

What can go wrong?

Woods E. Houghton

Eddy County Agriculture Agent

and

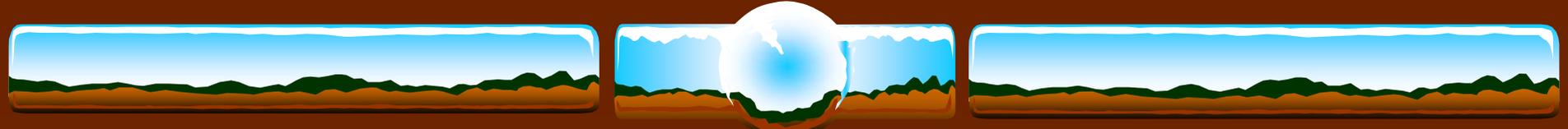
Jim Libbin Extension Agriculture

Economist

Discovery Process

- ❖ 30 July 02 Eddy County Agent received a request from Oscar Vasquez to look at his cotton field
- ❖ The field look totally burned in a very uniform destruction.
 - ❖ Disease unlikely but samples were sent to NMSU Dr. Goldberg.
 - ❖ Nematodes unlikely, samples send to Dr. Thomas NMSU nematologist
 - ❖ Nutrient deficiency unlikely, samples sent Dr. McWilliams

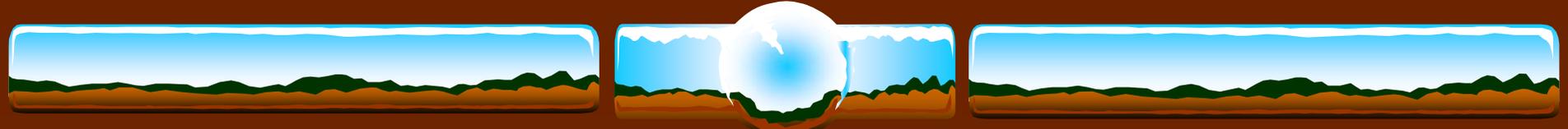




Discovery

- ❖ Aerial chemical application was a possibility.
 - ❖ Lesser effected plants were not consistent with direction of boll weevil control application.
- ❖ Lesser effected plants were on high ground which did not receive as much water.
 - ❖ Also plants on the field turnouts were greatly effected.





Discovery

- ❖ It was probable that the irrigation water was contaminated. But by ??
- ❖ Possibilities thought of.
 - ❖ Brine water
 - ❖ Benzoic chemicals
 - ❖ Oil and gas?
 - ❖ Illegal activities?
- ❖ Soil samples of lesser effected plant site and greater effected plant site were sent to Dr Flynn for salinity analysis.





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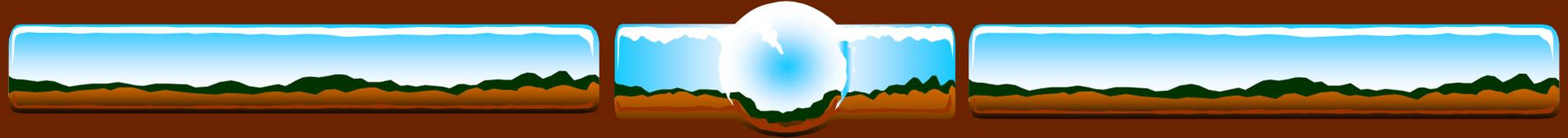
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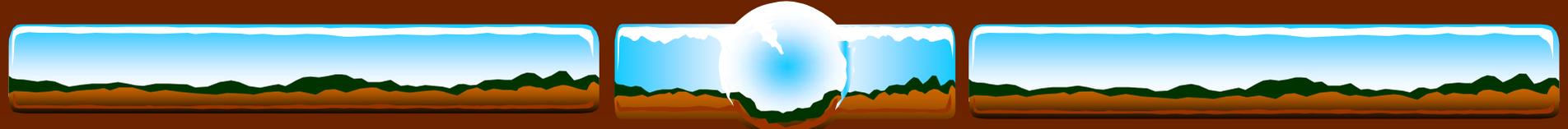
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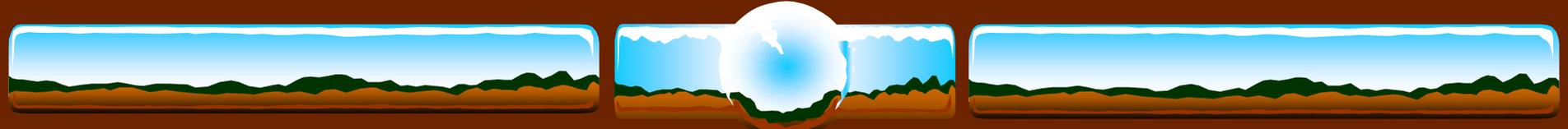
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Discovery

- ❖ On 3 August 02
 - ❖ County Sheriff office was notified of possible dumping
 - ❖ New Mexico Surface Water Quality Bureau notified
 - ❖ Carlsbad Irrigation District notified
- ❖ On 7 August 02 I flew over the affected area in county aircraft looking for anything unusual.
 - ❖ We could see browning of vegetation up to Black River diversion.

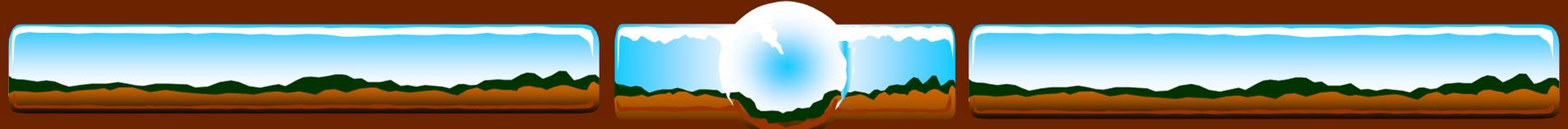




Discovery

- ❖ We also observed area flooding





Discovery

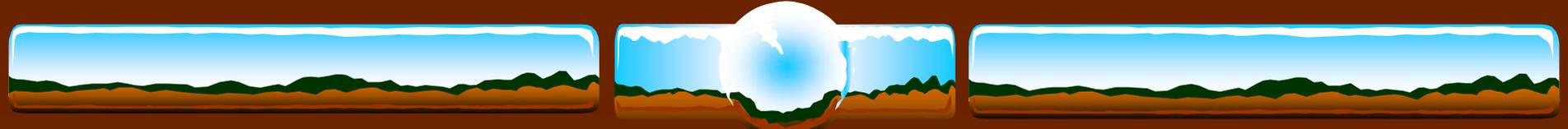
❖ Plant Symptoms

- ❖ Chlorosis, necrosis at the tops of most plants.
- ❖ Cupping of leaves
- ❖ Root hair damage
- ❖ Fruit and squire drop

❖ Result from Ec test

- ❖ Ec at the effected plant site were $<$ Ec from the lesser effect plant site.

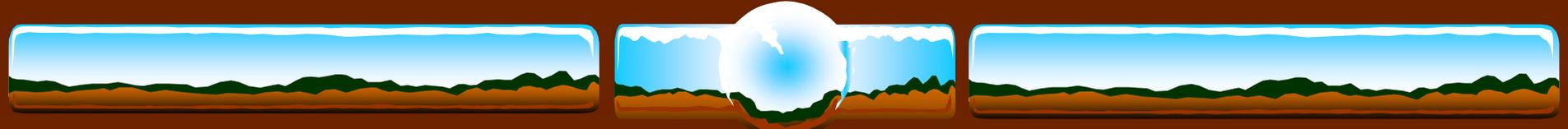




Discovery

- ❖ Ec test indicted chemical was brought to the field in the water.
- ❖ Symptoms indicated that the chemical was a photosynthesis inhibitor and was take up by the roots with the water.

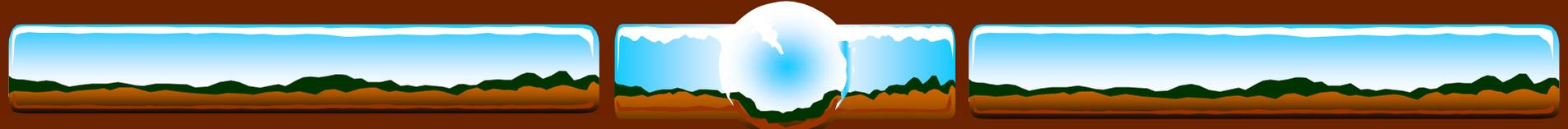




Discovery

- ❖ By phone Dr. Goldberg, Dr. Mc Williams indicated probable herbicide injury. Agreed that it was water soluble, taken up by the roots and photosynthesis inhibitor.
- ❖ Field history collected on the first day.
 - ❖ Caparol was put down by the farmer in January. Any effect would have been seen before now and it was put down the same in all fields.

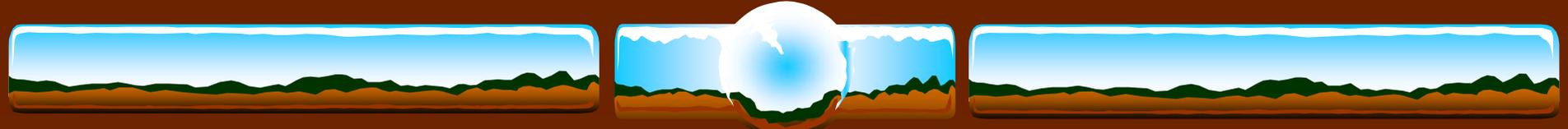




Discovery

- ❖ Had to consider the volume of product required to contaminate 150 acres (known to be affected at the time).
- ❖ At 4 acre inches ~24,000 gal was contaminated based on the number of acres thought to be effected.
- ❖ A large volume of product was required to cause this wide spread damage



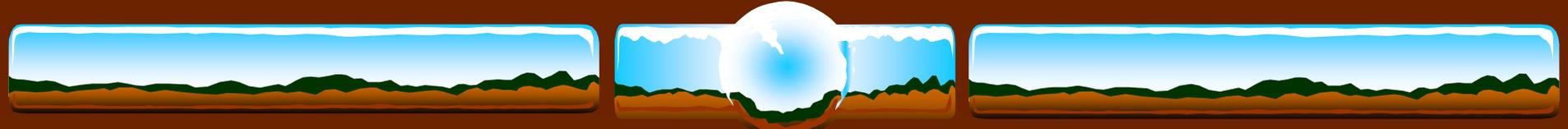


Discovery

❖ Looking through the list of possible chemicals:

- ❖ Aatrex
- ❖ Bladex
- ❖ Caparol
- ❖ Milo-Pro
- ❖ Princep
- ❖ Velpar
- ❖ Sinbar
- ❖ Hyvar
- ❖ Korvar

- ❖ Bucril
- ❖ Basagran
- ❖ Tough
- ❖ Karmex
- ❖ Cotoran
- ❖ Lorox
- ❖ Tupersan
- ❖ Spike
- ❖ Stam



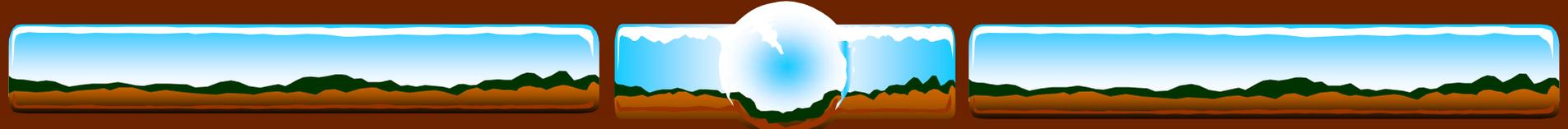
Discovery

❖ Which of these chemical are used in large volume in Eddy County?

- ❖ Caparol (Cotton)
- ❖ Velpar (not much, Mesquite)
- ❖ Sinbar (Alfalfa)
- ❖ Hyvar (non-cropland)
- ❖ Krovar (non-cropland)
- ❖ Bucril (small grains)
- ❖ Karmax (corn)
- ❖ Spike (non-cropland)

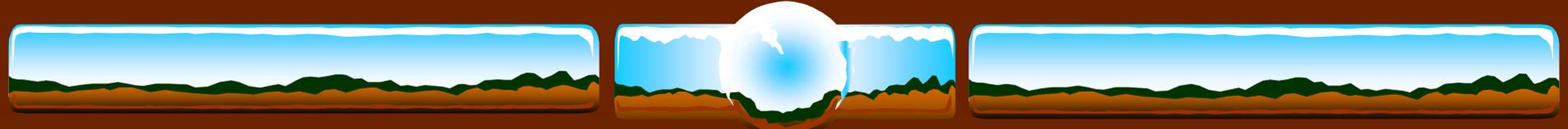
❖ Which of these chemicals would be possibility used above blackriver diversion in high enough volume to cause 150 acres crop damage?

- ❖ Hyvar (oil and gas sites)
- ❖ Krovar (oil and gas sites)
- ❖ Spike (range brush control)



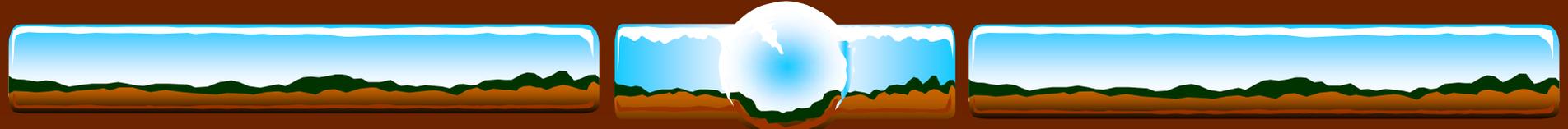
Discovery

- ❖ BLM was contacted to determine if Spike had been applied recently above the blackriver diversion. They indicated it had early July 2002.
- ❖ Maps that indicted Oil and gas sites most likely too small of an area, less then 70 acres, to supply large amounts of any products.
- ❖ On 8 August 2002: Dow Agro Sciences, NMDA, BLM, NRCS, NMED and CID were contacted about possible off target movement of Tebuthiuron (Spike).



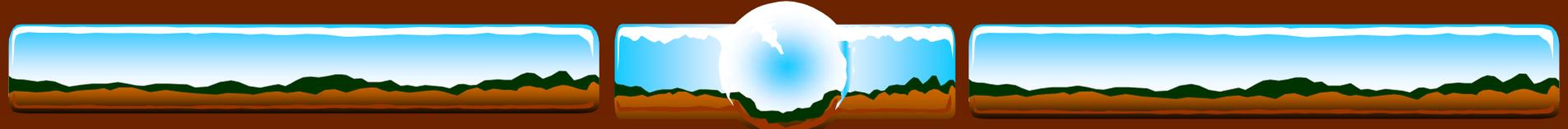
Discovery

- ❖ 9 August 02 Russell Knight NMDA, and Woods Houghton County Agent, sampled soil and tissue for NMDA and Dow Agro Science.
- ❖ Dr. Keith Duncan Range Brush Specialist NMSU Extension Service was consulted and he observed fields and the treatment target and the diversion.
 - ❖ Dr. Duncan felt the symptoms did not make an exact match with Spike. Spike usually starts at the bottom of the plant not the top. Agreed what ever the cause it was a something taken up in the root from water and was a photosynthesis inhibitor.



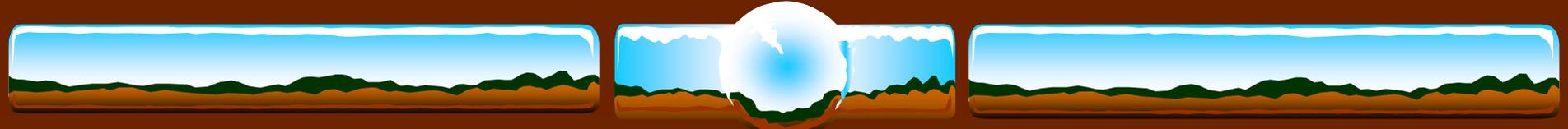
Discovery

- ❖ Dr. Duncan contacted Dr. Mc Daniel and had me e-mail photo of plants to him. Dr. Mc Daniel concurred with Dr. Duncan.
- ❖ Dr. Duncan and Dr. Mc Daniel put out plots on cotton at the Artesia Plant Science Center using Spike at three different concentrations. Five days latter these test plots of cotton were showing very similar symptoms as was observed in Malaga cotton fields.



Discovery

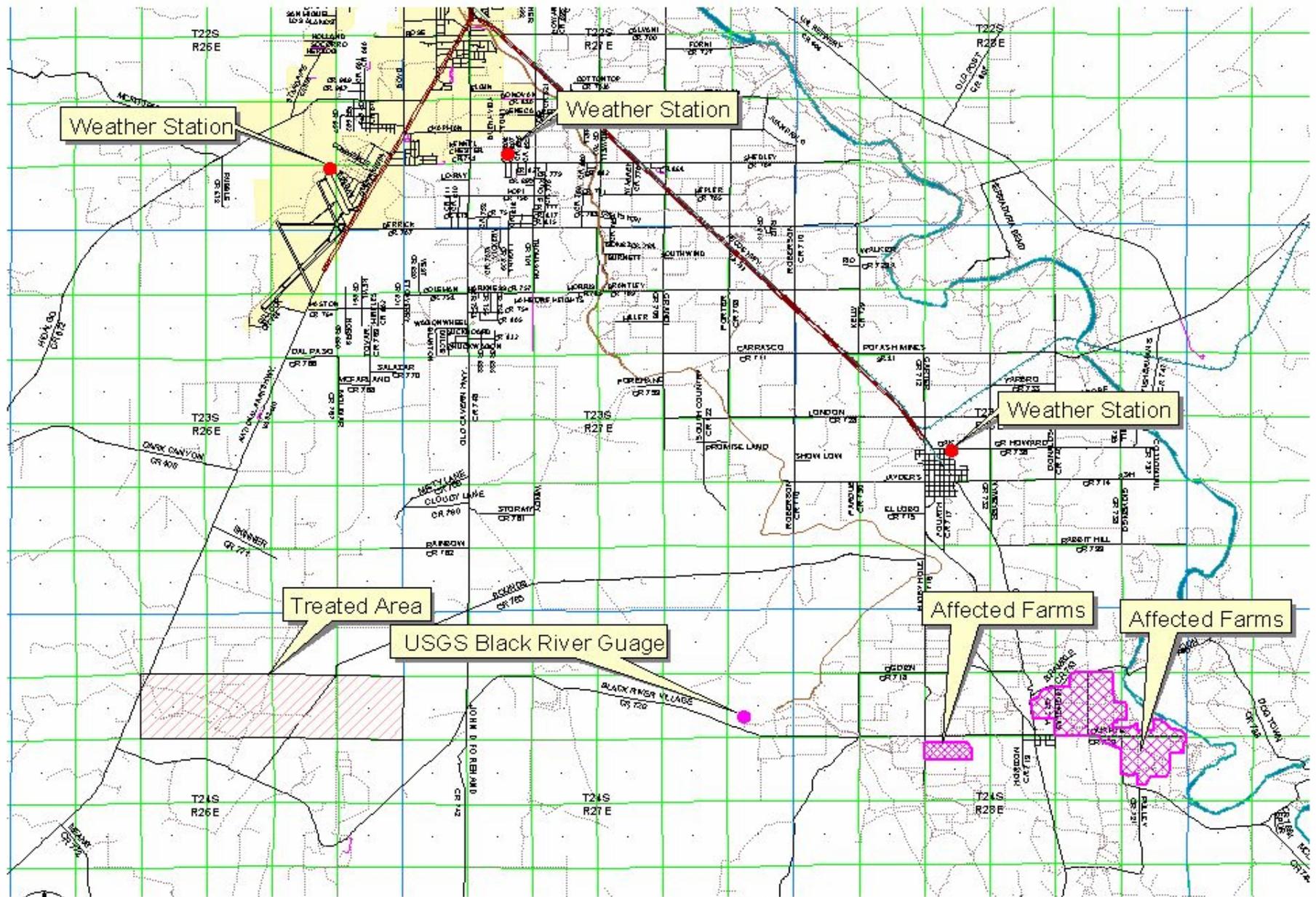
- ❖ Samples taken from the Vasquez field by CID were sent to Analytical Pesticide Technology Lab.
- ❖ 16 August 2002 the results indicated that the:
 - ❖ Soil had in the 0-12" depth, 0.187 ppm Tebuthiuron
 - ❖ Cotton plant sample #1 had 1.66 ppm Tebuthiuron in the tissue.
 - ❖ Cotton plant sample #2 had 2.03 ppm Tebuthiuron in the tissue.
 - ❖ Elm leaves from Black River Diversion had 0.196 ppm Tebuthiuron in the tissue.
 - ❖ Cottonwood leaves from the above diversion 0.329 ppm Tebuthiuron in the tissue.
- ❖ Dow sample results were sent to a different lab were also positive for Tebuthiuron, but not as high in ppm.

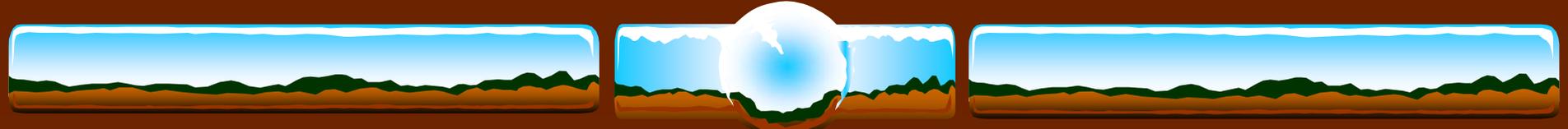


Discovery

- ❖ CID and BLM collected more samples up blackriver. All were positive for Tebuthiuron until the point where black river turn to the south, near black river village. Positive sample were found up the drainage to the North to the treatment target.
- ❖ USGS gages indicate that a high intensity, short duration storm occurred 17 July 02 above black river diversion. Flow went from below 4 cfs to above 100 cfs.

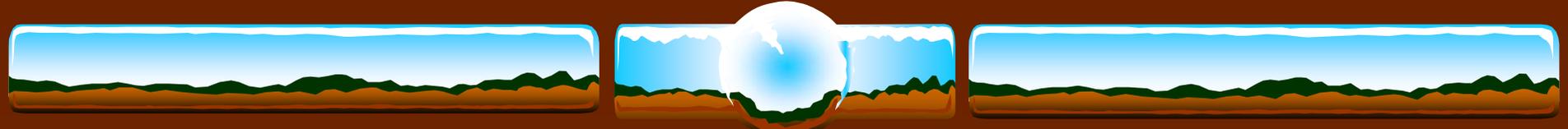
MALAGA CONTAMINATION





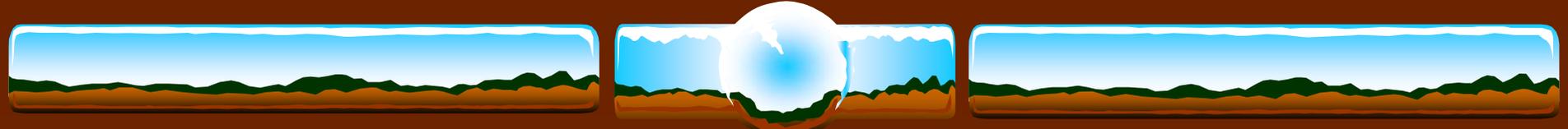
Application of Spike

Location	Acres	Pounds of AI	Pounds of Formulation
Application site 3/4#/acre	587 (BLM)	440.25	2201.25
Application site 1/2#/acre	1602 (BLM)	801.00	4005.0
Application site 1/2#/acre	648 (private)	324	1620.00
Totals of treated	2837 acres	1565.25 pounds	7826.25 pounds



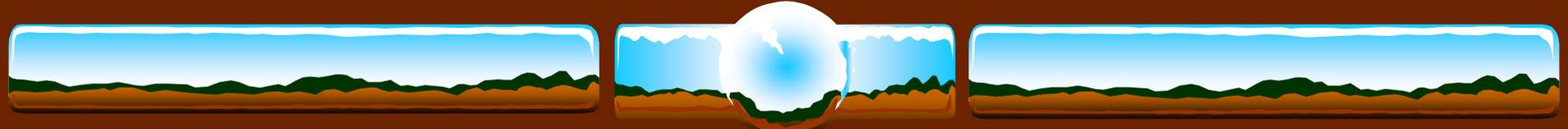
Sample data up to 16” soil depth at 48 days post application

Location	Acres	Pounds of Active	Pounds of Formulation	Percent of application
At ¾# site	587 (BLM)	143.228	716.14	32.35%
At ½# site	1602 (BLM)	163.404	817.02	20.4%
At ½# site private	648 (private)	66.10	330.48	20.4%
Totals	2837 acres	372.732 pounds	1863.64 pounds	23.81%



Vegetation on application site

- ❖ Assuming 750 pounds biomass (BLM) at 30 ppm (Extremely high) on 2837 acres would account for 63 pounds active or 315 pounds formulated product.
- ❖ This is about 4.025 % of what was applied.
- ❖ Can only account for 27.835% of what was applied still on the application site 48 days post application.

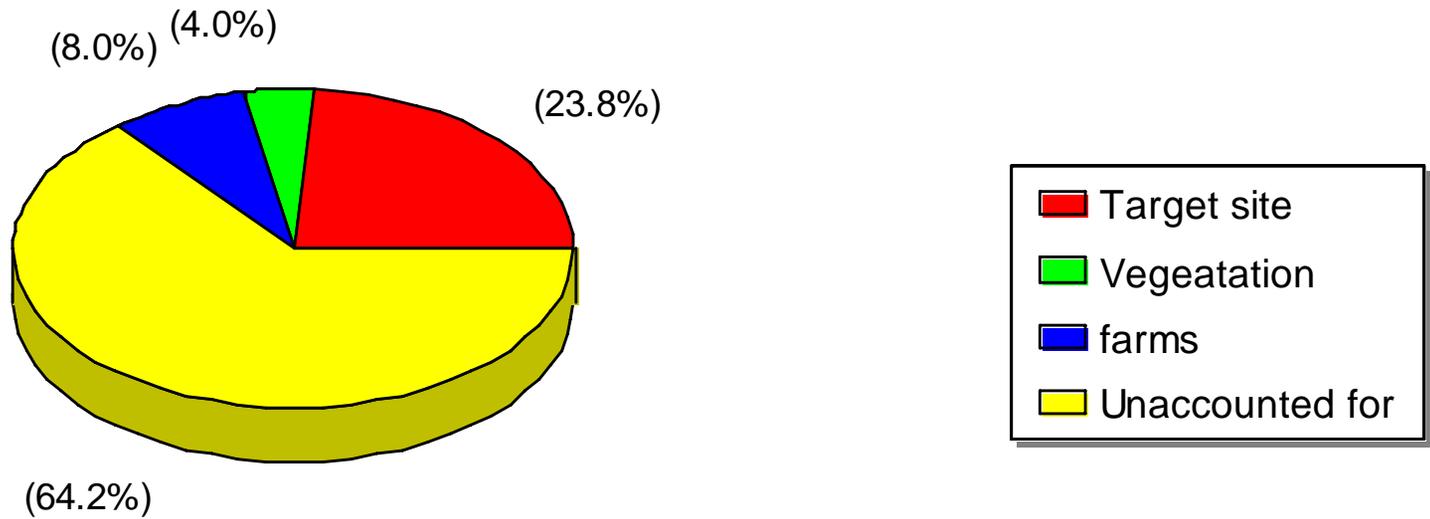


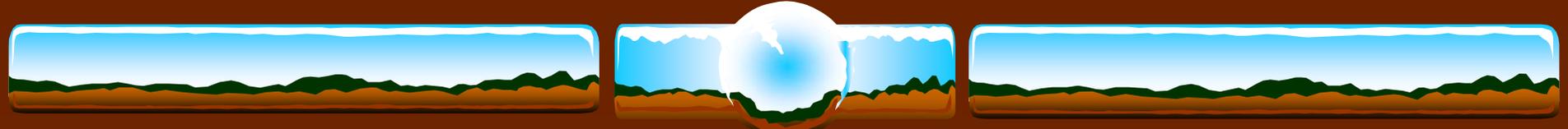
How much was found on farm land.

Estimated on farm amounts	Acres	Pounds of Active	Pounds of Formulation	% of Application
0.4 to 0.5 pounds per acre	130	65	325	4.1 %
0.2 to 0.399 pounds per acre	100	30	150	1.9 %
0.1 to 0.199 pounds per acre	300	30	150	1.9 %
Total	530	125	625	7.98 %

Accounting of tebuthiuron applied on rangeland

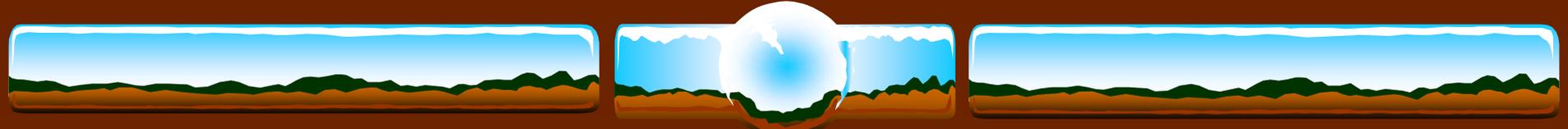
% of total application





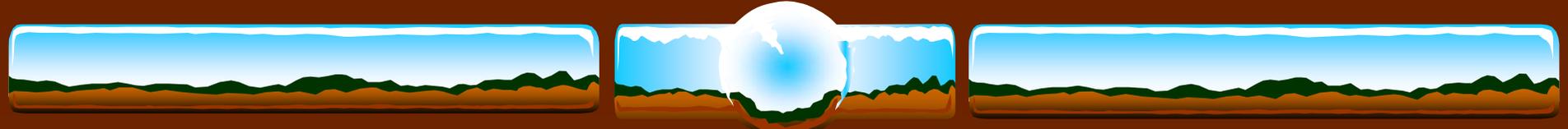
Terrorist or other sources:

- ❖ The 125 pounds AI on farmland is in the ballpark. The amount of formulated product need would be 625 pounds. Formulated product is packaged in 25-pound bags. It would take 25 bags @ \$163.50 per bag or \$4,087.5. Not including unaccounted for losses down the black river, and other locations. None of the local distributors have a sale of that large to a “over the counter customer”.



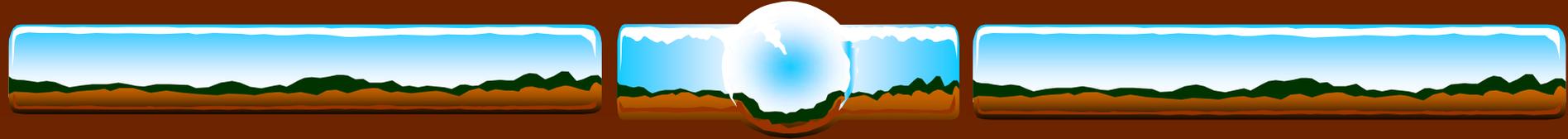
What concentration is required to deliver to farmland if we
assume x pounds AI per acre.

Pounds of A. I. of Tebuthiuron per acre	Parts per million required in 1/3 of an acre foot to deliver Tebuthiuron to the farm
0.5 pounds AI/acre	0.548 ppm
0.4 pounds AI/acre	0.438 ppm
0.3 pounds AI/acre	0.329 ppm
0.2 pounds AI/acre	0.219 ppm
0.1 pounds AI/acre	0.110 ppm

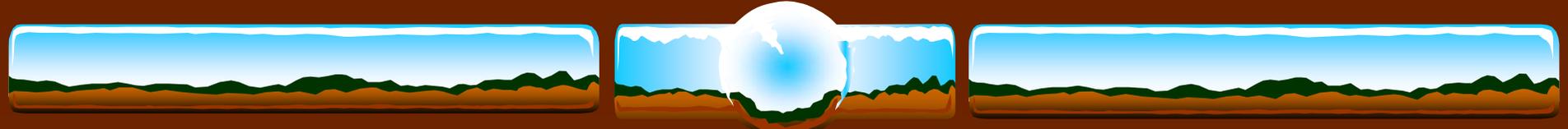


Is this possible?

- ❖ A high flow rate of 100 cfs was recorded in the black river gage.
- ❖ 100 cfs in 24 hours = 200 acre-feet per 24 hours.
- ❖ 1 acre foot water = 325,850 gallons of water @ 8.4 pounds per gallon = 2,737,140 pounds.
- ❖ 2,737,140 pounds of water * 200 Acre-feet = 547,428,000 pounds of water in 24 hours.
- ❖ 1004.52 pounds of Tebuthiuron unaccounted for and on farm fields assuming previous slide is correct.
- ❖ $1004.52 * 10000000 / 547,428,000 = 1.84$ ppm of Tebuthiuron was possible which is high exceeds the ppm required in the pervious slide above.
- ❖ If we assume 48 hours of 100 cfs.
- ❖ $1004.52 * 10000000 / 1094856000 = 0.918$ ppm of Tebuthiuron was possible; this still exceeds the above table requirements.



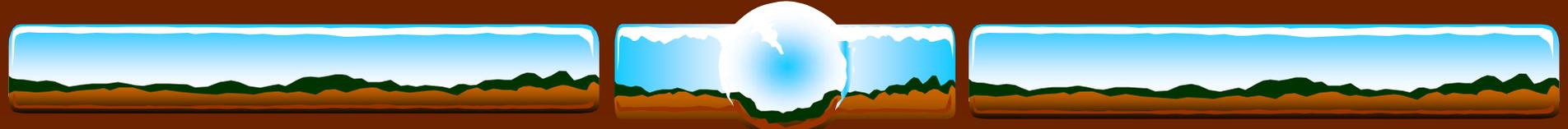
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4 minutes latter



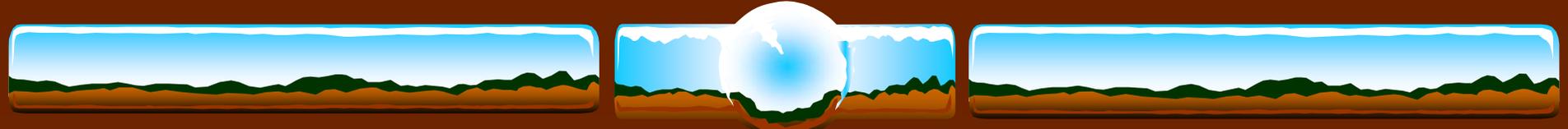
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❖ Conclusion

- ❖ Tebuthiuron herbicide contamination of blackriver prior to irrigation has resulted in cotton and other crop losses. That a high intensity short duration storm highly contributed to the off target movement of Tebuthiuron.
- ❖ Application of Tebuthiuron on sections 9, 10,11,and 12 are the most recent, large scale application **known**.
- ❖ Other large scale applications of Tebuthiuron has been applied in the area above the diversion in the past 4 years. These have not been documented or sampled at this time.



What we did not know!

- ❖ How long your field will be affected ?
 - ❖ Depends on how much is there, om, ect.
 - ❖ The highest concentration field as of crop year 2005 can not grow cotton, has grown sorghum with a yield reduction.
- ❖ Can you sell your current products?
 - ❖ Alfalfa
 - ❖ Cotton
 - ❖ Cotton seed
 - ❖ Pecans
- ❖ As long as it did not cross the state line no agency stopped sale of any product.

The End



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