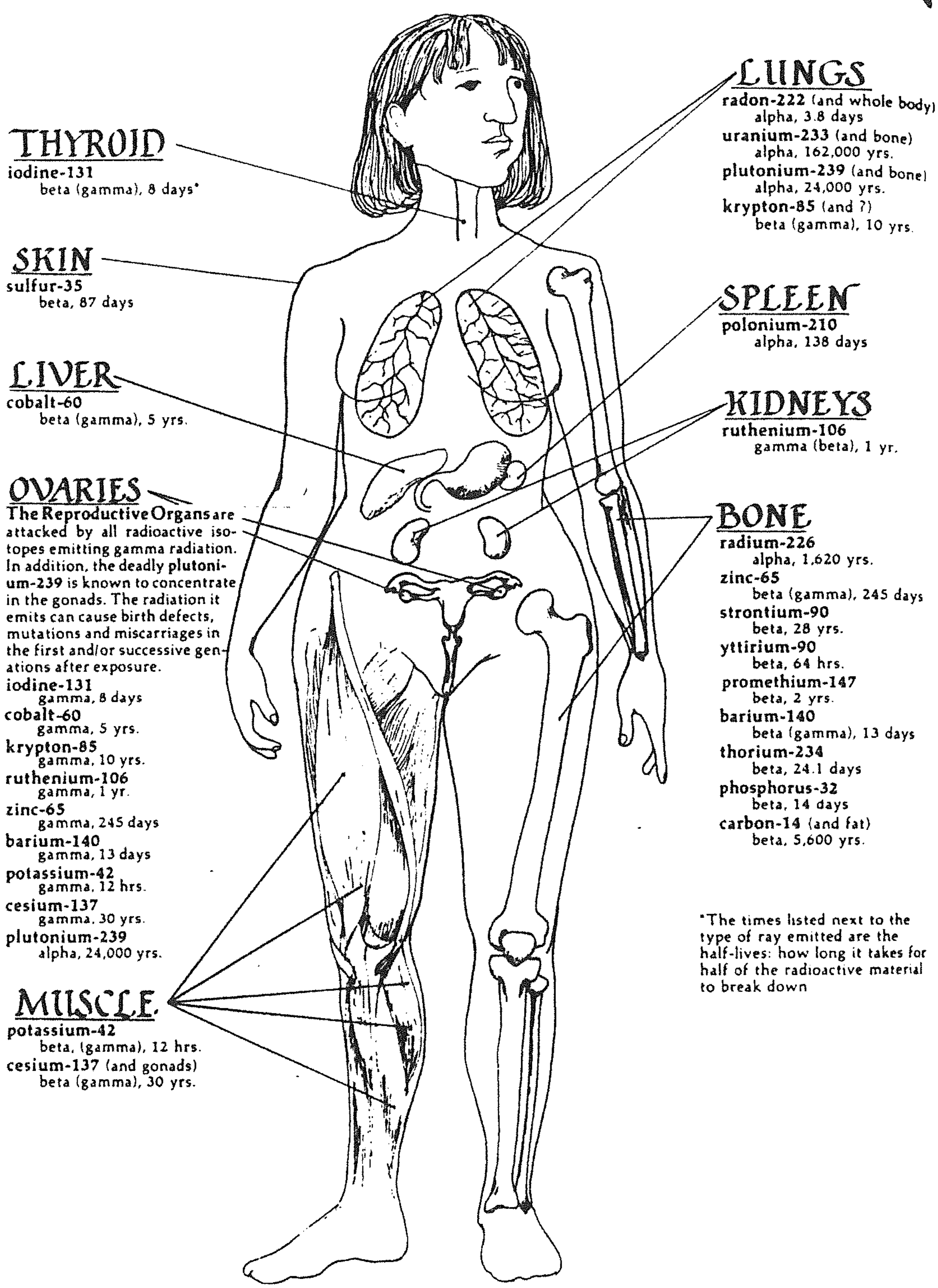
What does this mean to the people living around the mines? Research shows that continuous exposure to low-levels of radiation is a source of continuous free-radical damage. This eventually causes the body's immune system to shut down. Lowered immunity can cause all types of diseases but more importantly, it can also create new and unknown health problems. There is mounting evidence that the bazaar diseases that affect society today are a result of the increased exposure to continuous low-level radiation in our food and environment. Things that we have always been immune to are suddenly becoming life threatening.

Apparently, the state agencies are waiting for an epidemic to occur before dealing with the mining populations health issues. They are waiting for hospital death records to show large increases in cancer and leukemia before taking action. But this will not occur because of the small size of the rural populations and the obtuse nature of the diseases involved. In the mining areas health problems do not fit normal disease patterns, lowered immunity has cause confusing and undetermined health problems. How do you gauge a community's level of health if you can't label their diseases? It used to be common practice in these areas for hospitals to label unknown causes of death as heart failure on the death record, leaving no record of actual death.

The nuclear professionals of the state's regulatory agency are a closed society; they are not receptive to outside advice. In contrast, the *agencies are totally accepting (and dependent) on industry-sponsored studies that only show how safe mining is.*

The current health problems in these mining areas are blamed on other issues. The industry claims that radiation cannot be proven to cause any health problems without direct evidence. This is the same argument the cigarette industry uses to convince people there was no direct link between cigarette smoking and cancer.

IONIZING RADIATION



*The times listed next to the type of ray emitted are the half-lives: how long it takes for half of the radioactive material to break down

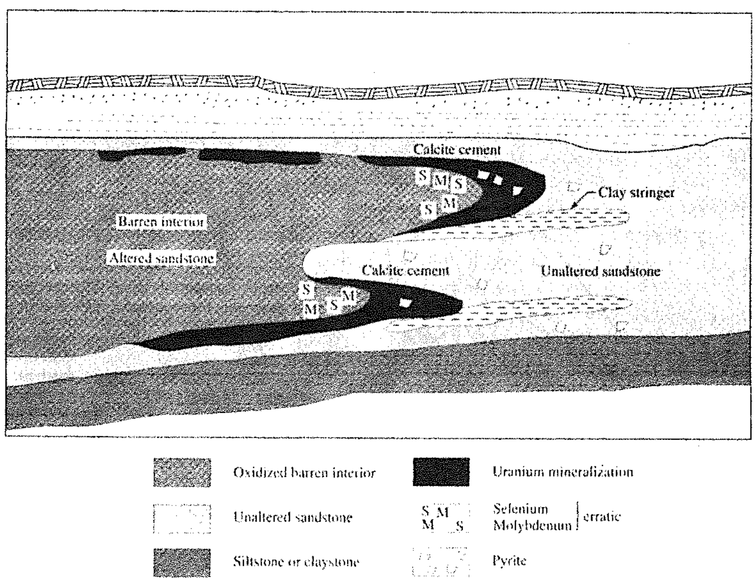
Where does Uranium come from?

In Texas, uranium ore is found in shallow aquifers. These ore bodies are the result of a combination of natural processes that have gathered up very small amounts of radioactive materials spread over large areas of Texas and delivered them to special areas where they were concentrated into uranium rich ore deposits.

Some rocks contain naturally occurring low levels of radioactive materials. It is believed that these materials are left over from the creation of the Earth (so-called primordial radionuclide). They typically have half-lives of hundreds of millions of years and include uranium-235, uranium-238, thorium-232, and potassium-40. Over the years, weathering and plant roots have broken down this primordial rock, contributing to the background levels of radioactive material in the soil and groundwater.

Researchers have suggested that uranium ore bodies in Texas were formed many eons ago when volcanoes in Northern Mexico exploded ejecting lava rock under high pressure, miles into the upper atmosphere. This finely atomized form of lava is known as fly ash and it contained small amounts of radionuclide from the primordial rocks. Fly ash is so lightweight that the prevailing trade winds carried it for hundreds of miles into the southern United States where it settled into the ground many feet thick.

Figure 5 - Typical Roll Front Sedimentary Uranium Deposit (Langmuir, 1997)



Schematic cross-section of an idealised uranium roll-front orebody showing the zonation of elements and primary hydrologic and geochemical features. Oxidised groundwaters flow from left to right. The roll front and associated redox interface moves in the same direction.

Over the years, rainfall washed most of this fly ash into the rivers carrying it into the Gulf of Mexico. But some of the uranium in the ash leached into the ground where it migrated down into the shallow

aquifers. Like the ash, this uranium also flowed out to the Gulf of Mexico except in some areas where the aquifers contained reduced atmospheres (without oxygen). Reduced atmospheres areas can be found in front of fault zones where reducing gasses from lower formations (hydrogen sulfide from oil deposits) seep up the fault line crack and replace the oxidized atmosphere in the shallow aquifer. The lack of oxygen allowed the uranium to precipitate out of solution. The fault zones block the aquifer flow and trap the reduced gasses in a stagnate zone, keeping the oxygen in the aquifer from washing away the uranium. The alkaline environment further helped to trap the uranium by locking up the metals on the clay particles that surround the sand granules in the aquifers. In the 1990's it was discovered that the bio-film created by certain anaerobic soil bacteria also play an important part in trapping the uranium.

The Mining Environment

Because uranium moves freely in an oxidized environment, it has long since washed out of the South Texas aquifers. As mentioned above, the ore bodies are only found in specific oxygen-free atmosphere areas where the ore is tightly locked up deep underground, safe from public exposure.

Strip mining removes the overburden exposing the ore to atmospheric oxygen, allowing the uranium to unlock and migrate in the aquifer. In-Situ mining pumps oxygen down into the aquifers in order to make the uranium mobile. Currently, there is no technology available to stop the migration. Because of the long-lived nature of this toxic material, this is a threat to many future generations.

The companies are suggesting that is not a problem because the waste will migrate to a new reduced atmosphere underground and eventually lockup. The state regulators are accepting this "do nothing" concept because they want an easy fix; they are too dependent on industry-sponsored studies that promote the cheapest possible solutions.

There are many unanswered questions with the "do nothing" approach. The original ore bodies have remained lockup securely by Mother Nature for centuries because these sites are extremely stable and isolated from conditions that cause changes. Finding new down-dip lockup sites, as proposed by the industry, is unlikely since these original lockup sites are now being mined for uranium. New lockup sites are unlikely otherwise the South Texas aquifers would have uranium ore bodies locked up everywhere, and it doesn't!

There are apparently many conditions that are necessary for lockup. Uranium forms where fault zones allow hydrogen sulfide to seep up from deeper oil formations, replacing the oxygen in the aquifer and creating the necessary reduced atmosphere. Current studies show that the reduced atmosphere allows certain anaerobic soil bacteria to create chemicals and bio-films that lockup uranium naturally. Aquifer pH plays a roll; high pH will lock up some of the heavy metals on the aquifer clays while other low pH will lockup other metals but no condition exist that will lockup all of them at once. Then there is the necessity of finding an area in the aquifer with a stagnate flow (which is caused by the damming effect of the fault zones) to prevent washout.

Even if lockup site can be found, long-term stability is questionable. Research has shown that uranium can re-oxidize from rainwater seeping down into the groundwater along the fault lines. Only Mother Nature has proven to have the capability of forming stable sites capable of long-term storage.

Today these contamination plumes are moving underground, the only solution currently available is to provide long-term monitoring in order to safeguard the public but *the regulatory agencies have no plans to provide any perpetual monitoring*.

Strip Mining

In the 1970's, the Corpus Christi Caller newspaper published aerial photos of Karnes County showing what they called a "moonscape" of deep craters stretching far over the horizon. These were the abandoned uranium strip mining pits. These steep-sided, 300 feet deep canyons formed mile after mile of un-earthly landscapes across South Texas. The combined area of the pits equaled approximately 31,000-acres, spread out over 18 South Texas counties. Although strangely beautiful with their subterranean azure-blue lakes, these pits hid a deadly secret. Neighbors adjoining the pits report of cattle, dogs, and birds dying after drinking or swimming in the ponds.

Strip mining is the process of removing millions of tons of soil, called overburden, in order to mine the underground ore. It was necessary to remove the overburden in order to get to the uranium ore but it was only profitable to dig down to a maximum dept of 300'. Since the uranium ore is found in the shallow aquifers, lakes formed in the bottom of the pits as the aquifer rushes in to fill the hole. In order for the companies to work the mine, it was necessary to pump-out the radioactive water. Pumping resulted in the wholesale draining of a huge portion of South Texas' aquifers and *resulted in the radioactive contamination of the local rivers, of with the San Antonio River was the most affected.* There have been no studies to determine the effects this had on the rivers and estuaries of the Gulf Coast and the Texas fishing industry?

The companies are only interested in extracting uranium oxide content of the ore. This uranium oxide comprises less than 2% concentrations in the ore. During mining, only the ore containing the highest levels of uranium oxide are profitable enough to be removed from the mine. Once the profitable ore was removed from the aquifer, the miners moved on leaving the mining pit abandoned. The ore left behind contained lower levels of uranium oxide and 98% of all the other radioactive and toxic materials common to radioactive ore bodies, including thorium-232, potassium-40, and thorium 230, radium, radon, arsenic, cadmium, chromium, lead, mercury, molybdenum, selenium, zinc and other toxic and radioactive substances.

The low grade ore left behind was left to oxidize. The excavated pits filled up with water as the unearthed aquifers continued their flow. The uranium flowed with the oxidized aquifers waters, destroying any reduced atmospheres in front of it. In the 1980's, the state spent 10's of millions of taxpayer dollars filling in these abandoned mining pits. No studies were attempted to find out the extent of the migration.

Tailings Ponds

During strip mining the ore was extracted from the mine and brought to the processing mill where the uranium oxide (also known as "yellow cake") was leached out of the ore. Less than 2% of ore is composed of high-grade uranium oxide. After the ore is milled and the uranium oxide is removed, *the*

unwanted material contains 98% of the radioactive and toxic materials including all the toxic and radioactive substances mentioned above. Large volumes of sulfuric acid were used in the mills to leach the uranium oxide from the ore. The spent acid and left over solid uranium waste was disposed of in aboveground holding ponds called "tailings ponds". Tailings ponds are aboveground holding ponds made by mounding up large earthen berms that are meant to confine the solids and liquids produced by the milling process.

<u>Today these ponds contain over 27,000,000 tons of solid radioactive waste.</u>

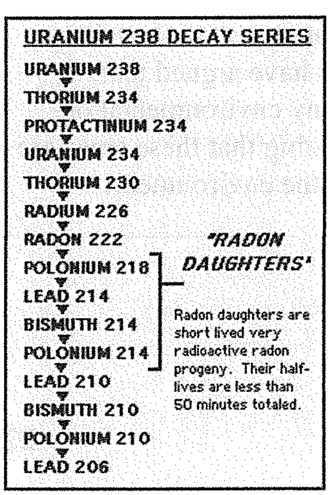
The idea of using tailings ponds for waste storage came from the oil industry. They wanted a cheap way to hold the excess saltwater that resulted form oil well drilling operations. They would mound up dirt mounds forming an aboveground tank to hold the saltwater. Someone got the great idea that these dirt embankments would be a cheap way to hold the uranium waste. The engineers were expecting the tailings ponds to hold the sulfuric acid until the sun could evaporate the liquids leaving behind only the solid waste. Apparently they did not know that *sulfuric acid does not evaporate after a certain concentration is reached.*

The engineers were also expecting the high clay content of the soil to prevent the fluids from leaking offsite but no one ever tested to see if the clays were compatible with the chemicals involved. During the 1980's, the government released studies showing that the sulfuric acid altered clay soils. *The acid changed the physical makeup of the clay, turning it into a non-plastic powder that actually increase the migration of the tailings waste out of the pond.* Basically these ponds had no holding capability at all.

Over the years, the companies dumped more liquid into these tailings ponds than they were designed to hold. This was possible because the liquids were leaching directly into the aquifer. The companies were aware of this discrepancy but continued on. The total amount of liquids is unknown because the companies were not required to keep records.

The 27,000,000-Ton Problem

The DOE spent $35,000,000 in 1984 to entomb the contaminated waste the Susquehanna mine into a massive flat-toped mountain. The Federal standards requires that the mesa was covered with a layer of clay and a layer of rock boulders in order to meet the Federal 100,000-years intrusion requirement that is necessary to insure the radioactivity solids and radon gas could not escape by erosion or intrusion.



But there is a unique problem with entombing radioactive waste; during this material radioactive lifespan, it transmutes from a solid, to a gas, and back to a solid again making it particularly difficult to contain. Uranium transmutes into Thorium; Thorium transmutes into Radium; Radium into Radon (a gas); and so on until it winds up as lead. This process is known as the "daughter product chain". These elements have very long half-lives, meaning that after one half-life has passed, only half of the radiation will be gone. Thorium 230 is has a half-life of 78,000 years, meaning that after 78,000 years, only one half of the radiation will be left.

Since Radon is a gas, it can travel for many miles before changing back into a solid radioactive element again. Because of this, Radon can cause areas in the downwind path to have elevated in radioactive levels.

The following examples illustrate how difficult it will be to keep the waste isolated from the public using only dirt as the tailings cap:

•) Plant roots can easily penetrate through the clay cap and take up radioactivity. As time goes by, radiation levels at the surface will increase as the plants die and leave behind their radioactive remains.
•) Animal will graze the site and burrow into the cover. This is an easy way for contamination to leave the site.
•) Wind and rain will eventually eroded the cap. Erosion is severe in South Texas. There are natural mesas in nearby McMullen County that were formed centuries ago when erosion leveled the surrounding clay soils and left behind the gravel mesas standing 100-feet above the surrounding plains.

Entombment with rock and clay is far from a perfect solution but by cleaning up the Susquehanna, the federal government set the example for tailings ponds. The state should have followed this example but because this was the smallest tailings pond in the state and it cost so much to clean up, the state regulators basically ignored the Federal example and allowed the mining companies to simply cover their tailings ponds with a single layer of clay. Although this saved the companies lots of money, dirt alone cannot survive the long-term threat of erosion, intrusion and out-gassing.

The waste will remain a danger for hundreds of thousands of years. How do you safeguard future generation when history shows that most governments do not survive longer than a couple of hundred years? In order to extend the isolation of the waste as far as possible, the boulder intrusion layer is required.

Denial of The Aquifer Problem

Because of the huge cost involved, the state has not required any company to cleanup of the aquifers contaminated by the tailings ponds.

The industry believes that the alkaline and reducing environment in the aquifers will eventually lockup the waste as it migrates underground. Several private wells have been contaminated next to the tailings ponds and the DOE has condemned the Susquehanna aquifer. The state agencies have argued that the aquifers in these areas are generally brackish and the populations are small, so any environmental or health problems that occur would have minimal impact. The agencies are suggesting that these areas are disposable! There is no acceptable excuse for letting a private company destroy the environment!

The Tailings Pond History

Susquehanna-Western and tailings pond:

The first mining operation in Texas was started in 1959 just west of Falls City, Texas. This was a joint effort by the San Antonio Mining Company, a subsidiary of Climax Molybdenum Company and Susquehanna-Western, Inc. They sold their ore to the Atomic Energy Commission but after that contract ended in 1966, they contracted with the Atomic Energy Commission to sell ore to the West German Government. This mine operated without regulatory oversight.

The mine originally used a solvent-extraction process that involved mounding up large piles of uranium ore and then setting up sprinklers on top of the piles in order to irrigate them with sulfuric acid. This leached the uranium oxide out of the ore. They than collected the uranium rich acid in pipes as it seeped out the bottom of the piles.

A tailings pond at the mine held the spent acid from the leaching process. The waste ore was dumped back into the mine pits. The pond frequently overflowed into the local creek. A large dairy adjoins this creek and their milk cows drank from this creek. They contracted a copper-molydenum imbalance called molydnenosis, turned white, and died of anorexia.

During a hurricane, the tailings dam broke and spilled the entire contents of the pond into the creek. *This was probably the largest radioactive spill to ever occur in the Texas (maybe in the U.S.)* but since the mine was unregulated, the exact details of the spill are unknown. This creek flows for a mile and then joins the San Antonio River where it empties into the river just upstream from the most popular swimming hole in the county. No one in the county was ever notified about the dangers of swimming in this area.

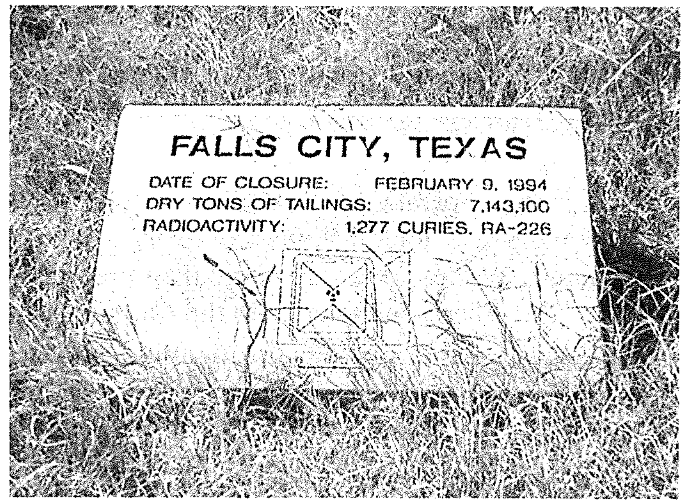
The site had been abandoned for many years when the Federal Government passed the UMTRA law that required the United States government to cleanup the early processing sites. Because of the sever leaking of the Susquehanna tailings pond the D.O.E. eventually condemned the regions aquifer after finding out that all the area wells were unsafe. In 1988 the D.O.E. estimated the price for cleaning up the aquifer was going to cost $350,000,000 but they did nothing to clean it up. Because of the cost involved, the state has made no effort to cleanup any of the other 3 mill tailings aquifers.

The Feds spent $35,000,000 of taxpayer money to build a 60-acre mesa-shaped entombment. To insure long-term isolation of the waste, the mesa was covered with a clay layer, then a layer of granite boulders several feet thick. The rock cover was necessary in order to protect the cap. Originally the feds planned to cover the entire mound with rock but this proved to be too expensive so only the sidewalls were covered. In order to provide this rock, two granite quarries were cleaned out during the building of this gravesite.

This mound contains 7,134,100-tons of radioactive waste. This includes 800-acres of contaminated farmland that surrounded the mine which had to be dug up and entombed. There is a total of 1,277 Curries of Radium-226 buried at this site.

Granite tombstones encircle the site. They are necessary to order to survive the hundreds of thousands of years necessary to warn the public of the danger that exists onsite. What kind of message does this send to future generations?

This mound can be seen at the intersection of Hwy 791 and Ranch Road 1344, a couple of miles west of Falls City, Texas.



Susquehannna Uranium Strip Mine - Radioactive Waste Burial Site
Tombstone Waring to Future Generations

Exxon-Ray Point and tailings pond:

Ray Point is mill tailings pond located east of Three Rivers on Hwy 72, next to the one of the public water supply towers. Little is know about the site because it operated mostly during the unregulated period. Apparently, Exxon covered the pond with dirt in an attempt to quickly close the site but the pond was not thoroughly dried out (concentrated sulfuric acid does not evaporate). Eyewitnesses report that the ground would shake when the cap was walked on.

Dupont / Conoco-Conquista and tailings pond:

During the early years of the Conoco-Conquista, the mine operated without any regulatory oversight. After the mining operations ceased, the Texas Bureau of Radiation Control allowed Conoco (later bought by Dupont) to operated the 256-acre tailings pond for 8 years as the official, unlicensed nuclear dump for the state of Texas.

The local residents were never informed that the site was being used as the nuclear dump for the state of Texas. The director of the Bureau of Radiation Control was quoted on the San Antonio TV news saying, "The public does not understand radioactivity, they just get excited when you talk about it. It's best not to say anything". It took a large public effort and heavy media attention to force the agency to close the site in 1988.

Only mining waste was supposed to be disposed of in the pond but since almost all nuclear waste can be considered a byproduct of mining, the company was allowed to dump all types of waste here. Some of the stuff was so hot that it should have been sent it to the federal high-level dump at Hanford, Washington.

One of the companies allowed to dump at the Conquista was the French company Rhone-Poulenc (now called Sanofi-Aventis). This is the third largest pharmaceutical company in the world. Rhone-Poulenc sold "rare earth" phosphors for TV screen and rare earth magnets. Rare earth refers to lanthanide series of the Periodic Chart, atomic numbers 57-71, plus yttrium, scandium and thorium. These materials contained levels of thorium and uranium *50 to 1,000 times more radioactive than typical South Texas uranium tailings mill waste*. Since the Conquista is now closed, Rhone-Poulenc sends this waste to the high-level nuclear facility in Hanford, Washington. Today, Rare Earth mining in the U.S. has been put on standby because cleaner, thorium-free Rare Earths from China, Brazil, India, and Russia have become available.

Rhone-Poulenc now processes its Rare Earth through its Rhodia Rare Earths division. Parts of the Rhone-Poulenc plant and several areas around the plant in Freeport, Texas was so radioactive that it had to be dug up for disposal at a nuclear dump.

During a regulator hearing on the Conoco-Conquista, a senior researcher with The Southwest Research Institute was going to speak about the possibility of the pond exploding because of the large amounts of ammonia and nitrate waste that was dumped here (this supposedly happened to a tailings pond in Russia). But before he could speak, Dupont apparently offered him a contract to study the situation and that was last time anyone heard from him.

The records show that one worker was sent to the hospital after passing out from fumes that came from a dump truck he was standing next to as it unloaded its waste into the pond.

Conquista was located less than a mile from the Susquehanna and it shared the same aquifer. The monitor wells showed the tailings pond was leaking but the contamination form the Susquehanna made it difficult to monitor the site. Because of this, Dupont claimed that the site could not be proven to be leaking. This was a lame argument because there was only a couple of feet of soil between the bottom of the pond and the aquifer and studies have shown that acids destroy the plasticity of clay and actually aids in the migration of contaminates.

Dupont now owns the Conquista. They have deep pockets and they must be held responsible for all long-term problems.

Chevron- Panna Maria tailings pond:

Chevron owns 3 uranium operations: the Palangana mine and the Panna Maria mine in Texas, and the Mt Taylor mine in New Mexico.

The Palangana was an In-Situ mine started in 1960. More information can be found on this site in the In-Situ section.

In 1979, Chevron opened the Panna Maria uranium strip mine and mill in Hobson, Texas. It was designed to process 2,500 tons of uranium ore a day. The mill and tailings pond covered over 290-acres. The mine closed in 1985 when the ore was exhausted.

The mill was then revamped in 1986 to process the uranium ore from Chevron's Mt. Taylor mine, a conventional underground mine located in northwest New Mexico. Coffinite was the primary ore, a gray colored sandy material. The uranium oxide content ranged from 0.15% to 2.0%. Chevron shipped millions of tons of the unprocessed ore daily in open, uncovered railcars from New Mexico to be milled at the Panna Maria facility. Clumps of this radioactive material could be found along the rails from New Mexico to Texas with a simple Geiger counter. The train tracks passed through several major cities in-route.

The Mt. Taylor mine produced over 8 million pounds of uranium oxide before it was put on standby in 1989. It is currently being considered for In-Situ leaching. It apparently has the largest uranium reserves in America with 100 million pounds of uranium oxide still in the ground.

During this time Chevron also processed the ore from their Rhode Ranch mine in McMullen County. At 800-acres, this was the largest uranium strip mine ever operated in Texas. The ore was shipped in dump trucks through 3 counties before being processed at the Panna Maria mill in Karnes County. The Rhode Ranch mine produced over 6.7 million pounds of uranium oxide.

A total of 10,000,000-tons of solid waste and an unknown amount of liquid waste was dumped into the Panna Maria pond, the largest in the state. Over the years, Chevron dumped all forms of radioactive waste into their tailings pond at the Panna Maria mine. The records show that the following wastes have been dumped at this site:

•) RCRA hazardous waste.
•) Uranium Hexafluoride waste from Allied Chemical conversion facility in Illinois.
•) Radioactive pipe scale from Mississippi.
•) Depleted uranium artillery shells from the military's Aberdeen Proving Grounds in Oklahoma.

•) When the EPA fined Chevron for trying to illegally dispose of acid waste from their refineries, the company shipped it by the trainloads to Panna Maria where they disposed of it in the tailings pond.

The Federal law requires that the state and federal government jointly take over ownership of a tailings pond when it closes. The Federal Nuclear Regulatory Commission questioned whether the federal government could legally share ownership of Chevron pond because the state of Texas had allowed so much non-mining radioactive waste to be dumped in the tailings pond.

During a public hearing on extending the permit of the Chevron-Panna Maria tailings pond, it was discovered that the company never plugged the hundreds of original exploratory drill holes under the tailing pond. This meant that the pond bottom was a Swiss cheese of holes that were direct paths into the aquifer.

A half-mile from the pond it was discovered that an old hand dug well had suddenly turned radioactive. On further investigation it was discovered that this well was located directly in the old, abandoned path of the San Antonio River. Over the years, the river had changed its course leaving behind a dry, sandy riverbed where the river once flowed. This ancient river flowed directly under the Panna Maria tailings pond where it served to funnel the waste from the pond directly into the ancient sandy river bottom providing a fast-track channel directly into the San Antonio River located less than a mile away.

Not a single monitor well was located in this riverbed. No data is available to determine how much fluid flowed out. No studies have been done showing the affects this contamination had on the river or the estuaries.

In 2005 Chevron bought Unocal Corporation making them the 4th largest energy company in the world. Unocal has a division, Molycorp, Inc, which owns one of the world's largest reserves of Rare Earths materials. These materials are open-pit mined in the Mojave Desert at Mountain Pass, Ca. The mine has been put on stand-by status in 2005 because cleaner, thorium-free Rare Earths have become available from China, Brazil, India, and Russia.

Chevron's transfer to General Atomics:

In1991, Chevron transferred ownership of their mining properties to General Atomics' Rio Grande Resources division. With this transfer Chevron also conveyed ownership of the Mt. Taylor, Rhode Ranch and Palangana uranium mines to General Atomics.

This transfer of ownership effectively put a layer of separation between Chevron and their direct responsibility of the radioactive waste. As shown below, General Atomics has provided this "service" to other troubled "deep pocket " corporations. General Dynamics is a conglomeration of other companies' liabilities.

Because of the recent push for nuclear energy, the Mt Taylor ore is now worth

billions.

General Atomics is a major player in Washington D.C. politics and is responsible for affecting many of the laws governing the nuclear industry.

More General Atomics history:

•) General Atomics was established in 1955 with a founding mission to find commercial uses for nuclear energy. They began building small research reactors, the TRIGA reactors. 65 TRIGA reactors were built during the next 40 years (including the University of Texas's nuclear reactor in downtown Austin).
•) After many years of problems with the TRIGA reactors and other lawsuits, Gulf Oil bought General Atomics in 1982.
•) In 1984, Chevron bought Gulf oil.
•) In 1984, after settling a 10-year litigation by Westinghouse over a uranium price-fixing conspiracy by General Atomics and 23 other companies, General Atomics paid out over $200 million in claims (for more information see the Bruni-Westinghouse section below).
•) In 1986, two brothers, Neal and Linden Blue, bought General Atomics from Chevron for $60 million. This was an incredibly cheap purchase price and some business annalist considered this the bargain of the century.
•) As CEO, Neil Blue shifted the company into nuclear waste cleanup operations. During the 80's, Kerr McGee Corp. transferred ownership of the Sequoia Fuels facility in Oklahoma to General Atomics. Sequoia is the nuclear fuel conversion facility made famous in the movie "Silkwood". This site was extremely contaminated. It was eventually closed down, dismantled, and dumped in a nuclear waste dump. *It is possible that the Sequoia facility was dumped in the Panna Maria tailings pond since General Atomic now owns the site (see next).*
•) In 1991, Chevron transferred their liabilities for the second time, by conveying ownership of their mining properties to General Atomics.
•) General Atomics had set up an "advisory council" to trawl for taxpayer dollars. The Council featured the former Secretary of State Alexander Haig and ex-U.S. Joint Chief of Staffs chairman General John Vessey. The brothers became big contributors to both the Republicans and Democrats.
•) In 2001, the U.S. Attorney and Sam Kholi, a former General Atomics employee, claimed that the two brothers had conspired to defraud federal taxpayers of millions of dollars by rigging contracts, padding payroll cost, and presenting false claims for payment. At the time, General Dynamics had over $210 million worth of government contracts. From 1998 to 2003, General Atomics has had a total of $981,366,405 in defense contracts.
•) In 2005 alone, General Atomics spent $2,420,000 on total lobbying expenditures in Congress. General Atomics is the single biggest corporate underwriter of Congressional trips between 2000 and 2005. The company spent more than $666,000 on 86 trips by members of Congress, their aids and families.

The In-Situ Problem

Strip mining dominated the industry until the 1970's when it was replaced by a newer, unproven form of underground mining, called In-Situ. It is currently the only process that is being licensed by the regulatory agencies.

In-Situ involves injecting a leaching solution into the underground aquifer where the uranium is locked-up on the sand and clay particles. The ore is sucked back to the surface where it is separated from the mining fluids. This process transfers the isolated, underground ore body to the surface where it increases the public's exposure. After processing, the radioactive liquids are pumped into deep aquifers for disposal. These waste liquids contain the same levels of radioactivity and hazardous materials associated with the ore bodies. This process results in the contamination of two (2) aquifers and the creation of large volumes of solid radioactive waste that must be disposed of.

In-Situ offers two main advantages to the industry:

1) It is much cheaper than strip mining.
2) It takes place underground, offering an "out-of-sight, out-of-mind" solution to their liabilities.

Texas is the birthplace of commercial In-Situ mining and today has the largest concentration of In-Situ mines in the world. The state agencies were forced to cobble together the first In-Situ regulations in 1975 when they licensed the illegally built Westinghouse designed Bruni In-Situ mine (see Bruni section below). The state was originally going to close down the mine and prohibit the technology but after studying information provided Westinghouse, they decided to license the technology. Years later they found out the information provided by Westinghouse was badly flawed and promises made could not be meet. But it was too late to change the law because the industry was firmly established.

Because of the premature birth of this industry, South Texas has been used as a large-scale experiment for In-Situ technologies. This ongoing experiment has resulted in a patchwork of In-Situ regulations that are a reflection of the problems inherent with this technology. Over the years, whenever In-Situ problems developed, the regulators would simply change the regulations allowing the miners to try other techniques in the hope that they would finally get it right. As a result:

- Many shallow aquifers have been damaged as companies cycled through different chemical solvents and oxidizers.
- Deep aquifer are threatened by unproven disposal technologies.
- Permits have been changed in order to allow for increasing contaminate levels in the aquifers.
- Large amounts of land have been contaminated by spills and untested surface disposal techniques.
- Workers have been injured by unsafe work practices and jerry-rigged equipment.
- Future generations are threatened by this long-term, mobile threat.

Although the public as actively worked to stop the permitting of new sites, the agencies have never denied a permit in the 60 years that the industry has existed. Since Texas has allowed the industry to become established, companies all over the world have been given the green light to use In-Situ mining.

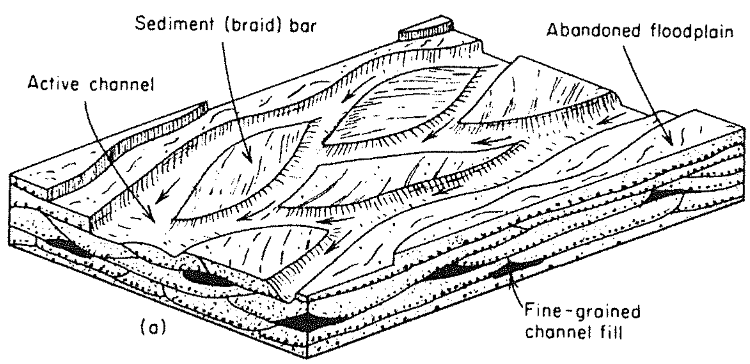
Groundwater Geology

Groundwater is commonly found in the materials laid down by river channels and floodplains. This includes gravel, sand, silt or clays. A layer of sand might be deposited under a particular environment, and over time, water accumulates forming an aquifer or groundwater reservoir. They are known as alluvial deposits or aquifers, and due to the inherent complexity of shifting river channels and everchanging flow velocities, the exact layering and connection of sands or clays can be difficult to determine, even with an extensive number of boreholes. Two distinct types of alluvial deposits are recognized: braided river and floodplain alluvial deposits.

Floodplain river environments also contain coarsegrained deposits of sands and gravels, but are typically dominated by finegrained silty or clay deposits. They are characterized by lower slopes and smaller flow velocities. The complex channels that are formed are also highly variable and very difficult to characterize with borehole data.

Braided river environments generally occur in settings where the sediment available for transport has considerable coarsegrained sand or gravel and where river velocities are large due to steep regional topography. Sequences of sands and gravels can develop, with only minor zones of silty or clayey sediments. The flow of groundwater through an old braided riverbed can often thus be unpredictable due to complex channels and bars (braids) that are formed during deposition.

Figure 2 - Braided River Environment (Freeze & Cherry, 1979)

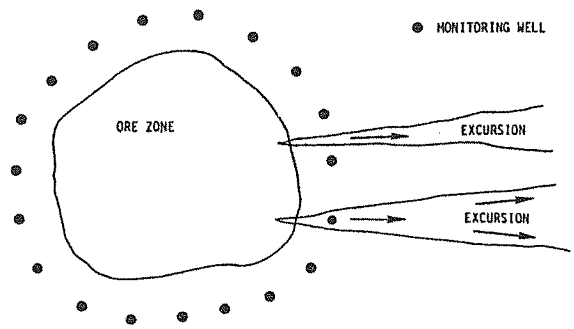


Other types of sedimentary type groundwater systems are formed by the action of winds (aeolian deposits) or glaciers. They are also highly variable, and are characterized by fractures and variable properties. Fractures, or lines where the sediments are discontinuous, often provide avenues for groundwater flow to escape.

Monitoring by Guessing

The industry suggests that by sucking excess water out of the aquifers, they can control the movement of the underground fluids. To achieve this, the mines dispose of 10% of the leaching fluid that is sucked out of the ore field; this fluid is called the "bleed stream". Newer mines claim that by leaching sander formations, they can use bleed streams that are less than the 10% average. The bleed stream creates an area of negative pressure underground around the suction wells; know as the "cone of depression". It is

suggested that this continuous, excess suction can control the flow of the leaching fluids by pulling the injected fluids back into the suction wells before they can migrate offsite.

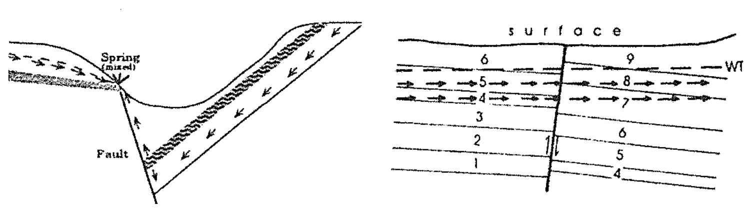


But this cone of depression technique is flawed because the complex nature of the aquifer geology makes it impossible to predict what is going to happen underground. The industry acts like the aquifer is composed of uniform beech sand where all the material is the same size and porosity. As described above, these strata are full of rocks, clay and sand lenses of different sizes and porosities. The injected fluids take the route of least resistance, flowing in narrow and torturous paths in a non-homogeneous stratum. It is impossible to monitor the fluids because it is impossible to know where to accurately place the monitor wells. The monitor wells can be isolated from the fluids by impermeable barriers or stagnate zones. To illustrate this problem, it is common for contaminates to be discovered in private wells outside the monitoring ring, un-detected by the mine's monitor wells.

No Such Thing as Impermeable

The key requirement of In-Situ technology depends on an impermeable layer above and below the injection aquifer. The presence of fractures can cause unpredictable contaminant migration away from a site. South Texas is a hot bed of oil and gas exploration, the geology is a Swiss cheese of abandoned oil well exploration holes. These holes are direct access into other aquifers. During the early years the In-Situ, the industry drilled thousands of holes exploring for uranium and then thousands more holes defining the shape of the ore bodies. None of the early holes were plugged. At the Bruni site, when the injection pumps were turned on for the first time, hundreds of open holes suddenly became fountains. The same thing happened at U.S. Steel when several upper aquifers were also contaminated from open holes.

Figure 17 - Idealised View of Some Typical Faults (Mazor, 1997)



Natural fault zones exist in these areas. These faults are what caused the uranium to lockup in the first place because they allowed the reducing gasses from lower formations to seep up the fault cracks and replace the oxygen in the upper aquifers, and this created the reduced atmosphere necessary for uranium to lockup. The very nature of uranium formation requires the ore bodies to be located in fractured, porous zones.

Mining changes the stable, steady-state environment of the uranium by making it mobile so that it can be remove from the aquifer. This mobility allows the uranium to freely travel on its on. The industry stresses any contaminates are contained by impermeable layers above and below the ore zone but as explained earlier, this impermeability is unlikely. The industry has tried to recreate the reduced atmosphere underground but they have not been successful. No technology currently exist that can return the uranium to its safe, reduced state.

For an excellent 144 page Australian report on aquifer problems see: "An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining", by Gavin Mudd, Victoria University of Technology". Go to this website: http://www.sea-us.org.au/pdfs/isl/no2isl.pdf

Disposing of the Waste

During processing, only the uranium oxide is removed leaving behind 98% of the radioactive and heavy metal toxic waste that must be disposed of.

Early mines tried to dispose of this waste in surface evaporation ponds. Heavy rains and broken float valves caused the ponds to overflow frequently. The solvents used in early mines became progressively harder to evaporate as the chemicals in the solutions became more concentrated. The radon out-gassing from the millions of gallons of radioactive water stored in the ponds was very high. The solid radioactive waste that remained after evaporation was simply stockpiled onsite. All these problems increased worker exposures.

Five sites were allowed to dispose of their radioactive wastewater by irrigating it directly on top of the ground. The EPA stated that this type of disposal was not acceptable and the agency personnel fought to prevent the practice, but agency permitted the sites anyway.

One of the most notorious sites was the 105-acre Everest Exploration irrigation site was located 900' from the shoreline of Lake Corpus Christi, the drinking water supply for 1,000,000 people. The agency personnel suggested that *approximately 50% of the fluids dropped on the ground at the site wound up in the lake*. Eventually, after 4-years of operation, the agencies realized this technology was a mistake and outlawed the practice (see the "Everest Exploration" section).

Because of the problems caused by early disposal techniques, the state has allowed the industry to use deep well injection to dispose of their wastewater into lower aquifers. This has caused a whole new set of problems.

Other states consider deep well injection to be a questionable practice and most have outlawed the practice but in Texas there are over 32,000 thousand deep well injection sites. Texas is the birthplace of the deep well injection technique and it has the largest concentration in the world. It came about because

the oil industry wanted a cheap way to dispose of excess saltwater from oil well operations. Using deep wells to inject saltwater is not the same as injecting radioactive waste.

Deep well injection pumps the waste into the lower aquifers *basically transferring the ore body to a deeper aquifer.* Deep well injection creates two contaminated sites: the original shallow aquifer and the newer deep aquifer, both are oxidized and migratory.

The deep aquifer waters are under great pressure from the inflow of fresh water into the water column. Given any chance, they will flow into and contaminate upper aquifers. *The agencies do not allow monitoring of any strata below the mined ore field.* Because of this, we have no idea how much damage has been done to the lower aquifers.

The agencies feel that allowing monitor wells to penetrate below the "impermeable" layer of the mining zone would increase the risk of contaminates migrating past the impermeable cap. This is a reasonable concern but there are already many possible natural and artificial excursion paths in the cap including the fault zones. The dangers posed by deep injection require monitoring of all the lower aquifers.

Aquifer Protection

Over the years, the industry has tried many types of leaching fluids in an attempt to find one that would work properly. These fluids have included: ammonia, sulfuric acid, hydrogen peroxide, carbonated water, baking soda, and oxygen. The worst of these was the ammonia used in the early mines. It was found to lock up on the clays in the aquifer and was impossible to flush it out of the aquifer (see the "Bruni" section below).

Current technology involves the use of oxygen in the leaching fluid to oxidize the ore atmosphere and make the uranium mobile. The industry claims that this is safer than older techniques. But concerns exist because oxidization unlocks the uranium and allows it to migrate.

Large amounts of uranium waste products remain in the aquifer after mining. In public hearings the companies promised the local communities that they would cleanup the aquifer to the baseline levels and originally, all mining permits required that the aquifers to be cleaned up to the original pre-mining levels. But over the years it became clear that the companies could not do this, so the state changed the rules and allowed increased contaminates in the aquifers. Even at these increased levels, companies could not meet permit requirements. <u>An examination of 32 permits from closed Texas In-Situ mines showed that *in each case*, companies were permitted to leave behind higher levels of contaminants in the groundwater than were allowed in the permit</u> (Corpus Christi Caller-Times, Nov. 5, 2006). These included elevated levels of contaminates such as calcium, nitrate, magnesium, potassium, bicarbonate, sulfate, arsenic, iron, manganese, selenium, ammonia, molybdenum, radium-226, and uranium. In some cases, companies were able to meet the restoration target for one mineral but reported 10- and 20-fold increases in others. Older mines tended to require more drastic permit amendments; some mines had to have their contaminate levels increased several times and some mines were closed without ever getting anywhere close to cleanup requirements.

After the companies finish mining, the oxidized atmosphere that remains underground continues to leach

the ore field. The industry tries to remove the remaining ore by flushing the aquifer with billions of gallons of clean water. But when the flushing stops, the oxidizing action continues on unlocking the large volume of ore that remains. At the Bruni In-Situ, mine 35% of the profitable uranium remained in the aquifer after the wells were plugged and the mine had shut down. U.S. Steel used over 2,000,000,000-gallons of water without being able to reach the permit requirements.

Currently, the companies are allowed to close down an In-Situ site if during restoration, the monitor wells in the aquifer do not show significant increasing contamination for a 3-month period. 3 months is a ridiculously small amount of time. Since the ore is located in stagnate flow zones, movement of contaminates will not show up in the wells in 3 months. But the oxidation does not go away and the waste will eventually will find their way into the faster flowing aquifer.

At the end of the 3-month period the agencies allow the companies to plug all the onsite wells. At this point there is no way to detect any increases. That is until they show up in down-dip private wells. The agency has no plans to monitor these wells

Exposure Levels

In-Situ mining is a process of removing the uranium ore bodies in the aquifer and delivering them to the surface. The leaching fluids sucked out of the ore fields contain large amounts of radioactivity. Once on the surface, the public is exposed to the dangers.

Table 6 - Average Leach Solution Composition - Minor Elements (mg/l)
(Underhill, 1992)

Element	Acid	Alkaline
Arsenic	<0.05	<0.05
Copper	1.00	0.04
Zinc	4.30	0.10
Lead	0.70	0.20
Iron	25.40	0.60
Nickel	0.60	0.06
Chromium	0.15	0.07
Strontium	3.70	1.50
Zirconium	3.30	0.90
Selenium		1.60
Manganese	1.20	
Molybdenum		0.90
Radium-226[1]	390	1,750
Vanadium	1.00	
Cobalt	0.20	

[1] - pCi/l

This fluid is pumped from the wellheads to the processing plants by a network of miles of PVC pipe. This fluid is concentrated with very high levels of radioactive and hazardous materials. These pipes frequently break and decouple, releasing thousands of gallons of fluid. Long periods of time can elapse before workers discover and repair the leaks. The worst site is the U.S. Steel plant and even though they were fined many times for not reporting their spills, the incident files of the Bureau of Radiation Control show over 1.2 million gallons of radioactive spills (see the "U.S. Steel / Niagara Mohawk – Clay West" section below).

The holding tanks at the processing plant must be vented to atmosphere in order for the tanks to be filled. They are a large source of Radon gas to workers and anyone in the downwind direction. At U.S. Steel, leaching fluids contained a radon content of 167,000 pCi/l (pico Curries per litter).
The In-Situ processing plants produce large amounts of solid radioactive sludge, filters, resins, plumbing parts and equipment that must be disposed in a nuclear dump. They are stored onsite until a large quantity can be assembled for shipment to a nuclear dump. Disposal cost are high and the companies frequently allow the waste to pile up to dangerous levels requiring the agencies to force the removal. This waste used to be disposed of in the tailings ponds at Conquista and Panna Maria but they are closed. Currently, the companies dump their waste at the Envirocare site in Utah or one of several tailing ponds in Utah and Wyoming that are still open.

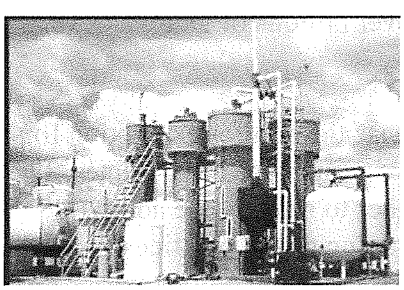
In-Situ Site Examples:

The Utah Construction and Mining Company built the first experimental In-Situ mine in 1963, near Shirley Basin, Wyoming. In was later converted to a conventional strip mine.

Chevron Palangana:

The Palangana is located in Duval County, Texas. Originally started as a conventional underground mine in 1960, it was converted to a test facility for a new mining technique called "In-Situ" leaching. This was the earliest experimental In-Situ site in Texas. Because of on-going problems with the In-Situ process, the project was shut down in 1979 after mining only 314,000 pounds of uranium. There is still 5.6 million pounds of uranium in the ground. The site was allowed to close by the regulatory agencies in 1999 after a long and unsuccessful attempt to restore the aquifer back to the permit requirements. We are investigating this site and will have further information available in the future.

Bruni-Westinghouse:



In 1971 Wyoming Minerals, a wholly owned subsidiary of Westinghouse Electric Co. (now a division of Siemens) began laboratory studies on In-Situ mining methods.

Westinghouse became involved in the uranium mining business for a particularly unusual reason. During the early days of the nuclear age, the government wanted to commercialize nuclear power, as a source of electricity but no utility would build a plant because they felt the technology was too dangerous.

The government's Atomic Energy Commission (AEC) had a monopoly on uranium sales in the U.S. and they had fixed the price of the ore. This allowed Westinghouse to offer the utilities long-term contracts to

supply them with fuel at a fixed cost. Fixing the fuel price was a good deal for the utilities because it allowed them to stabilize the consumer's electric rates.

In the beginning, this worked well for Westinghouse and they built several plants. But in 1970 the AEC released their market controls on uranium and this caused the cost of the ore to skyrocketed. Westinghouse found itself going bankrupt trying to supply fuel to the utilities.

In an effort to find a cheaper source of uranium, Westinghouse went into the In-Situ uranium mining business. They built the pilot In-Situ plant in Bruni in 1973 to test an unproven, experimental ammonia leaching process. It was a consortium of Wyoming Minerals-Westinghouse, Union Carbide, Pechiney Ugine Kuhlman, Conoco Oil, Pioneer Nuclear, Cleveland Cliffs, and Getty-Skelly Oil.

Geoffrey G. Hunkin, a mining engineer, developed this process. In his resume he states that this technology is "comparable in economic importance to the introduction of carbide drill bits and ammonium nitrate blasting agents," and he claims the benefits of In-Situ mining are low capital cost, short lead times, and low labor requirements. Mr. Hunkin was responsible for developing the Bruni plant and running it. The plant was designed to produce 250,000 lbs of uranium a year.

The Bruni-Westinghouse was unlicensed and operating for 4 years until 1975 when the Texas Water Commission (TWC) learned of the site. The TWC decided to take legal action against Westinghouse for starting a uranium mine "without any concurrence" from the TWC. But after a couple of weeks, for some unknown reason, the Bureau decided to license it instead. The industry wanted this cheaper technology and since it was clear that strip mining had many problems, the agency probably felt that it was necessary to promote newer and hopefully safer technologies. But the agency based its decision on faulty information provided by Westinghouse and by the time the agency realized their error, the industry was already well established.

Westinghouse claimed in their permit application in 1975 "test in small well fields have shown that they could restore the aquifer to original condition by simply reticulating the groundwater through the ore zone for a few weeks". Five years later Westinghouse admitted, "Developments in restoration technology have not advanced as far as was hoped, and after several years experience in mining and restoration, we now have a more realistic understanding of the limitations of the technology". They estimated that it would take 30 changes of very clean water to clean the aquifer. This amounted to 270,000,000-gallons of fresh water required to lower the levels to 100mg/l ammonia. The TWC permit required the aquifer to be returned to 0.8mg/l ammonia. To achieve this level billions of gallons of very clean water would be required.

In 1987 the Texas Water Commission (TWC) amended the permit to increase the aquifer exemption for ammonia to 5 mg/l. Uranium levels were increased 15 times and conductivity increased to 25 times. The Texas Department of Health warned the TWC to "consider carefully whether to remove the aquifer exemption because of extremely high ammonia levels". This was the beginning of the practice of increasing contamination levels whenever a company could not meet their clean-up requirements.

Westinghouse suggested that the ammonia would eventually breakdown in 3,000 to 3,500 years and should not migrate more than 3,500' during this period. There were no independent studies to back up this statement.

They were never able to clean up the aquifer; it is still loaded with ammonium. Westinghouse estimated that the ammonia carbonate-bicarbonate leaching solution was 65% effective at recovering uranium for the ore field, meaning that 35% still remains in the aquifer, available to migrate. Westinghouse estimates that for every 40 square feet of the ore body, approximately 4,330 lbs of ammonia remained in the aquifer. Eventually the site was closed down with the blessing of the Bureau. They removed all the monitor wells so that it is impossible to determine what is going on underground.

Bruni used five (5) evaporation ponds capable of holding 2,169,173 gallons of fluid in order to evaporate the excess leaching bleed stream. Uranium content in the leaching fluid was 15%. Workers were exposed to high levels of Radon out-gassing form the ponds. The workers were exposed to frequent pond overflows and to the evaporated solid waste that was piled up next to the ponds.

The state licensed In-Situ as a technology before anyone knew if it was safe! There was no public input, no independent studies, and no idea if Westinghouse could ever make the system work. Once the Bruni site was licensed it opened the door for every other company to use this technology and today we are paying for this mistake with the flood of new IN-SITU mines all over the world.

The history of Bruni is one of radioactive fluid spills, uncontrolled migration of radioactive water off site and worker overexposure. Despite this, Westinghouse received only one fine during this time.

For more detail, see the Texas Energy Alliance report: "Analysis of In-Situ Uranium Mines U.S. Steel / Niagara Mohawk and Westinghouse / Wyoming Minerals".

U.S. Steel / Niagara Mohawk – Clay West:

In 1973 the U.S. Steel Co, DALCO Oil Co, and Atlantic Richfield Co. began an experimental ammonia IN-SITU test pilot plant between George West and Freer on Hwy 59. In 1975 they opened the Clay West site. This was the first, large-scale commercial In-Situ uranium mine capable of producing over 1,000,000 lbs of uranium a year. U.S. Steel expanded their operation and opened the Burns site adjacent to the Clay West with a rated capacity of 4,000,000 lbs of uranium a year.

Niagara Mohawk, the electric utility company for upstate New York, became a 50% partner with U.S. Steel by buying a portion of their ore field. They invested $86,000,000 to insure the fuel supply for their two nuclear power plants, Nine Mile One and Two, located in Oswego County, NY. In 1987, a television station revealed that Niagara Mohawk was charging their customers $40 a pound for uranium that could be bought on the open market for $15 a pound. This launched an investigation that showed Niagara Mohawk was on the verge of bankruptcy because of bad investments.

The agencies documented 82 worker overexposures during U. S. Steel's 11-year operation. Overexposure was routine at this plant and could not be avoided because of the plants design:

•) The plant was designed with no conveyance system. The liquid uranium was routinely transferred between processes by dumping it on the floor of the plant where workers would then

use shovels to scoop it into the nearest sump pit so that it could be pumped to the next process. This was contrary to the original design allowed by the permit.

•) It was discovered that the concrete sump pits had been eaten away by the acids in the uranium slurry. During excavations for a foundation at the plant, it was discovered that the entire plant was floating on uranium-saturated ground. Test show that the soil contained from 32mg/l to 3060mg/l uranium concentrations.

•) During an inspection of the U. S. Steel trash pit and storage areas in 1980, a gamma radiation survey showed levels so high that it "pegged" the Geiger counter needle and readings could not be taken.

•) According to a report "The Uranium District of the Texas Gulf Coastal Plain" written by Lewis M. Cook in 1978, the fluids at U.S. Steel showed a radon content of 167,000 pCi/l. "This implies that very high levels of radon in the air can be expected above the water in tanks". All the tanks at In-Situ plants are vented to atmosphere. Worker at U. S. Steel were exposed to high radon levels.

•) During an agency inspection, uranium was observed flowing off the plant floor onto the ground. A solid yellow sheet of dried uranium was observed covering the ground beside the plant foundation.

•) An inspection of the control room found a chair seat coated with yellow cake measuring 1,300 counts per minute, *alpha radiation.*

•) On 8/22/81 the company blamed the workers for the high exposure levels at the plants. They said that poor personal hygiene is to blame.

•) The company reported on 2/17/82 that they had dumped 500 lbs of radioactive ash in the George West town dump. A survey of the incinerator at the plant showed a reading of 30-60 ur/hr. Radioactive material was being disposed of by burning. This was very dangerous because the radioactivity does not burn and it becomes airborne. Inhalation is the most deadly form of radiation exposure.

•) While digging a pit at the Burns plant on 8/31/83, the company discovered a plastic sewer line that used to service the old employee change room. On further investigation, the entire drainage field and septic tank was found coated with uranium. The uranium came from workers washing off the yellow cake that coated their bodies at the end of the workday. A TBRC inspector arrived on 4/17/84 and surveyed the area. Even though all of the pipe, septic tank, and drainage field pipe had been removed, the background Geiger counter reading showed 5,000 counts per minute, gamma radiation (average is 8 counts per minute).

•) During an attempt to clean up a uranium spill that had occurred, workers from three companies in Corpus Christi were overexposed to radioactivity while repairing a machine for U.S. Steel. A TBRC inspector accidentally discovered this on 3/18/85 while inspecting the Corpus companies.

•) The largest overexposure ever recorded in the TBRC files was a U.S. Steel worker on 8/9/82. Armand Salazar was exposed to a uranium level in his urine at a level of 50,494ug/l (30mg/l is the overexposure limit). The company suggested that his sample was contaminated and discounted it. They immediately fired Mr. Salazar in order to eliminate any future liability. This effectively caused the other workers to cover-up overexposures.

Because of the unplugged exploration holes at U.S. Steel, all the upper aquifers were contaminated.

In-Situ processing plants are connected to the well field by miles of PVC plumbing. The agency records show that U.S. Steel's pipes were particularly bad at breaking. Over 22 spills were reported at the U. S. Steel. A total of 1,200,000 gallons of radioactive spilled.

On 6/19/81, the largest surface spill ever recorded by the regulatory agencies, occurred at the burns site when a fiberglass pipe ruptured spilling 850,000 gallons of leaching fluid. It flowed from 4:00 a.m. to 8:00 a.m. before workers noticed it. It flowed out and covered highway 59. U. S. Steel reported to the agencies that only 100,000 gallons of fluid had spilled. The owners of the land were shocked to read about the spill in the newspapers. Neither the company nor the agencies had notified them.

To give an idea of the radiation levels involved in these spills, a 90,000-gallon spill of leaching fluid on 7/01/80 showed gamma readings in the area made the Geiger counter needle go off the scale, making measurements impossible. As shown earlier, the leaching fluids at U.S. Steel contained a radon content of 167,000 pCi/l.

Current update of regulatory action:

- •) The Texas Natural Resources Commission (TNRCC) allowed U. S. Steel to relax the restoration standards in 1998 at the Clay West and Burns/Moser sites allowing for increased contaminates in the aquifer.
- •) In 2001 they released the sites for unrestricted use.
- •) In 2002 the Texas Department of Health terminated the license for U. S. Steel.

U. S. Steel used over *2 billion gallons of water* trying to lower contaminate levels in the aquifer but was never able to reach the permit requirements.

During this time, *the agencies never levied a fined against U. S. Steel!*

For more info see the report, "Analysis of IN-SITU Uranium Mines U.S. Steel / Niagara Mohawk and Westinghouse / Wyoming Minerals".

Everest Exploration:

Everest Exploration's Mount Lucas site was a 9000-acre IN-SITU mine on the west shoreline of Lake Corpus Christi, the drinking water supply for a million people. Everest was allowed to irrigate a 105-acre irrigation site with radioactive wastewater. This is one of 5 sites in the state that were allowed to dispose of radioactive wastewater by surface irrigation. It is probably the worst site because it affected so many people.

The original permit for the mine required the radioactive waste water from the processing mill to be disposed of by deep well injection but Everest wanted to use the cheaper irrigation disposal method. The personal of the Texas Bureau of Radiation Control (TBRC) opposed the idea of radioactive wastewater disposal by irrigation. But on October 1983, the TBRC gave Everest permission to begin the untested

irrigation project on 22.5-acres located 900 feet from the shoreline of Lake Corpus Christi. The law required the Texas Department of Health (TDH) to give its permission for the project but they never did.

From 1983 to 1985 Everest was allowed to monitor the site by themselves. In 1984, the TDH personal discovered Everest had cut and bailed the radioactive hay growing on the test plot. The company intended to sell the hay for cattle feeding.

In 1985, TBRC allowed Everest to expand its irrigation site an additional 88-acres although the original 22-acre site was already showing radium-266 contamination levels 4 to 93 times higher than the permit allowed.

They were required to pre-treat the waste by using barium-settling ponds to remove the excess radioactivity from the water before irrigation. The TRBC set In-Situ limits on the treated irrigation water at 400 pCi/l radium, even though the EPA had set limits for In-Situ mine water discharge at 10 pCi/l radium. Again the TBRC personal voiced their opposition to irrigation. They opposed the "dilution-is-the-solution" disposal method and argued Everest's apparent lack of public responsibility. They pointed out that the aerosolizing / evaporation of 400pCi/l radium water would contribute significantly to the public exposure.

An inspection in 1986 noted irrigation water flowing south out of the irrigation plot and draining close to the edge of the lake. Cattle and geese were observed feeding in this area. Radium levels in the soil in this area were above the 5pCi/l remedial action limit. Another inspection that year noticed that Everest had begun to plow inside and outside the irrigation area in an attempt to spread the radiation over a larger area in order to lower the radium levels below the 5 pCi/l remediation limit.

It was reported in the 1986 Environmental Assessment report that the barium-settling pond had been built with no soil testing and no liner under the pond. The soil under the ponds was described as high permeability and the base of the pond was within 5' of the water table.

In 1986, the TRBC discovered that the company never monitored the aquifer at the site. According to the agency personal, <u>50% of the irrigation water used at the site had percolated into the shallow water table at the site.</u> According to the 1986 Environmental Assessment, the 10' deep water table was shown to rise and lower with the lake meaning it was directly connected to the lake 900-feet from the irrigation plot.

In 1987, it was discovered that Everest had not periodically removed the clay bottom as required in the permit. This was necessary to insure that the radioactive particulates that settle out of the waste stream do not build up to high levels on the pond bottom. The clay liner must be disposed of yearly at a licensed nuclear dump. That same year the TBRC discovered that Everest had used the wrong type of clays when building the ponds and the French drain monitor system under the ponds had been showing increased leaking out of the ponds.

From the beginning, the agency personal opposed this disposal but the agency licensed it anyway. After years of violating the permit requirements, the Bureau of Radiation Control closed down the site, admitting that it should never have been licensed. *The agencies never informed the citizens of Corpus Christi about the problems at the site.*

On 2/25/2002 the state issued an Emergency Order for cleanup of three Everest Exploration's sites including the Mt Lucas site. Everest also owns the Palangana, Rosita, Hobson, Tex 1 and Las Palmas IN-SITU mines.

It is interesting to note that in the 90's, it was discovered that Hugo Berlanga, the Speaker Pro-Tem of the House of Representatives, was discovered to own minerals at the URI Rosita In-Situ mine in Duval County, Texas.

For more detail, see the Texas Energy Alliance report: "Surface Exploration at the Everest Exploration, Mt. Lucas Site".

Total Minerals Corporation/COGEMA/AREVA:

There are foreign influences in Texas that are affecting our laws and contributing to our waste problems.

France is totally dependent on nuclear power plants for its electricity. In order to secure fuel for its plants the France must look to other countries for uranium ore. The French government through the French Atomic Energy Commission and the Electrical Company of France controls all aspects of the nuclear industry in France. In order to secure a stable, non-3rd world source of fuel, France has invested heavily in Texas.

Total Mineral Corporation jointly owns several In-Situ sites in Texas with Areva NC (formally COGEMA), a subsidiary of AREVA, an industrial group. Areva NC is 81% owned by the French State through the French Atomic Energy Commission with Total Minerals Corp. owing 15% and Technip (an engineering firm) 3.5%.

In Texas, Total Minerals owns 71% of the El Mesquite In-Situ mine and the Electrical Company of France owns the other 29%. They also own the Holiday, West Cole and O'Hern mines.

Areva NC provides uranium, conversion and enrichment services to 80% of the nuclear power plants in the United States. They are responsible for 52% of the world reprocessing capacities and over 80% of the MOX fuel fabrication capacities. Areva NC has a history of legally questionable activities and scientifically questionable decision-making in France (for more information see - http://www.bredl.org/pdf/Cogemafile100102.PDF).

The French promote nuclear technology to the world as a safe and clean source of electricity. But in fact, they are very dependant on other countries to dispose of their waste:

•) The mining process leaves behind 97% of the radioactive material as waste that the host country must deal with.
•) The ore is concentrated at a U.S. conversion facility before shipment to France leaving behind high-level waste product that must be disposed of in America.

Other Cowboy Stories

In the mining districts, local stories about the industries reckless practices are common:

- In Karnes County, the companies allowed the tailings waste to be used for driveways, concrete mixes and home foundations. Eventually these sites were quickly dug up by the state after a San Antonio TV station ran a special documentary about the issue.
- To lower liability, most companies did not hire the employees that worked for them. Instead they hired a subcontractor whose sole purpose was to provide an added layer of liability protection.
- Workers that had overexposures were frequently fired to remove any complications with health and liability issues. This caused many workers to falsify exposure levels in order to keep their jobs.
- Workers in the early strip mines wore no mask or protection of any kind. They described the air in the bottom of these pits as being so dusty that they had to drive their equipment in the middle of the day with the headlights on.
- Workers at the early In-Situ processing plants describe working in the drier rooms where the companies used simple open-air peanut roasters to dry out the uranium slurry. The dryers were located in un-insulated metal buildings that would heat up to over 150F in the summer. The workers would work in the nude with no protection. By the end of the day they would be entirely covered in uranium yellow cake.
- During the early years, prospectors used airplanes with sensitive instruments to find ore deposits. One flight over Karnes City recorded a radiation spike. On further investigation, it was discovered that the radiation came from clothes drying on a clothesline. They belonged to a worker from one of the uranium mines.
- For years, some companies would transport their wet yellow cake slurry from the mine to the processing plant. In some cases these plants were located several counties away. The ore was transported in open, unlined dump trucks that leaked the slurry out the tailgate onto the highway. Uranium is electrostatic and cannot be easily removed from surfaces without using acids washes. In some large spills, the state required the pavement to be jack-hammered away in order to remove it for disposal.
- A secretary that worked for one company in Kennedy, Texas explained that they would take orders for uranium over the phone. The yellow cake was stored in brown paper bags in a closet in the main office. The secretaries would have to go into the closet to retrieve the orders. A yellow cloud of dust would float into the room and remain suspended in the air, coating everything in the room. Uranium is electrostatic and will not settle until it becomes grounded on an object. The secretaries were never told of any radiation danger and never wore any protection.
- The industry still demonstrates in schools and public meetings how harmless uranium is by using a Geiger counter and a piece of paper to show how alpha waves can't penetrate the paper. This is supposed to demonstrate how safe uranium is because it can't penetrate human skin.

What they don't tell people is that uranium is a strong emitter of alpha radiation and alpha rays use up all their energy in the first 4 cells of the human body if inhaled or ingested. Once alpha-emitting uranium enters the stomach or lungs, it circulates through the body and eventually

passes through the kidney where it is excreted in the urine. Because of the high energy levels of the alpha radiation, it is considered the most deadly form of radiation inside the human body.

August 5, 2024

Reviewed By GCW

AUG 07 2024

CHIEF CLERKS OFFICE

2024 AUG -7 PM 2:45

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

See attached

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: RAYMOND STARR

Address: PO Box 957; 748 West Franklin St, Goliad TX 77963

Phone: 361 484 3698

Email (if available): RaymondStarr@sbcglobal.net

Thank you for your attention to this matter.

I am totally and emphatically opposed to issuing the renewal permit for i-situ uranimum mining in Goliad County. There is clear evidence that the nature of the geology of the region makes it highly like (inevitable) that there will be contamination of thw water supply for the region. Because of fault lines, mining practices, etc—it is clear there is likely hood the contamination will move to and affect not only water supply of surrounding landownes, but qcan evenaffect cit of Goliad Water. This I am totally against the issuing of this renewal permit.

Raymond Starr
8-1-24

Dr. Raymond Starr
PO Box 957
Goliad, TX 77963-0957

Dr. Raymond Starr
PO Box 957
Goliad, TX 77963-0957

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 AUG -7 PM 2:45

CHIEF CLERKS OFFICE

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
2 AUG 2024 PM 3 L

RECEIVED

AUG 07 2024

TCEQ MAIL CENTER
DA

Office of Chief Clerk, MC 105
TCEQ
PO Box 13087
12100 Park 35 Circle, Bldg F
Austin, TX 78753

78753819O2 CO15

Jennifer Cox

From:	PUBCOMMENT-OCC
Sent:	Wednesday, July 31, 2024 4:55 PM
To:	PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject:	FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: rachel.tyrna@hotmail.com <rachel.tyrna@hotmail.com>
Sent: Tuesday, July 30, 2024 11:46 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: MRS Rachel Tyrna

EMAIL: rachel.tyrna@hotmail.com

COMPANY:

ADDRESS: 106 ABERDEEN ST
VICTORIA TX 77904-2746

PHONE: 2817739030

FAX:

COMMENTS: I am writing to express my strong opposition to the renewal of the Class III Injection Well Area Permit (UR03075) for the Uranium Energy Corp.'s in-situ uranium mining operations in Goliad County, Texas. The potential environmental and public health risks associated with this permit renewal are significant and warrant careful consideration. Groundwater and Surface Water Contamination: Uranium mining, especially in-situ recovery (ISR) mining, poses severe risks to both groundwater and surface water systems. During the ISR process, leaching solutions are injected into the groundwater to dissolve uranium. This process can introduce radioactive isotopes, heavy metals such as arsenic, and other hazardous chemicals into the aquifer. If these contaminants migrate beyond the mining site, they could pollute groundwater that feeds into ponds, rivers, and other water bodies in Goliad, Dewitt, and Victoria counties. [oai_citation:1,Geosciences | Free Full-Text | Mitigation of Uranium Mining Impacts—A Review on Groundwater Remediation Technologies](https://www.mdpi.com/2076-3263/11/6/250) [oai_citation:2,Radioactive Waste From Uranium Mining and Milling | US EPA](https://www.epa.gov/radtown/radioactive-waste-uranium-mining-and-milling). Health and Environmental Hazards: The contamination of groundwater and surface water by uranium mining operations has been documented to pose serious health risks to humans, livestock, and wildlife. Radioactive waste, including mill tailings and raffinates, contains a high concentration of radionuclides which remain hazardous for extended periods. Radon gas, a byproduct of uranium decay, can further contaminate air and water supplies, increasing the risk of lung cancer and other health issues [oai_citation:3,Radioactive Waste From Uranium Mining and Milling | US EPA](https://www.epa.gov/radtown/radioactive-waste-uranium-mining-and-milling) [oai_citation:4,Contamination Risks Associated with In situ-Recovery Mining for Uranium – Debating Science](https://websites.umass.edu/natsci397a-eross/contamination-risks-associated-with-in-situ-recovery-mining-for-uranium/). Regulatory and Remediation Concerns: Even with stringent regulations, the history of uranium mining has shown that contamination incidents are difficult to prevent and remediate. The costs and efforts associated with cleaning up contaminated groundwater are substantial and often span decades. The EPA's guidelines for monitoring and remediation highlight the complexity and long-term nature of ensuring environmental safety post-mining operations [oai_citation:5,Contamination Risks Associated with In situ-Recovery Mining for Uranium – Debating Science](https://websites.umass.edu/natsci397a-eross/contamination-risks-associated-with-in-situ-recovery-mining-for-uranium/) [oai_citation:6,Uranium Mining | SpringerLink](https://link.springer.com/chapter/10.1007/978-3-030-72670-6_8). In conclusion, given the substantial risks of groundwater and surface water contamination, and the potential adverse health impacts on the local communities and ecosystems, I urge the Texas Commission on Environmental Quality to deny the renewal of Permit UR03075. It is imperative that we prioritize the health and safety of our environment and communities over the short-term economic gains from uranium mining operations. Thank you for considering my comments. Sincerely, Rachel Tyrna Victoria TX

RECEIVED

AUG 05 2024

AT PUBLIC MEETING

August 5, 2024

Office of the Chief Clerk, MC105
TCEQ
Post Office Box 13087
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept the below pubic comments regarding the above referenced permit renewal.

I am very concerned you will renew this contract and start polating the ground water again. It is just starting to get better from the last time. What plans do you have to treat the contaminated water?

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Janie von Dohlen

Address: 248 Hill Ave

Phone: 361-648-1001

Email (if available): jvondohlen@gmail.com

Thank you for your attention to this matter.

RECEIVED
AUG 0 5 2024
AT PUBLIC MEETING

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Carol Warren, David Warren

Mailing Address: 1235 Hallemann Rd

Physical Address (if different): ______

City/State: Goliad TX **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: Carolwarrendvm@yahoo.com

Phone Number: 361-212-3165

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☐ No

  If yes, which one? ______

☐ **Please add me to the mailing list.** – already on

☐ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

Against Uranium Mining

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

April 28, 2024

Reviewed By GC

MAY 0 2 2024 PM

CHIEF CLERKS OFFICE

2024 MAY -1 PM 2:45

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: Cynthia Warzecha
Address: 1742 East FM 1961 Goliad, TX 77963
Phone: 361-564-7572
Email (if available): cinnddee@gmail.com

Thank you for your attention to this matter.

Cynthia Warzecha

Mailing Address: P.O. Box 656
Cuero, TX 77954

April 28, 2024

Reviewed By

MAY 0 2 2024 PM

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

2024 MAY -1 PM 2:45

CHIEF CLERKS OFFICE

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Name: N. Michael Warzecha

Address: 1742 E. FM 1961

Phone: 361-564-7571

Email (if available): mwarzecha@hotmail.com

Thank you for your attention to this matter.

N. Michael Warzecha

Mailing address: P.O. Box 656
Cuero, TX
77954

P.O. Box 656
Cuero, TX 77954

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 2 L

QUALITY
2024 MAY -1 PM 2:44
CHIEF CLERKS OFFICE

RECEIVED
MAY 01 2024
TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Tuesday, August 13, 2024 10:23 AM
To: PUBCOMMENT-RMD; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number UR03075

From: 2bearmouse@gmail.com <2bearmouse@gmail.com>
Sent: Tuesday, August 13, 2024 10:18 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Gary Paul Weise

EMAIL: 2bearmouse@gmail.com

COMPANY:

ADDRESS: 255 GARZA RD
GOLIAD TX 77963-3508

PHONE: 3617740716

FAX:

COMMENTS: I believe the UEC has an ulterior motive and that is to obtain the permit for the deep radioactive waste well wich I believe UEC will use for operating a radioactive waste disposal service sold to companies other than UEC. I also believe the near surface uranium mining is a serious mistake and should not be allowed because it will loose uranium into the shallow water table. Please deny the permit.

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: Katy, Colt Williams

Mailing Address: 363 Santa Rita Blvd

Physical Address (if different): ______

City/State: Goliad **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: knockawayfarm@gmail.com

Phone Number: 361-894-4647

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☑ No

  If yes, which one? ______

☑ **Please add me to the mailing list.**

☐ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

RECEIVED
AUG 0 5 2024
AT PUBLIC MEETING

My well is located about 160 ft in B sand. Are you saying that I need to monitor my well regularly? This well supplies my family and my livestock with clean drinking water. who will be responsible for the uranium, arsnic and radon gas released into our drinking water that can contaminate my cows and cause cancer in myself and my children.

11

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: ROBERT WOOD

Mailing Address: P. O. BOX 645

Physical Address (if different): ______

City/State: GOLIAD, TX **Zip:** 77963

This information is *subject to public disclosure under the Texas Public Information Act*

Email: ______

Phone Number: ______

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☑ No

  If yes, which one? ______

☐ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)

Please give this form to the person at the information table. Thank you.

Reviewed By GC

MAY 0 2 2024 PM

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

2024 MAY -1 PM 2:48

CHIEF CLERKS OFFICE

April 28, 2024

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

Re: Uranium Energy Corp.; TCEQ Permit # UR03075

Dear TCEQ:

Please accept this notification of my request for a Public Meeting regarding the above referenced permit renewal.

I am very concerned about the negative impacts this permit will have on the quality and quantity of my water supply. Groundwater is my sole source of potable water.

Name: David A. Wright

Address: 1372 FM 2443 Kenedy Tx 78119

Phone: 361-218-3175

Email (if available): dwright7770@gmail.com

Thank you for your attention to this matter.

[signature]

David Wright
1312 FM 2443
Kenedy, TX 78119

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
29 APR 2024 PM 3 L

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2024 MAY -1 PM 2:48

CHIEF CLERKS OFFICE

RECEIVED

MAY 01 2024

TCEQ MAIL CENTER
DA

Office of the Chief Clerk
TCEQ
12100 Park 35 Circle, Building F
Austin, Texas 78753

78753-180800

Jennifer Cox

From: PUBCOMMENT-OCC
Sent: Thursday, August 8, 2024 2:32 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075

Jesús Bárcena
Office of the Chief Clerk
Texas Commission on Environmental Quality
Office Phone: 512-239-3319

How is our customer service? Fill out our online customer satisfaction survey at:
www.tceq.texas.gov/customersurvey

From: billyoast@gmail.com <billyoast@gmail.com>
Sent: Thursday, August 8, 2024 12:58 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Bill Yoast

EMAIL: billyoast@gmail.com

COMPANY:

ADDRESS: 2932 N US HIGHWAY 183
GOLIAD TX 77963-3633

PHONE: 3614294294

FAX:

COMMENTS: I oppose this permit being issued/renewed

2

TCEQ Public Meeting Form
August 5, 2024

Uranium Energy Corp.
Permit No. UR03075

Application to Obtain
A Class III Injection Well Area Permit Renewal

PLEASE PRINT

Name: DENNIS ZENGERLE

Mailing Address: 1405 ROY CT PEARLAND, TX 77581

Physical Address (if different): " "

City/State: PEARLAND, TX **Zip:** 77581

This information is *subject to public disclosure under the Texas Public Information Act*

Email: DENROB33@SWBELL.NET

Phone Number: 832-630-0479

- Are you here today representing a municipality, legislator, agency, or group? ☐ Yes ☑ No

  If yes, which one? ______

☑ **Please add me to the mailing list.**

☑ **I wish to provide formal *ORAL COMMENTS* at tonight's public meeting.**

☐ **I wish to provide formal *WRITTEN COMMENTS* at tonight's public meeting.**

(Written comments may be submitted at any time during the meeting)
Please give this form to the person at the information table. Thank you.

Ellie Guerra

From: PUBCOMMENT-OCC
Sent: Wednesday, July 19, 2023 6:02 PM
To: PUBCOMMENT-OCC2
Subject: FW: Public comment on Permit Number WDW423
Attachments: Zengerle Public Comments on UR030751.docx; Zengerle Public Comments on UR030751.docx

From: denrob33@swbell.net <denrob33@swbell.net>
Sent: Wednesday, July 19, 2023 2:44 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WDW423

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: WDW423

DOCKET NUMBER: 2022-1553-WDW

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Dennis Zengerle

EMAIL: denrob33@swbell.net

COMPANY:

ADDRESS: 1405 ROY CT
PEARLAND TX 77581-6323

PHONE: 8326300479

FAX:

COMMENTS: Please see the attachment "Zengerle Public Comments on UR03075'.

Concerns:

- Testing done previously is out dated and new test should be performed.

- It is my understanding mining operations consume huge amounts of water. Each year, more and more people are moving to our beautiful area. As drought conditions have only been increasing, the demand for the ground water will only continue to increase. Adding to the burden on our aquifers from the mining operations doesn't seem to be the right thing to do.

Stability of the Layers & Safety of the Aquifers:

It's not too late to hire or obtain the input/experience of a geologist not associated or affiliated with the Uranium Mining Co whom can provide:

- Input concerning the safety of the mining operation both short term and long-term 500+ years out. The impact resulting from mishaps in this industry can last for thousands of years. I do not believe we can be overly concerned.

- The expected stability short term and long-term, 500+ years out of associated layers, and what impact can the ~200+ earthquakes that occur in Texas yearly have on the layers?

- What impacts will/can fracking have on the layers and the aquifers?

- How much horizontal layer shift has or, can be expected to occur. Note: It is my understanding some of the Well Casings of wells drilled in the 50's have been bent and no longer accessible as a result of horizontal shifting of the layers. This has resulted in fluids relocating and mixing with other fluids at other elevations.

- Record high temperatures around our planet, are currently being broken daily. As the impacts of Global warming continue to be realized each year, what assurance if any, will the continued rise of sea levels have on the flow directions of the Aquifers in or around the mining operations? It is my understanding as the permafrost throughout our planet continues to thaw at rates way above all previous forecasts, more CO_2 is being released daily into our atmosphere which is only adding to the impacts of Global Warming and creating increased demands on our water.

- Will the operation be 100 % safe? NOTE: this industry does not have a past history of being responsible to their impacts on our environment or, to the landowners when mistakes have occurred. Bankruptcy is all too often the industry's safety net for their investment and profits while the landowners are left with the present and future generations being destroyed.

Personal Impact of Contaminated Groundwater:

- I use the Ground Water to: hydrate my body, bath, wash dishes, wash clothes, water my garden and, my cattle and the abundant wildlife use it. Should the groundwater become contaminated, my land would become useless and a burden. The property was obtained after lots of sacrifice and extremely hard work by my grandfather, passed onto my father, then passed onto me and, the maintenance, care and love for the property is being continued by my son with the anticipated heirs to continue to be able to enjoy this beautiful piece of land.

- Ongoing discussions have been taking place concerning future plans for the property which include: growing grapes, with the possibility of a winery, developing portions of the property for weekend cottages and, a retreat center.

Question: should the mining operation have any accidents or, experience oversites and miscalculations from engineering, consultants and or management/employee mistakes: Equipment improperly maintained, misuse of equipment, misunderstanding of the correct operating procedures, insufficient training and/or communication of training which would result in our groundwater being contaminated, would the landowners be held immediately or at some point in the future responsible/liable if we bring the groundwater to the surface and the cattle and wildlife consume this contaminated water?

- In the attempt to be 100% assured our ground water is safe, how often would our water be required to be tested and, who would bear that cost? I ask this because several individuals that participated in the 7-17-2023 Hearing shared they had experienced changes in the groundwater as a result of activities from the mining co.

- Is it possible the hearing that took place on 7-17-2023 at the Goliad County Groundwater Conservation District could be repeated? I ask this because myself

and others found the acoustics in the building in additions to the AC blower each time it came on, made hearing and understanding what was being said to either be impossible or, very difficult. NOTE: when I spoke, I brought attention to this at the SOAH preliminary hearing on 7-17-2023.

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Marielle Bascon

From: PUBCOMMENT-OCC
Sent: Wednesday, July 19, 2023 6:01 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-RAD
Subject: FW: Public comment on Permit Number UR03075
Attachments: Zengerle Public Comments on UR030751.docx

From: denrob33@swbell.net <denrob33@swbell.net>
Sent: Wednesday, July 19, 2023 2:43 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number UR03075

REGULATED ENTY NAME GOLIAD PROJECT

RN NUMBER: RN105304802

PERMIT NUMBER: UR03075

DOCKET NUMBER:

COUNTY: GOLIAD

PRINCIPAL NAME: URANIUM ENERGY CORP

CN NUMBER: CN603228461

NAME: Dennis Zengerle

EMAIL: denrob33@swbell.net

COMPANY:

ADDRESS: 1405 ROY CT
PEARLAND TX 77581-6323

PHONE: 8326300479

FAX:

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