VENEWS

VENTURE CHEMICALS, INC. • P. O. BOX 53631 • LAFAYETTE, LA 70505

VENTURE CHEMICALS, INC.

NOVEMBER 2000

A Lost Circulation "War Story"

In the late 1970's, an operator was drilling in the Rocky Mountain area of the U.S. The well had been spudded and was on the way to a target depth of 21,000 ft. At a depth of approximately 2,900 ft. a severe lost circulation problem was encountered. Surface casing had been set to approximately 2,100 ft. and the water level under static condition remained at approximately 1,900 ft. All of the conventional type approaches were tried in the initial stages to regain circulation.

The operator tried various LCM products, various cements and cementing technique. Unusually high concentrations of conventional mixed LCM products were made up in 300 bbl increments. These pills were made up with water as the base. Each 300 bbl pill contained over 11 tons of LCM product. None of the materials ever returned to the surface. A decision was made to try some specialty LCM products. Again, of the tons of material pumped into the hole, none of it resurfaced.

By this time the operator had several million dollars in the location. After weeks of fighting the problem, a decision was made to bring in a wire-line logging truck to attempt to understand the location and nature of the problem. Radioactive surveys were run and the location of the problem was determined to be at the bottom of the hole. A plan to try some LCM bombs was devised. These bombs were constructed of 20 ft. lengths of 8" diameter PVC pipe. The bombs were packed with several types of LCM products, set on bottom and detonated with a wire-line truck. The first couple of bombs were unsuccessful. They decided to be more aggressive this time and placed 1/4" hail screen in the bottom of each bomb in the hope of the hail screen unraveling after detonation and forming a bridge for the LCM to seal.

Finally, a decision was made to skid the rig one location and start over. The second well was drilled through at the same interval with no problem. The first well made a major producing water well.

♦ Check out the lost circulation centerfold in this issue

Venture Chemicals, Inc. Lost Circulation Products and Aids

PRIMARY

VEN-PLUG™ - polymer/Fiber LCM
VEN-PLEX™ - complexing agent for VEN-PLUG™
VEN-BLEND™ 225 - blended LCM product
VEN-PEL™ - expandable LCM product

SECONDARY

VEN-FYBER™ 201– micronized cellulose fiber (LCM adjunct)
VEN-VIS™ 501 - liquid XC polymer (special LCM use)
VEN-VIS™ 503 - liquid HEC polymer (special LCM use)
VEN-GEL™ 413 - organoclay (auxiliary and special LCM use)
VEN-GEL™ 420 - organoclay (auxiliary and special LCM use)
VEN-CHEM™ 208, 215, 222 - organohumates (special LCM use)

♦ These products are specialty LCM products and auxiliaries aimed at moderate to severe LCM problems where conventional LCM products are ineffective.

HAPPY THANKSGIVING

FROM EVERYONE AT VENTURE CHEMICALS, INC.!

The first Thanksgiving in America occurred in 1621. The feast lasted for three days, included 90 "Indians" and enough fowl to supply the entire village for one week!

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LOST CIRCULATION PRIMER……

Several Key References to Lost Circulation

1. Cagle, W.S. and Mathews, H.D.: "A New Look at Lost Circulation," Pet. Eng., (Nov. 1967), pp. 69-70, 72-73.

2. Gatlin, C. and Nemir, C.E.: "Some Effects of Size Distribution on Particle Bridging in Lost Circulation and Filtration Tests," J. Pet. Tech., (March 1990), pp. 328-337.

3. Green, B.Q.: "Eight Steps to Stop Lost Circulation," Pet. Eng., (March 1963), pp. 76-87.

4. Loeppke, G.E., Glowka, D.A., and Wright, E.K.: "Design and Evaluation of Lost Circulation Materials in Severe Environments," J. Pet. Tech., (March 1990), pp. 328-337.

5. Messenger, J.U.: "Barite Plugs Simplify Well Control," World Oil, (June 1969), pp. 83-85.

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7. Ruffin, D.R.: "New Squeeze for Lost Circulation," Oil and Gas Journal, (October 10, 1978), pp. 96-97.

PRODUCT CORNER

VEN-PLUG™ / VEN-PLEX™

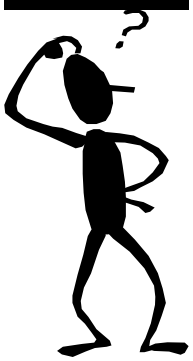
VEN-PLUG™ is a specialized LCM polymer/fiber-based product that was developed by Venture Chemicals, Inc. and is designed to provide a temporary polymer plug.

VEN-PLUG™ will form a highly viscous pill when added to water at a concentration of a sack per barrel. This pill can then be complexed in various ways with **VEN-PLEX™** to form a pliable, rubbery type plug. The plug will then allow cement to be placed, a filter cake deposited or another type LCM product to be placed on a more permanent basis. If the **VEN-PLUG™** pill is treated with a biocide, a much longer lasting plug will result. If a biocide is not used, a typical **VEN-PLUG™** pill will begin to break down in a matter of a few days.

VEN-PLUG™/VEN-PLEX™ can offer you some alternatives next time you have a lost circulation problem. It is not a "cure-all," but it does have a great deal of versatility. It can also be used in conjunction with your standard LCM products.

So if you're interested in relatively low cost polymer-type plugging material that can also be used to drill surface hole, ask for information about our **VEN-PLUG™/VEN-PLEX™**.

THOUGHT TICKLERS



"Who the hell wants to hear actors talk?"

- Harry M. Warner, Warner Bros. Pictures, 1927

"There is no likelihood man can ever tap the power of the atom."

-Robert Millikan, Noble Prize in Physics, 1923

"Ruth made a big mistake when he gave up pitching."

-Tris speaker, 1921

"Sensible and responsible women do not want to vote."

-Grover Cleveland, 1905

"Heavier than air flying machines are impossible."

-Lord Kelvin, President Royal Society, 1895

"It is what you learn after you think you know it all that counts."

- Unknown

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VENTURE CHEMICALS, INC. is: a basic manufacturer of specialty chemical products used in the petroleum and chemical industries. Marketing is specifically oriented toward the drilling and production industry and to select market segments of the chemical industry. VENEWS is published by Venture Chemicals, Inc., P. O. Box 53631, Lafayette, LA 70505, as a service to users of VCI products and services. All correspondence should be addressed to Shana Nicholson, Editor, VENEWS, at the above address.

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A Venture Chemicals, Inc. Primer on Lost Circulation of Drilling Fluids

A. Background

Lost circulation — the bane of drilling operations. It usually comes when least expected and can be costly and dangerous. Lost circulation has been a problem since the first wells were drilled. Often, we are not really sure where in the hole the problem is occurring and many times we are not sure how to handle the problem. Thus, in spite of all our technology, the solution to lost circulation still remains more of an art than a science.

B. What is Lost Circulation?

Drilling operations require the drilling fluid to be pumped from surface down a drill sting, through the bit and back up the hole to surface. Drilled solids are removed from the drilling fluid and pumped down hole again. Circulation of the fluid is a must. Sometimes the fluid is lost to highly porous, fractured or vugular formations and cannot be circulated back to the surface.

The problem of lost circulation has always been widespread geographically, varies widely in depth and can vary significantly in wells that are drilled as close as 100 feet from each other. One well will exhibit a sever problem and an offset will not have lost circulation. Some losses involve fractures (natural and induced). Others involve highly porous sands. In certain places large caverns and large underground water flows complicate the problem even further. There have been numerous approaches both mechanically, physically and chemically to solve the problems. The product approach has probably had the widest variation over the years.

C. Causes of Lost Circulation

1. Natural

- coarsely permeable formations
- cavernous or vugular formations
- fissures and/or fractures

2. Mechanically Induced Fractures

- running drill pipe into hole too fast
- spudding the bit
- bit plugged while running pipe
- pump surges
- bit and collar balling
- hole clearance too small
- poor hydraulics program

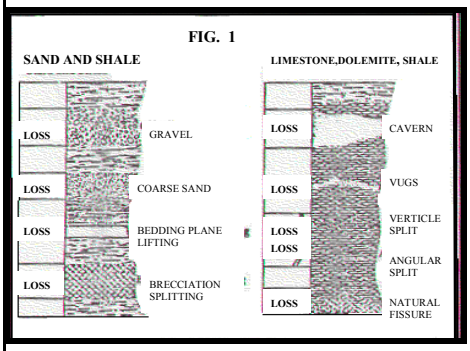
3. Poor Mud Practices

- weight too high
- ECD too high
- gels too high
- viscosity too high
- fluid loss too high

D. Formations Causing Lost Circulation

Voids in formations result in lost circulation.

FIG. 1



E. Induced Fractures and Drilling Procedures

Lost circulation can be caused by induced fractures caused by surge pressures during drilling. Surge pressures caused by rapid, downward pipe movements can induce fractures. W.C. Goins of OGS showed that surge pressures equivalent to 2.0 lb/gal increase are not unusual. Where annular clearances are small, balling is present or loose shale is present, surge pressures can be even greater.

Annular space circulation pressures will normally be 200 psi or less. However, they can jump to 1500-2000 psi (full pump pressure) if the annulus is reduced. Mud is a good fracturing fluid and these high pressures can induce fractures.

Induced fractures can also be caused by incorrect mud properties and their effects on surge/swab pressures. Table I shows an example of the effect of gel strengths on pressure surge.

Incorrect mud properties can also result in excessive increases in equivalent circulating density (ECD). An ECD of several pounds above hydrostatic pressure is likely to cause induced fractures.

F. Mechanical Techniques to Alleviate Loss of Circulation

- balanced pressure drilling as by air, foam, minimum fluid density
- cable tool
- blind drilling
- advanced drilling practices
  - trip time control
  - minimum mud weight
  - optimum hole cleaning
  - clean bottom hole assembly
  - optimum mud properties
  - leak-off tests

G. Orderly Approach to Lost Circulation

- determine severity, probable location and type of loss. (see Item J)
- give formation chance to heal itself by waiting if possible.
- after consideration of all factors, select most likely technique and product to form a seal within the loss zone.

H. Well Planning to Prevent Lost Circulation

- casing programs to protect weak potential loss zones before high mud weights become necessary.
- crews instructed on latest techniques to avoid pressure surges—opening pumps too rapidly, spudding pipe and running pipe into hole too fast.
- mud program--planned minimum weight with safety margin.
- viscosity and gels—values not to promote lost circulation.
- good lost circulation program preplanned (where possible) with adequate supply of good cross-section of LCM products.

A Venture Chemicals, Inc. Primer on Lost Circulation of Drilling Fluids

I. Generalized Approach to Lost Circulation Problem

B.Q. Green developed a generalized approach to a lost circulation problem:

1. Pull up into casing—stop pumping—wait 4-8 hours—hole will heal itself in many cases.
2. Reduce pressure—improve mud properties (ECD).
3. Batch squeeze LCM product after a thorough analysis of problem.
4. Spot select LCM—squeeze again.
5. Spot—squeeze larger size LCM.
6. Spot—squeeze specialty LCM product.
7. Set protective pipe if possible.

This sequence assumes no returns achieved at each stage. Spots and squeezes of various LCM products are tried in sequence. There are many LCM products and techniques available.

TABLE 1
Surge/Swab Pressure Due to Gel Strength

Annulus size	Depth, ft.	Gel Strength	Pressure Surge
10 3/4" casing:			
4 1/2" drill pipe	7,000	36	275
	7,000	12	125
	3,000	36	125
	3,000	12	62
7" casing:			
3 1/2" drill pipe	7,000	60	487
	7,000	36	462
	7,000	6	362
	3,000	60	212
	3,000	36	200
	3,000	6	160

Reference: Cannon/Moore

J. Survey Information Needed for Lost Circulation Problem

You can't get too much information for treating a lost circulation problem, particularly a severe problem. The following outline indicates some of the information that can assist in solving a lost circulation problem.

1. Severity of the loss
   a. partial with normal density and pressure
   b. partial with reduced dens. and pressure
   c. complete, but hole stands full
   d. complete and mud at or near point of loss
2. Well Data
   a. casing program
   b. amount of open hole
   c. size of pipe and collars
   d. pit size and amount of mud
   e. total depth at time of loss
3. Well History
   a. formations exposed
   b. previous trouble, if any
   c. case histories of other wells in the area
      1. Zones of lost circulation
         a. how handled?
         b. mud and well data
   d. can mud be changed
4. Mud Condition at Time of Loss
   a. type of mud
   b. all physical properties
5. Data at Time of Loss
   a. operations at time of loss
   b. formation being drilled
      1. Rate of drilling
      2. Changes in rate of drilling
6. Materials and Availability
7. Bottom Hole Temperature
8. Bottom Hole Pressure
9. Bottom Hole Assembly
10. Can you pull out of hole?
11. Pumping equipment available
12. What has been tried?

K. Methods for Locating Lost Circulation Zone

- spinner surveys
- temperature surveys
- radioactive tracer surveys
- indirect information from well conditions

L. General Types of LCM Treatments

- pretreatment of system
- slug/pill —batch testing
- combination treating

M. General Types of LCM Products

1. Fibrous
2. Granular
3. Flakes
4. Slurries
5. Combination 1-4

N. Typical LCM Slurries

1. hydraulic cement
2. diesel oil—bentonite—mud mixes
3. diesel oil—cement—bentonite mixes
4. oil—polymer slurries
5. high solids—high liquid loss slurries
6. crosslinked polymer slurries

O. New LCM Problems

Several key developments in drilling operations are causing another look at conventional approaches in LCM and techniques.

Downhole motors and MWD (Monitoring While Drilling) packages are putting more restrictions on the size and type of materials that can be pumped through the drill pipe. This is causing a complete rethinking of LCM approaches. Small restrictions and orifices limit the size of material that can be pumped.

Horizontal drilling requires much longer periods of time and longer drilling intervals in a producing formation. This means that there is more emphasis on nondamaging additives for longer periods of time than what is found in a vertical hole.

Environmental restrictions are creating additional development requirements as a key consideration. The consideration of environmental impact is the first step in the development of any new LCM product.

Limited offshore rig storage facilities are creating a demand for more universal products (those having more than one potential use). In addition, there is a trend toward handling LCM products in bulk rather than in conventional loose storage.

All of these new requirements will eventually change many of the old products and the old ways of handling lost circulation. Venture Chemicals, Inc. has been and plans to remain as an innovator in the LCM product and application area.

♦ For more information, check out page 2 for several key references on lost circulation.

VEN-BRIEFS

- A recent experiment conducted by computer scientists at UNC-Chapel Hill proved that tele-immersion is no longer a concept, but a reality...tele-immersion will allow us to 'be' in another city or country without leaving our living rooms…imagine schoolchildren in China walking underneath massive dinosaur bones in a New York museum...this would be conceivable using tele-immersion... although the experiment at UNC was considered successful, the current internet speeds would have to become much faster before tele-immersion becomes practical in our everyday lives...Internet2, a current project, is attempting to do just that…. before Internet2 gets any serious backing it has to show that tele-immersion would be in high enough demand to prove worth it...with companies like McDonalds showing interest it seems the new technology is on the horizon…McDonalds envisions equipping their restaurants with tele-immersion booths that would allow family members in distant cities to eat dinner together…

  - *New Scientist* October 21,

VENTURE CHEMICALS, INC.

For fresh-water muds, a rough measure of the relative amounts of barite and clay in the solids can be obtained by using the following:

RELATIVE AMOUNTS OF BARITE AND CLAY IN SOLIDS

Specific gravity of solids	Barite, percent by weight	Clay, percent by weight
2.6	0	100
2.8	18	82
3.0	34	66
3.2	48	52
3.4	60	40
3.6	71	29
3.8	81	19
4.0	89	11
4.3	100	0

HOW IMPORTANT IS YOUR JOB?

- Oil provides about 40% of the energy Americans consume and 97% of our transportation fuels.
- The U.S. oil industry employs nearly 1.4 million people.
- In 1998, the petroleum industry spent 8.5 billion to protect the nation's environment. Since 1990, it's estimated that about 83 billion has been invested in our environment.
- As a result of cleaner burning gasoline and improved automobile technology it would take 26 new cars today to equal the tail-pipe pollution of one car made in the 1960's.

  - American Petroleum Institute

WITH VENTURE CHEMICALS, INC., YOU'RE ALWAYS ON TARGET!

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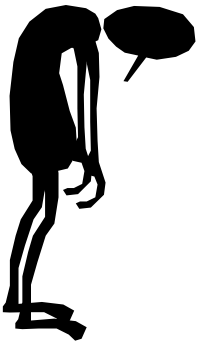
NOVEMBER 2000

Venture Chemicals, Inc.

- viscosifiers
- biocides
- fluid loss additives
- shale control additives
- lost circulation products
- emulsifiers
- oil based products
- wetting agents
- flocculants
- dispersants
- lubricants
- spotting fluids/additives



TRIED JUST ABOUT EVERYTHING TO SOLVE YOUR LCM PROBLEMS?

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