







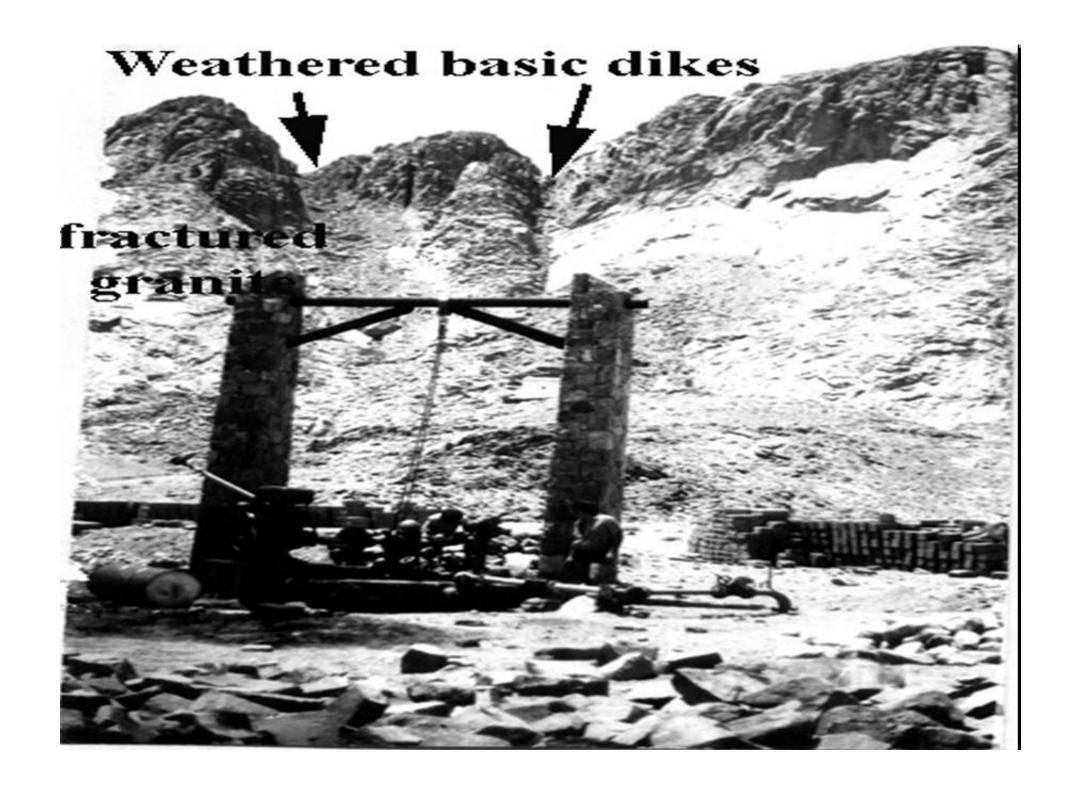


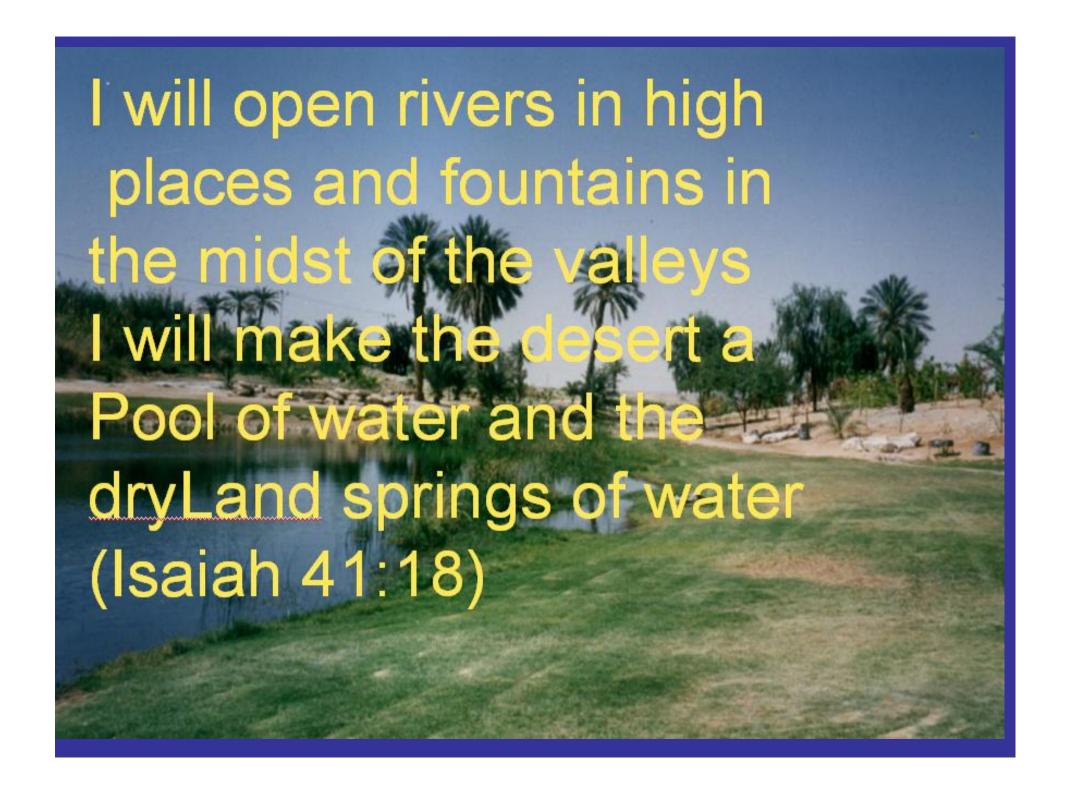


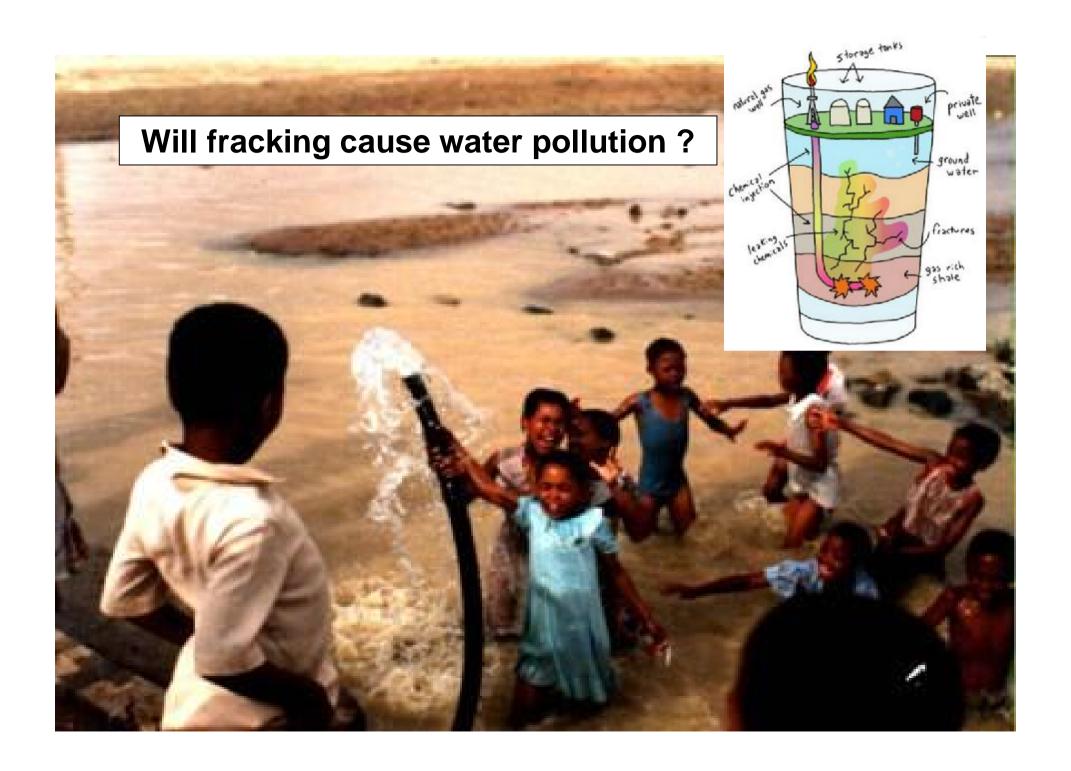
# "THE BIBLICAL STORY OF MOSES STRIKING THE ROCK TO GET WATER THE FIRST REPORT ON WATER IN FISSURED ROCKS"

Arie S. Issar,
Professor Emeritus Ben Gurion
University of the Negev, Beer Sheya Israel

## Weathered basic dike fractured granites monastery







#### Pennsylvania law on fracking chemicals worries doctors

On May 15 the Ohio State Senate approved legislation that would prevent physicians from sharing information about patients' exposure to hydrofracking chemicals with their local health departments, first responders, or anyone else who might have been

New PA Law Lets Doctors Know What
Chemicals Are Killing You - But They're Not
Allowed To Tell You

**Doctors Call for Fracking Moratorium** 

#### **LOVE CANAL**

### POLLUTION DISASTER

#### **Lois Gibbs**

**Director of CHEJ** 

(Center for Health, Environment and Justice , CHEJ)

#### Mother of the

SUPERFUND

in the US

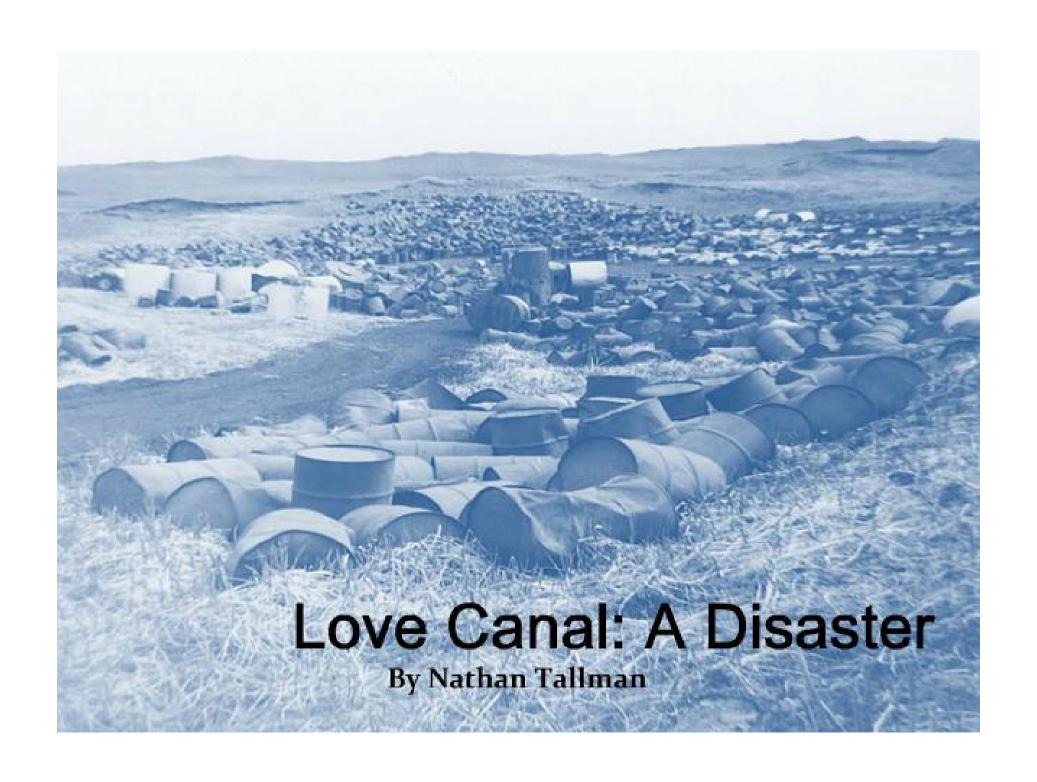


#### Lois Gibbs on Fracking

Fracking is comparable to the Love Canal pollution Disaster

Love Canal: Companies buried hazardous chemicals just below surface

Fracking: hazardous chemical are injected deep down into the earth from where it will found pathways to move upward and pollute our fresh water aquifers



WE'VE GOT BETTER THINGS TO DO THAN ! SIT AROUND AND BE

Infrared aerial photo of Love Canal area (taken in spring 1978) showing 99th Street elementary school in center, two rings of homes bordering the landfill and LaSalle Housing Development in upper right. White patchy areas indicate barren sections where vegetation will not grow, presumably due to leaching chemical contamination.



#### Chronology

- 1894 William T. Love begins construction of the Love Canal
- 1900's Construction stops
- 1947-1952 Hooker Chemical and Plastics uses site for hazardous waste disposal 22 000 ton chemical
- 1953 Hooker sells site to Niagara Falls School Board under pressure
- 1955 99<sup>th</sup> Street Elementary School erected

- 1975-1976 Heavy rainfall raises the water table
- April 1978 NYS Health Commissioner Robert
   Whalen declares a health threat in area, residents start
   to organize efforts and demand closing of 99<sup>th</sup> Street
   Elementary School
- August 2<sup>nd</sup>, 1978 Commissioner Whalen declares
   State of Emergency, closes the 99<sup>th</sup> Street Elementary
   School, recommends pregnant women and children
   under two to evacuate

- August 7<sup>th</sup>, 1978 President Carter declares Federal
   State of Emergency and provides funds for evacuation
   (pregnant women and children under 2) of1<sup>st</sup> Ring
- February 8<sup>th</sup>, 1979 President Carter orders evacuation of 2<sup>nd</sup> Ring
- May 17<sup>th</sup>, 1980 EPA announce chromosome damage found in health study

- May 19<sup>th</sup>, 1980 Upset by EPA announcement and lack of any follow-up action, Love Canal residents hold two EPA members hostage, demanding action
- May 21<sup>st</sup>, 1980 President Carter agrees to temporarily evacuate all residents (within rings one and two)
- October 1<sup>st</sup>, 1980 President Carter signs
   SUPERFUND, providing funds for permanent relocation and remediation

- September 1988 NYS Department of Health declares parts of Love Canal area habitable and resettlement planning begins
- 1988-1990 Former residence protest resettlement
- August 15<sup>th</sup>, 1990 Love Canal area renamed Black Creek Village and resettlement begins

#### Health Problems

- Birth defects:
  - Cleft palate
  - Slight retardation
  - Extra row of teeth
  - Eye defect
- Miscarriages
- Increase in number of those with cancer



Increased urinary tract infections

LOIS GIBBS "How dare they! How dare they made a decision about my little girl or boy living or dying!" Gibbs yelled. "The current trends in hydrofracking mirror the serious reality of water poisoning in Niagara Falls"

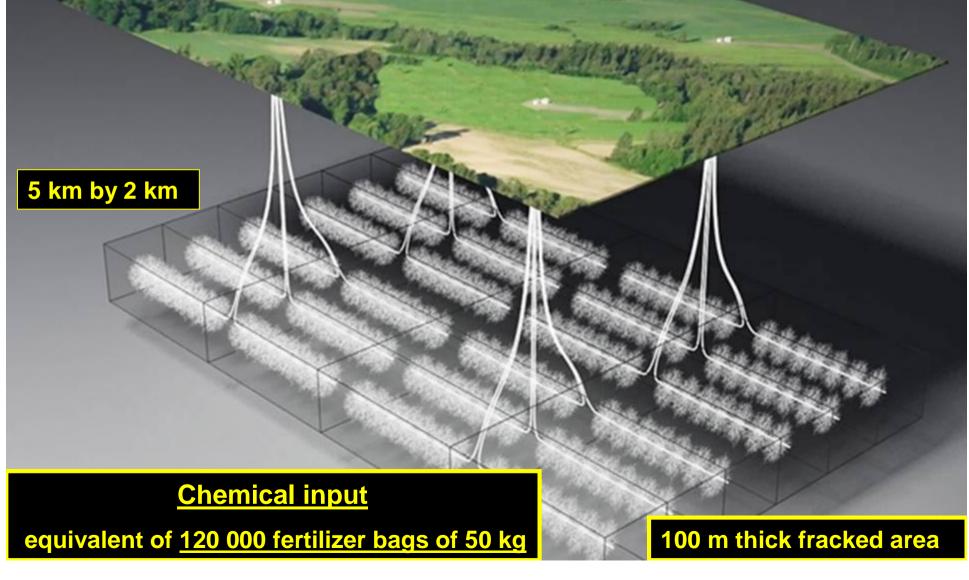


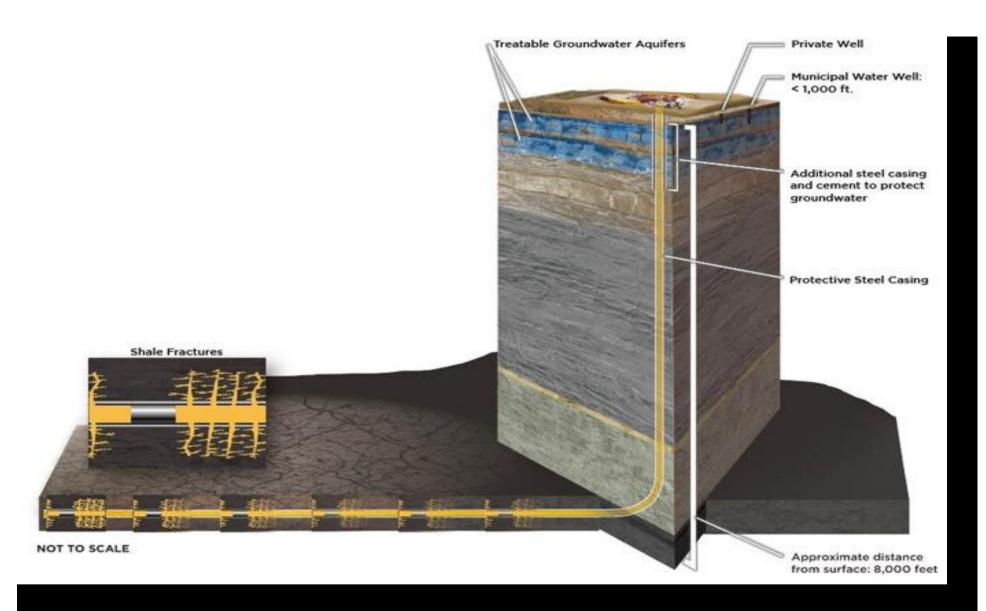
#### LOIS GIBBS

The main lesson to be learned from the Love Canal crisis is that in order to protect public health from chemical contamination there needs to be a massive outcry

- a choir of voices.....

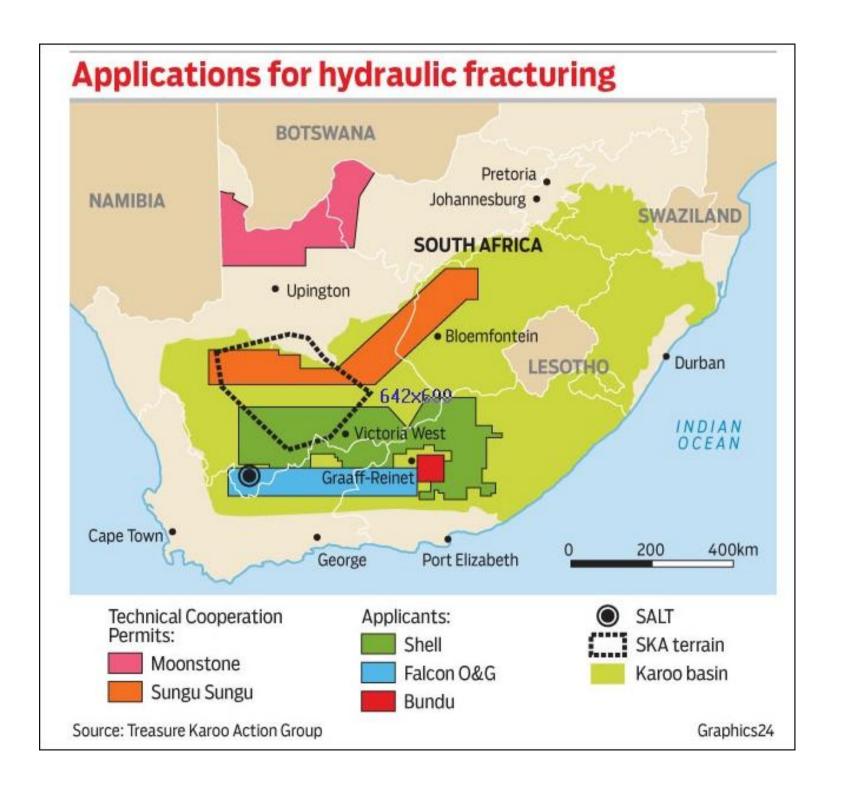
## Mr. Jan-Willem Eggink: 1 000 ha fracked from 30 boreholes **240 Olympic swimming** pools of water require



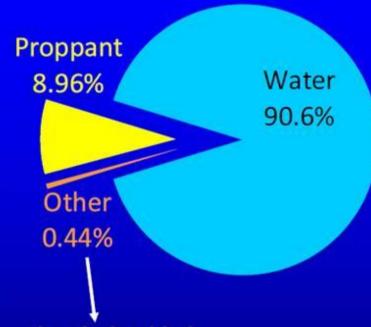


700bar: 20 million liters of water; 5 % sand; 1% chemicals

Chemicals = 4 000 fertilizer bags of 50 kg for each borehole



#### **Fracturing fluid composition**



#### Chemicals added

Friction reducer: reduce the pumping cost (polymer)

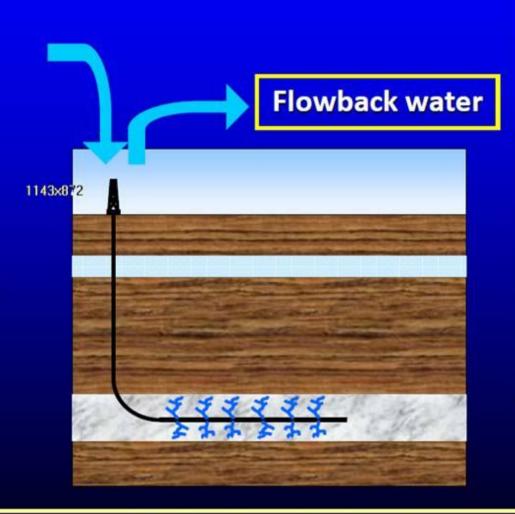
Acid: clean the wellbore

Antiscalant: limit precipitation and

scaling

Biocides: limit bacteriological growth

glutaraldehyde)





#### What is in the water?

'Tests' only discover (yes/no and how much) of what you decide to look for in a sample



#### **Chemicals in use in Wyoming**

		_				_									2				-			
	Chemical	# of Products	Product	Purpose	CAS#	evaporates/volati	Water Soluble/	Cancer	Mutagen	Cardiovascular	Developmental	Endocrine	Gastrointestinal	Immune	Kidney	Brain and	Reproductive	Respiratory	Skin, eye and	Ecological	Other	Clothing
-1	(2-BE) Lung glycol monobutyl ether	1	AQF-2, U66, F806, Detergent	Surfactant, solvent,	111-76-2	x	м	s		s	s	s	s	s	s	s	s	s	s	s	s	R,G,C
2	1-Propanaminium, 3- amino-N- (carboxymethyl)-N,N- dimethyl-, N-coco acyl derivs, inner salts	1	HC-2	Surfactant,	61789-40-0		x							s					s			
3	2,2',2"-Nitrilotriethanol	1	J 318 Liquid Breaker Aid	Liquid breaker aid, fracturing	102-71-6	x	x	s	s	s		s	s	s	s	s	s	s	s	s	s	R,G,E
4	3-Phenylpropenal	1	M295	Hydrogen sulfide scavanger	104-55-2	x	x		s		s		s	s		s	s	s	s	s	s	G,C,E
5	Acetaldol	1	SCA-130 Inhibitor	Inhibitor	107-89-1	x	x						s			s		s	s		s	R,G,C
6	Acetic acid	3	BA-20, Clear FRAC-EF, FE- 1A,	THE PERSON NAMED IN	64-19-7	x	x			s	0		s	s	s	s		s	s	s	s	R,G,C
7	Acetic anhydride	1	FE-1A	Additive, fracturing	108-24-7	x	X	s		s	s	s	s		s	s = 1	s	s	s		s	R,G,E
8	Acrylamide (2- Propenamide)	2	Acrylamide, Alcomer 60RD #2	Unknown, flocculant	79-06-1	x	x	x	s	s	s	s	s	s	s	s	s	s	s	s		R,G,C
9	Acrylic acid	1	Alcomer 60RD #2	Flocculant	79-10-7	x	x	s	s	s	s		s	s	s	s		s	s	s	s	R,G,C
10	Alcohols, C10-16, ethoxylated with 6.5 EO (Alcohols, C10-16, ethoxylate)	1	B145 #1	Friction reducer, fracturing	68002-97-1	x	x						s					s	s	s		R,G,E
11	Aliphatic hydrocarbon	1	HME Energizer	Surfactant, fracturing	64742-96-7	x							s	y V	s	s		s	s	y v	s	R,G,C E



#### 188 listed hydrofrac chemicals/ additives

## Headings in spreadsheet

http://www.endocrinedisruption.co m/chemicals.spreadsheets.php

http://www.endocrinedisruption.co m/chemicals.spreadsheets.php

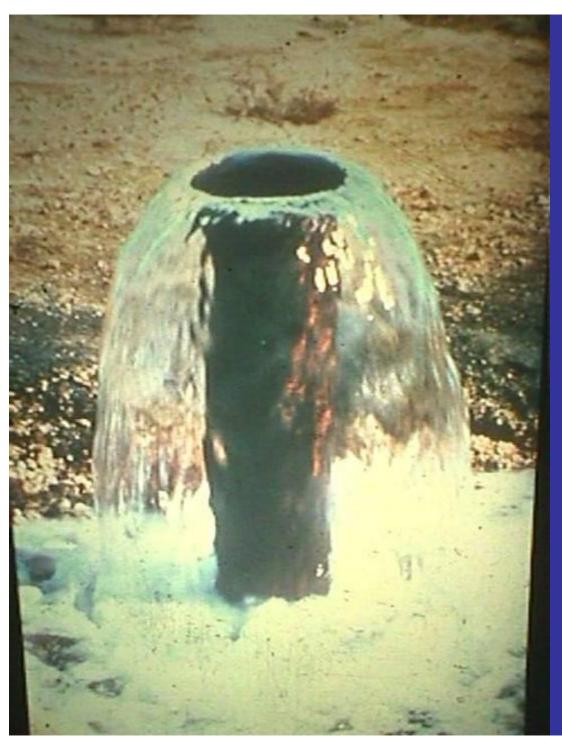
Chemical # of Products **Product Purpose** CAS# Readily evaporates/volatile Water Soluble/ Miscible Cancer Mutagen Cardiovascular and blood **Developmental Endocrine disruptors Gastrointestinal and liver Immune** Kidney **Brain and nervous system** Reproductive Respiratory Skin, eye & sensory organ **Ecological** Other **Protective Clothing** 

Health Effect Category	Number of Chemicals	Percent of Chemicals
Gastrointestinal and liver	21	100%
Respiratory	21	100%
Skin, eye and sensory organ	21	100%
Other	20	95%
Cardiovascular and blood	19	90%
Brain and nervous system	19	90%
Kidney	17	81%
Ecological	15	71%
Immune	11	52%
Developmental	10	48%
Reproductive	9	43%
Mutagen	7	33%
Endocrine disruptors	7	33%
Cancer	6	29%

#### Chemicals that can move through water

Of the 54 chemicals identified by DEP as being used in fracking fluids, 34 are soluble, allowing them to move into surface and underground water.

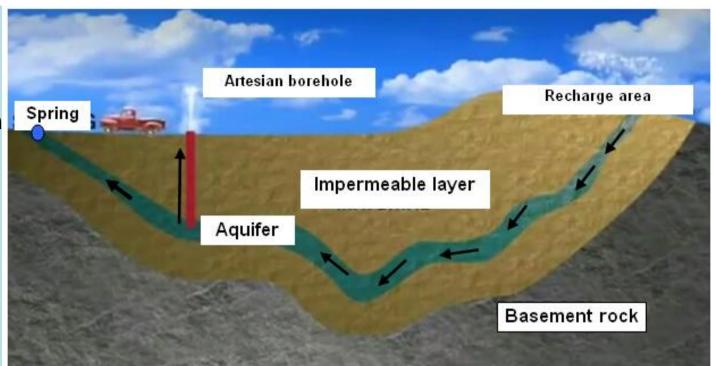
Health Effect Category	Number of Chemicals	Percent of Chemicals				
Skin, eye and sensory organ	34	100%				
Respiratory	32	94%				
Gastrointestinal and liver	31	91%				
Cardiovascular and blood	26	76%				
Other	26	76%				
Brain and nervous system	25	74%				
Kidney	21	62%				
Ecological	21	62%				
Immune	19	56%				
Developmental	14	41%				
Cancer	11	32%				
Endocrine disruptors	11	32%				
Reproductive	11	32%				
Mutagen	10	29%				



## Artesian borehole Karoo Basin is Artesian

Water at 3km depth is 90 degrees C, salty and contains radioactive material

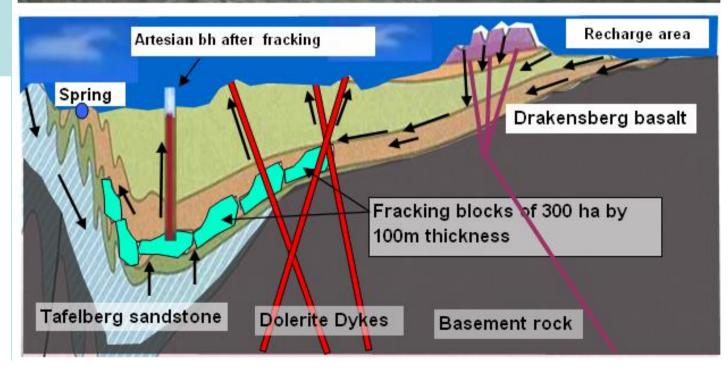
#### Great Artesian Basin Australia

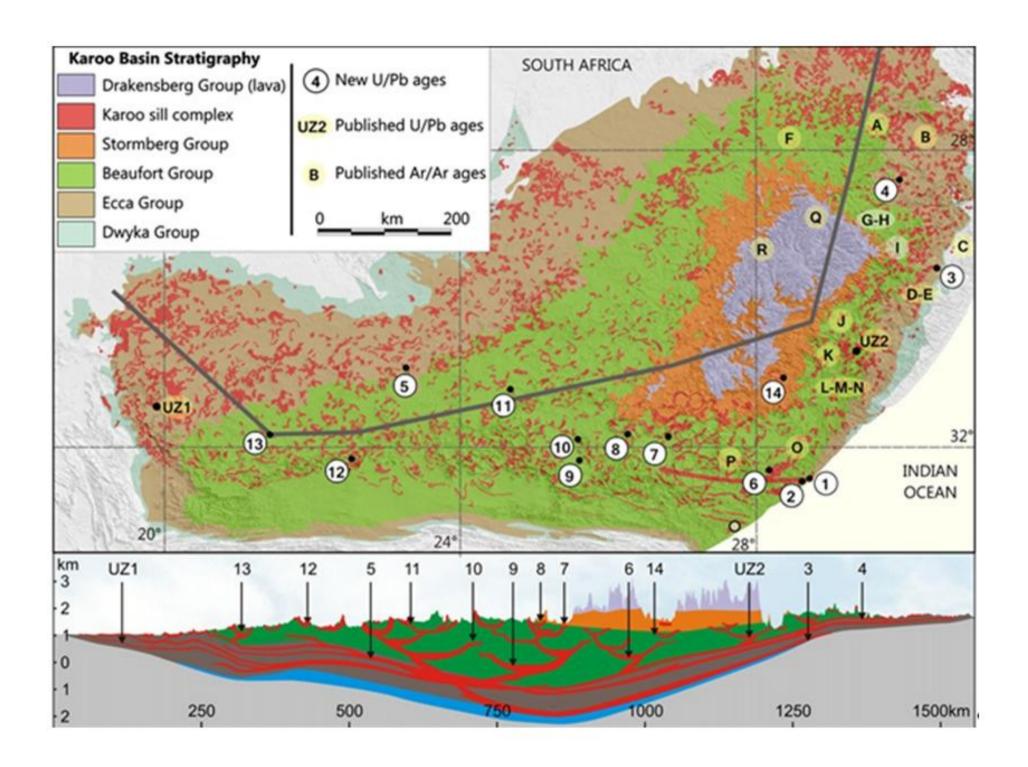


#### Karoo Artesian Basin

Blue aquifers will have an area of 2 million ha in 100 years if 10% is fracked

Will contain dirty water equivalent to 20 million olympic pools



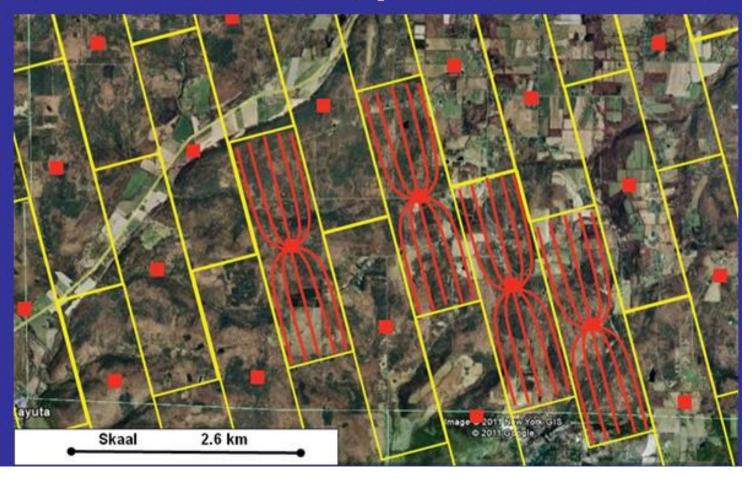


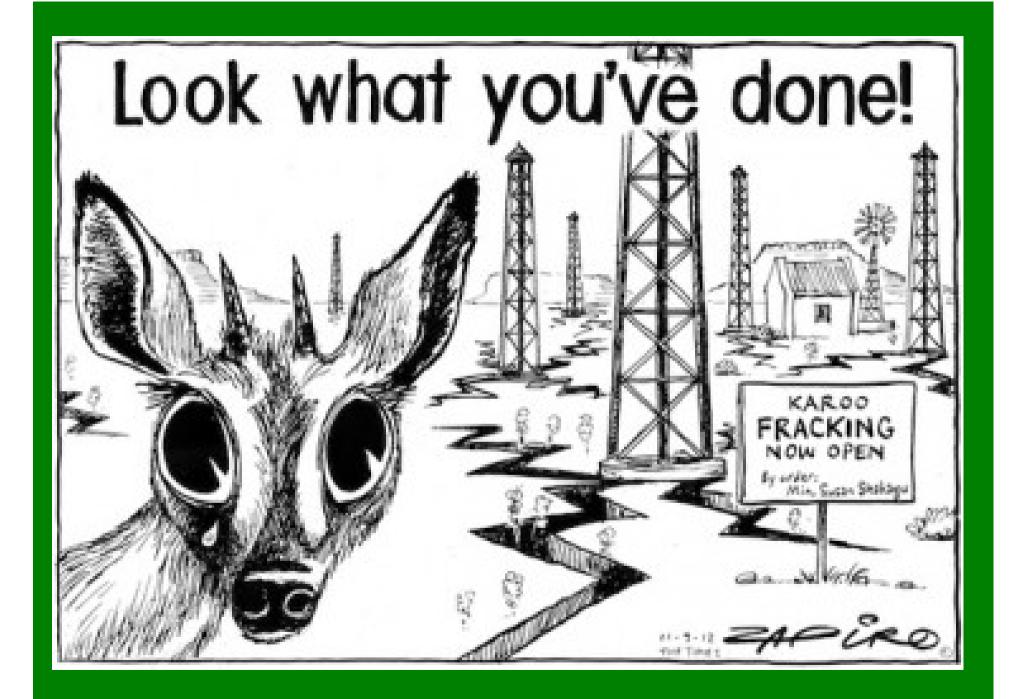
#### **FOOTPRINT**

#### Function of number of well pads

USA = maximum of 1 pad per 260 ha allowed

Will there be 100 pads? or 10 000?





### A mother's exposure to fracking before birth increases the overall prevalence of low birth weight by 25 percent

**Elaine Hill, Cornell University doctoral candidate** 





Three northeastern Pennsylvania families have reached a \$1.6 million settlement with a gas drilling company over contaminated water wells.

23rd June 2012, Associated Press, Pittsburgh

Attorney Todd O'Malley said he believes this is the first case involving pollution in the Marcellus Shale region where settlement terms were publicly disclosed. Past disputes have been sealed.



#### **Albert Schweitzer**

Man has lost the capacity to foresee and to forestall,

he will end by destroying the world

