Exhibit 22

EQC Docket 10-2803
Judith Bush

Frost Rock Products, Inc. LMO 1461

I have already described the circumstances concerning the issuing of an LMO permit to Frost Rock Products to operate side by side with Croell Redi-Mix at the Rogers Pit (See Appendix 21).

This exhibit includes the 2009 annual inspection report of AQD when it was discovered that Frost was operating at the Rogers Pit. This was a joint inspection of the DEQ LQD and the DEQ AQD. I am including both reports.

LQD report dated July 2, 2009 is on pages 12 and 13. The second page of this report notes that Frost began operating at the Rogers Pit on December 12, 2008. Frost first applied for a permit on December 9, 2009 (page 1) and this application is not stamped "received" by the DEQ until January 15, 2009. The permit was issued on February 17, 2009. At first Frost was to take over the Croell Redi-Mix LMO operation, but this was changed, and Frost was given his own LMO instead *(see pages 1 & 2)*. Frost may have been operating under Croell Redi-Mix LMO 1396 until February 17, 2009 *(see page 9)*.

The DEQ AQD report is located pages 14 and 15.

LMO applications do not have to be given public notice, and local landowners are not notified. The self issuing portable facility relocate / operate permits for crushing / operating only require public notice when the permit is first applied for. I believe that an AQD mine permit would have been given public notice, but Frost did not apply for one, although LQD did inform Frost that this was required *(page 10)*.

note **According to Appendix C-1 and Table C-1, the lands for which the minerals were federally held was the same as the location of the Frost Rock Products, Inc. LMO. However, the legal description to the federally held mineral rights is incorrect in Table C-1*(Appendix 2 page 3)*. Frost was operating in the NESW of Section 25. The federally held minerals are located in the NWSW of Section 25, immediately west of the quarter section within which Frost was operating and the federally - owned mineral rights have not been mined. The map included with the Croell Redi-Mix LQD application indicates the correct location of the federally held mineral rights. No one caught this discrepancy prior to the Croell Redi-Mix Land Quality Application being approved.**

lication and Surface Owner Consent for Limited Mining O[ ]ons
also known as Ten Acre Exemption

Under the Wyoming Environmental Quality Act W.S. §35-11-401(e)(vi), this form may be used only for mining **Sand, Gravel, Scoria, Limestone, Dolomite, Shale, Ballast or Feldspar**. The cumulative affected lands may not exceed ten (10) acres.

1. Location of lands affected by the mining operation.
   A. Pit, Stockpile and equipment storage areas: enter quarter-quarter or equivalent description.
   NE SW, Section 25, T. 52 N., R. 102 W., Acres 10
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   B. Haul and access roads; list those portions of newly constructed or upgraded private roads which provide exclusive service to the mining operation.
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   C. All listed lands occur in Crook County, WY and the Total Acres are 10

2. List all operators defined in W.S. §35—11-103(e)(ix) as "...any person engaged in mining...or who acts as an agent or independent contractor...in the conduct of mining operations."

A. Applicant for the Limited Mining Operation	B. Operator (if different from applicant)
Frost Rock Products	
(individual or company name)	(individual or company name)
PO Box 426	
Lovell, Wy 82431	
(mailing address)	(mailing address)
307-548-6505 / 307-548-6363	
(area code and phone and fax number)	(area code and phone and fax number)
Corporation	
(type of entity)	(type of entity)

3. Description of affected lands and mining operation.
   A. The mineral to be mined is limestone (type) and mineral ownership is private (private, state, federal)
   B. The mining operation will begin on January 09 (month & year) and is projected to last until January, 2010 (month & year)
   C. The mining operation will include 1)removing and stockpiling all topsoil with a dozer, scraper or similar equipment 2)removing and stockpiling overburden with a dozer, scraper or similar equipment 3)removing and processing and stockpiling the mineral 4)hauling the processed mineral 5)backfilling stockpiled overburden and unused mineral, regrading and contouring and retopsoiling and reseeding all affected lands.
   D. The premining and postmining land uses are grazing and wildlife habitat.
   E. The maximum depth of mining will be 50 feet and the estimated depth to groundwater at the pit is 600 feet.

4. A Reclamation Performance Bond in the amount of $ 10,000.00 calculated at the rate of $1,000 per acre for the total acres listed in 1.C. above. The bond is _____
   (C.D. No., Surety Bond No., Letter of Credit No.)

5. **Under penalties of perjury, we declare that we have examined this notification and consent and the information contained herein, and to the best of our knowledge it is true, correct and complete, and that the location of the proposed operation is accurately shown in the original U.S.G.S. quadrangle map accompanying this consent, and this Ten Acre Exemption will not be used in conjunction with any other adjacent Ten Acre Exemption to circumvent the permitting requirements of the Wyoming Environmental Quality Act. Further, it is agreed that the reclamation of the lands affected by the mining operation shall be in compliance with applicable Land Quality Division (LQD) Rules and Regulations and that we have the right to mine the minerals.**

6. **We, the surface owner and lessee and operator, are aware that the LQD may conduct inspections of the operation and by our signatures below we give our consent to the conduct of such inspections.**

Signature of surface owner and date	Signature of applicant and date 12/9/08
Roger Crozell	Jerry Frost
Print or type name of surface owner	Print or type name of applicant
Signature of surface lessee and date 12/9/08	Signature of applicant and date 12/9/08
4747 Old Hwy 14 Sundance, Wy 82729 307-283-2588	Frost Rock Products Co. 307-548-6505 307-272-5961 (CELL)
Print or type address and phone no. of surface owner	Print or type name and phone no. of applicant

MAKE NO ENTRIES — FOR LQD USE ONLY

TFN No. 5 1/077
Permit No. 1396ET
District III

Approved: Donna K. Lind for:
Administrator, LQD

Approval date: 02-17-2009

Form 10
Rev: 05/06

9

Notification and Surface Owner Consent for Limited Mining Operations also known as Ten Acre Exemption

Under the Wyoming Environmental Quality Act W.S. §35-11-401(e)(vi), this form may be used only for mining Sand, Gravel, Scoria, Limestone, Dolomite, Shale, Ballast or Feldspar. The cumulative affected lands may not exceed ten (10) acres.

1. Location of lands affected by the mining operation.
   A. Pit, Stockpile and equipment storage areas: enter quarter-quarter or equivalent description.
   NE-SW, Section 25, T. 32 N., R. 62 W., Acres 10
   _____, Section 25, T. 32 N., R. 62 W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   B. Haul and access roads; list those portions of newly constructed or upgraded private roads which provide exclusive service to the mining operation.
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   C. All listed lands occur in Crook County, WY and the Total Acres are 10

2. List all operators defined in W.S. §35—11-103(e)(ix) as "...any person engaged in mining...or who acts as an agent or independent contractor...in the conduct of mining operations."

A. Applicant for the Limited Mining Operation	B. Operator (if different from applicant)
Frost Rock Products (individual or company name)	(individual or company name)
PO Box 426 Lovell, Wy 82431 (mailing address)	(mailing address)
307-548-6505 / 307-548-6383 (area code and phone and fax number)	(area code and phone and fax number)
Corporation (type of entity)	(type of entity)

3. Description of affected lands and mining operation.
   A. The mineral to be mined is limestone (type) and mineral ownership is private (private, state, federal)
   B. The mining operation will begin on January 09 (month & year) and is projected to last until January 2010 (month & year)
   C. The mining operation will include 1)removing and stockpiling all topsoil with a dozer, scraper or similar equipment 2)removing and stockpiling overburden with a dozer, scraper or similar equipment 3)removing and processing and stockpiling the mineral 4)hauling the processed mineral 5)backfilling stockpiled overburden and unused mineral, regrading and contouring and retopsoiling and reseeding all affected lands.
   D. The premining and postmining land uses are grazing and wildlife habitat.
   E. The maximum depth of mining will be 50 feet and the estimated depth to groundwater at the pit is 1000 feet.

4. A Reclamation Performance Bond in the amount of $ 10,000.00 calculated at the rate of $1,000 per acre for the total acres listed in 1.C. above. The bond is _____ (C.D. No., Surety Bond No., Letter of Credit No.)

5. **Under penalties of perjury, we declare that we have examined this notification and consent and the information contained herein, and to the best of our knowledge it is true, correct and complete, and that the location of the proposed operation is accurately shown in the original U.S.G.S. quadrangle map accompanying this consent, and this Ten Acre Exemption will not be used in conjunction with any other adjacent Ten Acre Exemption to circumvent the permitting requirements of the Wyoming Environmental Quality Act. Further, it is agreed that the reclamation of the lands affected by the mining operation shall be in compliance with applicable Land Quality Division (LQD) Rules and Regulations and that we have the right to mine the minerals.**

6. **We, the surface owner and lessee and operator, are aware that the LQD may conduct inspections of the operation and by our signatures below we give our consent to the conduct of such inspections.**

Signature of surface owner and date	Signature of applicant and date 12/9/08
Roger Crowell (Print or type name of surface owner)	Sean Frost (Print or type name of applicant)
Signature of surface lessee and date 12/9/08	Signature of applicant and date 12/9/08
4747 Old Hwy 14 Sundance, Wy 82729 307-283-2586 (Print or type address and phone no. of surface owner)	Frost Rock Products Co. 307-548-6505 307-272-5961 (Cell) (Print or type name and phone no. of applicant)

MAKE NO ENTRIES — FOR LQD USE ONLY

TFN No. 5/1077
Permit No. 1346 ET 1461 ET
District III

Approved: Deanna K. Hirst for:
Administrator, LQD

Approval date: 02-17-2009

Form 10
Rev: 05/06

5 1/077

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

January 12, 2009

MG	LB	DE	SP
KK	MT	JS	JM
PS	CW	DC	DS
KT			

Frost Rock Products
ATTN: Elaine
P.O. Box 426
Lovell, WY 82431

RE: Application for a Ten Acre Exemption – TFN 5 1/077

Dear Elaine:

In follow up to our conversation, we are returning your Form 10. As discussed, please send the documents directly to the attention of Glenn Mooney at the Sheridan district office and include a map depicting the proposed mining area. We have enclosed two maps for your use. Please note we have assigned temporary filing number TFN 5 1/077 to your application.

Your check payable to DEQ and referencing Air Quality need not be reissued as we will have no problem depositing it in Land Quality's account. Receipt no.0396 is enclosed, for check no. 1317, in the amount of Ten Thousand Dollars ($10,000) for the Reclamation Bond.

To assist you we have enclosed general information listing the requirements for submittal of a Limited Mining Operation application.

Should you have any questions regarding the submittal, please do not hesitate to contact us.

Sincerely,

Deanna K. Hill
Mine Permit Applications
Bonding Analyst
Land Quality Division

Received
Dept. of Envir. Quality
Sheridan

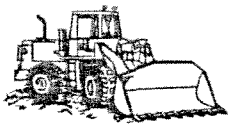
DKH:tf
Enclosures
xc: District III w/encl.

Herschler Building · 122 West 25th Street · Cheyenne, Wyoming 82002 · http://deq.state.wy.us

ADMIN/OUTREACH (307) 777-7758 | ABANDONED MINES (307) 777-6145 | AIR QUALITY (307) 777-7391 | INDUSTRIAL SITING (307) 777-7368 | LAND QUALITY (307) 777-7756 | SOLID & HAZ. WASTE (307) 777-7752 | WATER QUALITY (307) 777-7781

TFN 5 1/077, 2-3, Form 10, Receipt # 0396
Reclamation Bond

131



FROST ROCK PRODUCTS CO.
P. O. BOX 426
263 E. 2ND ST.
LOVELL, WY 82431
(307) 548-6505

WELLS FARGO BANK, N.A.
CASPER, WY 82601
99-109-1023

1/5/2009

PAY TO THE ORDER OF DEQ $ **10,000.00

Ten Thousand and 00/100********** DOLLAR

DEQ, Air Quality Division
122 W. 25th Street
Cheyenne, WY 82002

MEMO

AUTHORIZED SIGNATURE

⑈00131 7⑈ ⑆102301092⑆0000156035⑈

NOTES

RECEIPT

DATE 1-9-09 NO. 0396

RECEIVED FROM Frost Rock Products

ADDRESS PO Box 426, Lovell, WY 82431

Ten Thousand Dollars $10,000.00

FOR TFN 5 1/077 Reclamation Bond

ACCOUNT			HOW PAID		
AMT. OF ACCOUNT			CASH		
AMT. PAID			CHECK		
BALANCE DUE			MONEY ORDER		

CK No. 1317

Q-3

BY Tina Foster

FROST ROCK PRODUCTS

P. O. Box 426
263 East 2nd
Lovell, WY 82431

Phone-307-548-6505
Fax- 307-548-6363
sdfrost@tctwest.net

KR	LB	DE	SP
KK	MT	JS	JM
PS	GM	DC	DS
KT			

2-4-09

WDEQ/LDQ District III
1866 South Sheridan Ave.
Sheridan, WY 82801

Attn: Glen Mooney

Re: 10 Acre Permit

Dear Mr. Mooney,

Please find enclosed the Reclamation Liability Assumption that has been signed and notorized.

If you have any question please feel free to call.

Jim Frost, VP
Frost Rock Products

RECLAMATION LIABILITY ASSUMPTION

In consideration for approval of a Limited Mining Operations Permit (10-Acre Exemption) for Frost Rock Products, the undersigned hereby
(Name of Operator)

agrees to assume responsibility to reclaim all lands previously affected by Croell Lodi-Mix Inc under Permit 1396ET and to comply with applicable mining and reclamation requirements of Wyoming Statute §35-11-401(e)(vi) through (ix) and Land Quality Rules and Regulations, Chapter X for those lands previously affected and all newly affected lands.

Dated this 4 day of February, 2009

Signature of Operator Jim Frost

V.P
(Title)

State of Wyoming)
)ss
County of Big Horn)

The foregoing instrument was acknowledged before me by Jim Frost this 4 day of February, 2009.

Witness my hand and official seal. Diana Stanfield
(Notary Public)

DIANA STANFIELD NOTARY PUBLIC
COUNTY OF BIG HORN STATE OF WYOMING
MY COMMISSION EXPIRES

My Commission Expires: May 1, 2012

FEB
Received
Dept. of Envir. Quality
Sheridan

10/99

Do not make corrections to this form after printing. Forms bearing strikeouts, ink changes, etc will not be accepted.

RECLAMATION LIABILITY ASSUMPTION

In consideration for approval of a Limited Mining Operations Permit (10-Acre Exemption) for Frost Rock Products, the undersigned hereby agrees to assume responsibility to reclaim all lands previously affected by Croell Redi Mix Inc under Permit see attached Map and to comply with applicable mining and reclamation requirements of Wyoming Statute §35-11-401(e)(vi) through (ix) and Land Quality Rules and Regulations, Chapter X for those lands previously affected and all newly affected lands.

VS LB DE SP
KK MT JS JM
PS GM DC DS
KT

Dated this 6 day of February, 2009

Signature of Operator Jim Frost

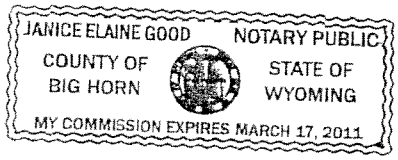
Vice-President
(Title)

State of Wyo.)
)ss
County of Big Horn)

The foregoing instrument was acknowledged before me by Jim Frost this 6 day of February, 2009.

Witness my hand and official seal.

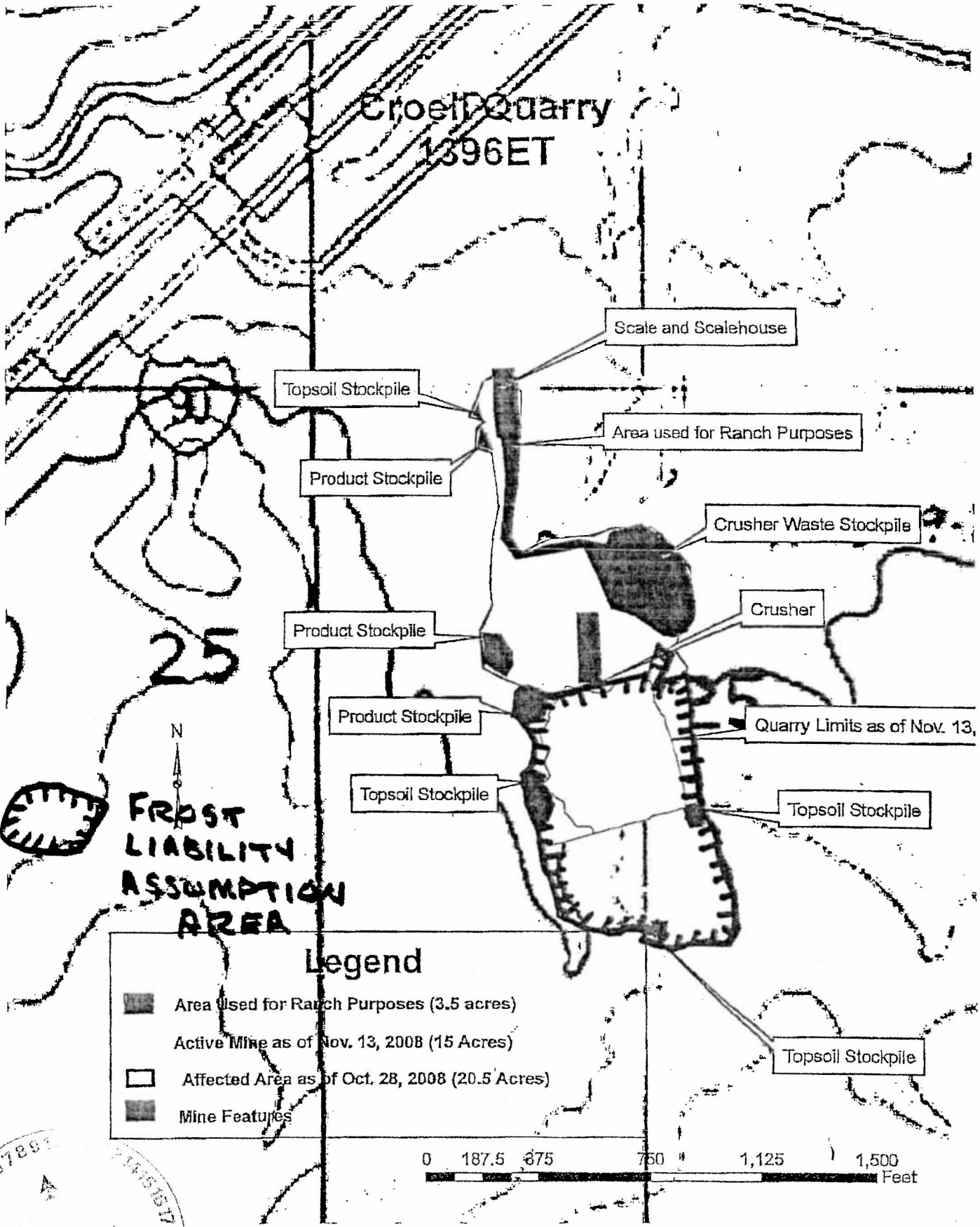
Janice Elaine Good
(Notary Public or Secretary if a Corporation)



(Notary Seal)

Janice Elaine Good
(Name printed or typed)

My Commission Expires:
March 17, 2011



Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

February 17, 2009

CERTIFIED MAIL #7008 0150 0001 1179 4268
RETURN RECEIPT REQUESTED

Julie Ewing
Croell Redi Mix Inc.
P.O. Box 1352
Sundance, WY 82729

RE: Approval of Transfer of 1396ET – TFN 5/1/077

Dear Ms. Ewing:

With the recommendation of Glenn Mooney, District III, the pending transfer referenced above has been approved effective this date. Enclosed is North American Specialty Insurance Company bond no. 2092125 which may be presented to the surety for cancellation.

As of this date you may not conduct mining activity under Limited Mining Operation No. 1396ET.

Should you should have any questions, please feel free to contact our office.

Sincerely,

Deanna K. Hill
Mine Operations Permit/
Bonding Analyst
Land Quality Division

DKH:tf
Enclosure
xc: District III
North American Specialty Insurance Co.

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

February 17, 2009

LS DE SP
MT JS JM
DC DS
FT

VIA MAIL & FAX No. 307-548-6363

Sean Frost
Frost Rock Products
P.O. Box 426
Lovell, WY 82431

RE: Approval of Assumption of Ten Acre Exemption No. 1396ET, TFN 5 1/077

Dear Mr. Frost:

With the recommendation of Glenn Mooney, District III, your pending ten acre exemption assumption cited above has been approved effective this date. Company check no. 1317 in the amount of Ten Thousand dollars ($10,000), had been accepted as the bonding instrument to cover the reclamation costs associated with Ten Acre Exemption No. 1396ET.

Pursuant to Land Quality Regulations, Chapter 10, Section 4, you are required to post a pit entrance sign clearly showing:

1. Operator name, address and telephone number.
2. Operator's local authorized agent.
3. Limited mining operation number.

Please be advised you must maintain Air Quality Division (AQD) and Water Quality Division (WQD) permits.

If your operation involves excavation or placement of fill within a drainage or wetland, you must contact the U.S. Army Corps of Engineers for permitting information. They may be reached at 2232 Dell Range Blvd., Suite 210, Cheyenne, WY 82009 (307-772-2300).

The annual report on your operation will continue to be due January 29. You will be notified by the Land Quality District office prior to that time and supplied with the necessary forms.

Sincerely,

Deanna K. Hill
Mine Operations Permit/
Bonding Analyst
Land Quality Division

DKH:tf
Enclosure
cc: District III w/encl.
U.S. Army Corps of Engineers
Terry Adcock, State Mine Inspector, Enclosures: Form 10, Map

cc: Rita Piroutek, Air Quality Division
Barb Sahl, Water Quality Division

1461 ET (8)

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

July 2, 2009

Sean Frost
Frost Rock Products
P.O. Box 426
Lovell, WY 82431

RE: 2009 Annual Inspection Report for Limited Mining Operation (LMO) No. 1461ET

Dear Mr. Frost:

Ms. Kris Thompson and I of the LQD District III office conducted the referenced inspection on June 25, 2009 with your assistance. To assist with delineating mining activities under LMO 1461ET and LMO 1396ET, operated immediately adjacent to 1461ET by Croell Redi-Mix, Ms. Julie Ewing also attended portions of this inspection. Due to complaints of lack of dust control for this mine site, Mr. Tanner Shatto of the Air Quality Division (AQD) District III office also performed his inspection and is noted as being present. A separate inspection report from the AQD will be sent to address their findings. Attached to this letter is the LQD inspection report for this inspection.

As noted in the inspection report, the following compliance concerns must be addressed: **1.** A barrier or system of markers that delineates the boundary between mining operations of Croell Redi-Mix under 1396ET and Frost Rock Products under 1461ET must be erected to allow LQD inspectors to delineate the affected areas associated with each of these operations. **2.** Topsoil salvage along the east, west, and south sides of this operation needs to be completed. Topsoil must not be used to construct containment berms and equipment must not be driven on areas that have not been adequately stripped of topsoil. **3.** To delineate what portions of the topsoil stockpile along the eastern edge of the pit are associated with each LMO, representatives of Frost Rock Products and Croell Redi-Mix agreed to physically divide this stockpile into two separate piles with each stockpile located within the respective disturbance boundary of the LMO it is associated with. A buffer from vehicle traffic running onto this stockpile and containment for protection against loss from wind and/or water erosion must be constructed. **4.** Please verify topsoil stockpile identification signs are erected on topsoil stockpiles along the western edge of this operation. **5.** Current disturbances associated with LMO 1461ET totaled approximately 10.9 acres. This exceeds the ten (10) acre maximum allowed under a LMO. Frost Rock Products must not expand the disturbance boundary beyond the current areas affected by mining

MOF 7/24

related activities.

At this time, a notice of violation will not be written for the above stated compliance concerns. Please notify me in **writing** and provide photo documentation in duplicate by July 28, 2009 that the above required actions have been performed. If these compliance concerns persist at this mining operation, a notice of violation will be forthcoming.

Thank you for your cooperation and assistance. If you have questions, please contact me at (307) 672-6488.

Sincerely,

Mark Rogaczewski
Supervisor
LQD District III

mr/

Attachments: Inspection Report, Photos and GPS Site Map

xc: Cheyenne LQD File (w/ attach.)
Roger Croell, Croell Redi-Mix, P.O. 1352, Sundance, WY 82739 (w/ attach.)

10 ACRE LIMITED MINING OPERATION INSPECTION FORM

Land Quality Division / 1866 S. Sheridan Ave. / Sheridan, WY 82801
(307) 673-9337 FAX: (307) 672-2213

NOTIFICATION INFORMATION

LMO No: **1461ET**	Inspection Date: **June 25, 2009**
LMO Issued To: **Frost Rock Products**	Date of Last Inspection: **First Inspection**
Operator: **Frost Rock Products**	Last Annual Report Received: **NA – Approved December 12, 2008**
Pit Name: **Rogers**	Current Bond Amount: **$10,000**
Inspector Name: **Mark Rogaczewski (LQD)**	Status: **Active** Inactive In Reclamation Abandoned
Participants: **Kris Thompson (LQD), Tanner Shatto (AQD), Julie Ewing (Croell)**	Landowner: **Private** State BLM Other
Sean Frost (Frost Rock Products)	Mineral Owner **Private** State BLM Other

FIELD INSPECTION	Y/N	Comments

Wyoming Department of Environmental Quality
Air Quality Division
Memorandum

TO:	Dave Finley, Administrator Bob Gill, SSC Program Manager Chad Schlichtemeier, NSR Program Manager
FROM:	Tanner B. Shatto, District Engineer
DATE:	July 2, 2009
RE:	Croell Redi-Mix – Roger's Rock Pit Complaint Investigation

June 25, 2009

On this date, I accompanied Land Quality (LQD) Inspectors Mark Rogaczewski and Kris Thompson, to Croell Redi-Mix's (Croell) Roger's Rock Pit to conduct a dust complaint investigation. The complaint was received by LQD on June 19, 2009 with several land quality related issues and concerns.

Upon arriving at the mine, it was noted that the roads had been watered, the crusher/screening operations were running and haul trucks were coming and going from the site. At the scale house, we met with Julie Ewing, Health and Safety Director for Croell Ready-Mix, and Sean Frost, President of Frost Rock Products Company. Mr. Frost informed us that operations would be shut down for a blast. We were able to do a partial tour of the site before having to return to the scale house until after the blast. Once the blast was over we returned to the inspection.

In discussions with Mr. Frost, Ms. Ewing, and LQD it was discovered that the mine, permitted under Air Quality Permit CT-4526, had expanded beyond the 10 acres allowed by the permit. LQD had already issued a Notice of Violation (NOV) for this expansion beyond the 10 acres maximum allowed under a limited mining operation. In order to keep the mine operating, Croell contracted out Frost Rock Products to continue operations in a newly designated 10 acre ET immediately south of Rogers Rock Pit. Frost Rock Products, operating under portable equipment Air Quality Permit CT-4089, brought in its own crushing and screening equipment. I informed both Ms. Ewing and Mr. Frost that the new 10 acre mine needed to be permitted by Air Quality, whether it under an expanded Roger's Rock Pit or a new separate 10 acre pit under Frost Rock Products. Ms. Ewing said that Croell plans to mine the whole area in the future and would like to just permit the Roger's Rock Pit for more acreage. I told her to get an application to NSR as soon as possible. Mr. Frost stated that he had assumed that as long as the pit was in the same township, range, and quarter/quarter expressed in

Permit CT-4526, the mine had a valid air quality permit. I informed him that this was not the case and that every mine needs its own permit. It should also be noted that the adjacent land owner has expressed her intensions of taking legal action to stop Croell from entering the mine through her property. It was unclear whether a legal easement into the property had ever been recorded.

Fugitive emissions from the haul roads and the crusher/screen were not over permit limits. Photographs taken during the inspection are attached.


Sundance
Hegge Ranch
ROAD
RIFLE PIT
Creek
DITCH
Well
Wells
POWERLINE
Red
T 52 N
T 51 N

SUNDANCE EAST QUADRANGLE UNITED STATES
WYOMING-CROOK CO. DEPARTMENT OF THE INTERIOR
7.5 MINUTE SERIES (TOPOGRAPHIC) GEOLOGICAL SURVEY

PROJECTION . . . . . TRANSVERSE MERCATOR
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR . . . . . ZONE 15
10,000-FOOT STATE GRID TICKS . . . . . WYOMING, EAST ZONE
UTM GRID DECLINATION . . . . . 0°29' EAST
1984 MAGNETIC NORTH DECLINATION . . . . . 12°30' EAST
VERTICAL DATUM . . . . . NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM . . . . . 1927 NORTH AMERICAN DATUM

To place on the predicted North American Datum of 1983, move the projection lines as shown by dashed corner ticks (6 meters north and 43 meters east)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

No distinction made between houses, barns, and other buildings

Gray tint indicates area in which selected buildings are shown

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of photography.

Under the Wyoming Environmental Quality Act W.S. §35-11-401(e)(vi), this form may be used only for mining **Sand, Gravel, Scoria, Limestone, Dolomite, Shale, Ballast or Feldspar.** The cumulative affected lands may not exceed ten (10) acres.

1. Location of lands affected by the mining operation.
   A. Pit, Stockpile and equipment storage areas: enter quarter-quarter or equivalent description.
   NE-SW, Section 25, T. 32 N., R. 102 W., Acres 10
   _____, Section 25, T. 32 N., R. 102 W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   B. Haul and access roads; list those portions of newly constructed or upgraded private roads which provide exclusive service to the mining operation.
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   _____, Section _____, T. _____ N., R. _____ W., Acres _____
   C. All listed lands occur in Crook County, WY and the **Total Acres are** 10

2. List all operators defined in W.S. §35—11-103(e)(ix) as "...any person engaged in mining...or who acts as an agent or independent contractor...in the conduct of mining operations."

A. Applicant for the Limited Mining Operation	B. Operator (if different from applicant)
Frost Rock Products (individual or company name)	(individual or company name)
PO Box 426 Lovell, Wy 82431 (mailing address)	(mailing address)
307-548-6505 / 307-548-6263 (area code and phone and fax number)	(area code and phone and fax number)
Corporation (type of entity)	(type of entity)

3. Description of affected lands and mining operation.
   A. The mineral to be mined is Limestone (type) and mineral ownership is private (private, state, federal)
   B. The mining operation will begin on January 09 (month & year) and is projected to last until January, 2010 (month & year)
   C. The mining operation will include 1)removing and stockpiling all topsoil with a dozer, scraper or similar equipment 2)removing and stockpiling overburden with a dozer, scraper or similar equipment 3)removing and processing and stockpiling the mineral 4)hauling the processed mineral 5)backfilling stockpiled overburden and unused mineral, regrading and contouring and retopsoiling and reseeding all affected lands.
   D. The premining and postmining land uses are grazing and wildlife habitat.
   E. The maximum depth of mining will be 50 feet and the estimated depth to groundwater at the pit is 600 feet.

4. A Reclamation Performance Bond in the amount of $ 10,000.00 calculated at the rate of $1,000 per acre for the total acres listed in 1.C. above. The bond is _____.
   (C.D. No., Surety Bond No., Letter of Credit No.)

5. **Under penalties of perjury, we declare that we have examined this notification and consent and the information contained herein, and to the best of our knowledge it is true, correct and complete, and that the location of the proposed operation is accurately shown in the original U.S.G.S. quadrangle map accompanying this consent, and this Ten Acre Exemption will not be used in conjunction with any other adjacent Ten Acre Exemption to circumvent the permitting requirements of the Wyoming Environmental Quality Act. Further, it is agreed that the reclamation of the lands affected by the mining operation shall be in compliance with applicable Land Quality Division (LQD) Rules and Regulations and that we have the right to mine the minerals.**

6. **We, the surface owner and lessee and operator, are aware that the LQD may conduct inspections of the operation and by our signatures below we give our consent to the conduct of such inspections.**

Signature of surface owner and date	Signature of applicant and date 12/9/08
Roger Croell (Print or type name of surface owner)	Sean Frost (Print or type name of applicant)
Signature of surface lessee and date 12/9/08	Signature of applicant and date 12/9/08
4747 Old Hwy 14 Sundance, Wy 82729 307-283-2598 (Print or type address and phone no. of surface owner)	Frost Rock Products Co. 307-548-6505 307-272-5961 (Cell) (Print or type name and phone no. of applicant)

MAKE NO ENTRIES — FOR LQD USE ONLY

TFN No. 5 1/077
Permit No. 1396ET
District III

Approved: Deanna K. Lind for:
Administrator, LQD
Approval date: 02-17-2009

Form 10
Rev: 05/06

Received Dept. of Envir. Quality Sheridan JAN 2009

Received Dept. of Envir. Quality Sheridan JAN

Appendix C-1

This Appendix "C" represents the location of lands by legal subdivision, section, township, range, county, and municipal corporation, if any, (W.S. 35-11-406, (a), (vi)) and the number of acres in each description. No mining activity may take place on land for which there is not in effect a valid mining permit (W.S. 35-11-405). To include additional lands within a permit area it is necessary to amend the permit (W.S. 35-11-406, (a), (xii)), so care should be taken to include all lands necessary to the mining and reclamation operation as defined in W.S. 35-11-103, (e), (viii). All acreage figures should be obtained from official survey documents or recent surveys if available. An original U.S.G.S. topographic map with the permit area clearly outlined should accompany each permit application.

TABLE C-1
Roger's PIT - LAND DESCRIPTION

A tract of land located in the SE1/4NW/4, that portion of SW/4NW/4 located east of Interstate 90 Right-Of-Way, SW1/4 and SW/4SE/4 of Section 25; that portion of SE/4NE/4 located east of Interstate 90 R-O-W, that portion of SE/4 located east of Interstate 90 R-O-W, and that portion of SE/4SW/4 located east of Interstate 90 R-O-W of Section 26; E/2NE/4, NW/4NE/4, that portion of the N/2NW/4 located east of Interstate 90 R-O-W and the NE/4SE/4 of Section 35, T52N R62W of the Sixth Principal Meridian, Crook County, Wyoming.

The NE1/4SW1/4 of Section 25 contains federal minerals for which no right to mine is claimed. Croell Redi Mix, Inc. has not obtained a BLM contract for these minerals. Therefore, the NE1/4SW1/4 of Section 25 is excluded from mining progressions.

SHOULD BE NWSW

SEE PREVIOUS PAGE

Said tract of land contains 600.07 acres, more or less, subject to all rights, restrictions, reservations and/or easements of sight and record.

COUNTY of Crook	Description Acres 600.07
Municipal Corporation Sundance	Total Permit (Amendment) Acres 600.07

Roy – Croell 5/14/09

Applicant Signature Date

Permit No.

1.07.2009

5/6/07

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND QUALITY DIVISION

MR LB DE SP
KK MT JS JM
DG GM DC DS
KT MB

REQUIRED ANNUAL REPORT INFORMATION FOR LIMITED MINING OPERATIONS (ET's)

1. Name of Limited Mining Operation (ET) Holder: Frost Rock Products

Mailing Address: P.O Box 424
Lovell, Wyo 82431

Telephone Number: 307-548-6505

Name of Operator if Different than ET Holder: _____

RECEIVED FEB 17 2010 DEQ/LQD

2. Limited Mining Operation Number (ET Number): 1461ET

3. Surface Landowner: Roger Croell

4. Time period covered by this report: from 2/17/09 through 2/17/10. (The reporting period begins on the month and day of permit issuance in the year reported. The end date of the reporting period is twelve months after the anniversary date.)

5. Location of the mining operation: Section 25, T. 52 N., R. 92 W., in Crook County

6. The number of **acres newly disturbed** during the report period is 10 acres. The total number of acres disturbed since mining began (including acres disturbed during the current report period) is 10 acres.

7. The quantity of **mineral** removed from the mine during the report period is _____ cubic yards or 235,000 tons.

8. The volume of **overburden** which has been stockpiled during the report period is 1000 cubic yards. The total volume of **overburden** currently stockpiled (including volume stockpiled during the current report period) is 1000 cubic yards.

9. The volume of **topsoil** which has been stockpiled during the current report period is 0 cubic yards. The total volume of **topsoil** which is currently stockpiled (including volume stockpiled during the current report period) is 15,000 cubic yards. (Only moved existing)

10. The number of **acres reclaimed** during the report period is none. The total number of acres reclaimed since mining began is none.

11. On those lands reclaimed during the report period, what is the average thickness of the topsoil that has been applied? N/A inches.

12. On those lands reclaimed during the report period, please state the date of seeding, what plant species were seeded, rate of application (pounds per acre), and method (drill or broadcast)
N/A

13. Please give a brief description of your proposed operations for the next year (include the number of acres to be disturbed and the number of acres to be reclaimed). 0

14. The expected remaining life of this operation (through reclamation) is 0 years.

15. **Reclamation Performance Bond:** Please describe the type and face value of the current bond:
40,000 Cash Fund
Land Quality Div.

16. Please include any additional comments on reverse side.

REPORT PREPARED BY Elaine Wood _____
(Name) (Date)

Exhibit 23

EQC Docket 10-2803
Judith Bush

Excerpt from December 21, 2009 pubic hearing General Manager of Croell Redi-Mix testifies on blasting frequency at the Rogers Pit, and average amount blasted each time.

The numbers do not add up to the reported annual product reported in annual reports, which is one reason, along with the history of AQD crusher / operator permits already presented, why I requested the Mr Croell provide documentation (records of truckloads hauled off site for and and all operators operating at the Rogers Pit) since start-up.

I believe that this was a reasonable request.

Mr. Marchant is the General Manager of Croell Redi-Mix.
Mr. Turgeon was an objector at that hearing.
Ms. Guschewsky is an EQC Council Member.

BLASTING STATISTICS - BRIAN MARCHANT Gen Mgr Croell
from transcript of December 21, 2009 public hearing regarding Croell Redi-Mix LQD Application regarding the expansion of its Rogers Pit operation
(Environmental Quality Council Docket 09-4806 / DEQ LQD TFN 5 6 /072)

Transcript page 245 line 5 - page 246 line 9

Turgeon	Would you go back over how often you blast?
Marchant	Depends on the time of year. I'm going to say it's every couple of weeks
Turgeon	And that's consistent throughout the year?
Marchant	Well, we have the crushing year-round. I mean, when we're crushing year-round, yes, it will be once every week to two weeks.
Turgeon	When you were crushing, how long did you crush:
Marchant	How long did we crush?
Turgeon	Yeah, that you've been doing this blasting every two weeks.
Marchant	I don't know. I'm going to say 20 weeks. I don't have exact dates. I'm guessing. Half a year.
Turgeon	Six months or so?
Marchant	Yeah.
Turgeon	And how many tonnage did you blast with each one?
Marchant	30, 40 thousand tonnage. It depends on how the pattern laid out, where you were on your pattern and on your high wall.
Turgeon	But somewhere between 30 and 40 thousand ton a blast?
Marchant	Yeah.
Turgeon	And what was that permit for? How many tonnage a year?
Marchant	I don't know. I don't have that in front of me.

Transcript page 248 line 22 - page 249 page line 9

Guschewsky	I'm trying to -- you said whenever you blast, you blast -- you blast to get either 30 to 40 thousand tons and you do that every couple of weeks?
Marchant	Yes. Well, and like I say, that's objective, ma'am. Sometimes you get a 20,000 ton blast. And it depends on the weather and all sorts of things. But, yeah.
Guschewsky	I'm trying to round it around. And if you take the, let's say, 30,000 twice a month times six months -- or you take it out to a year, where you are now, you're getting about 720,000 tons a year?
Marchant	Well, we have -- I guess we have never done that, no. We've never done that much, ma'am, no.

Exhibit 24

EQC Docket 10-2803
Judith Bush

Judith Bush - September 7, 2010
Notification of to Parties of Expert Witness and Expert Reports

BY FAX

To:	Environmental Quality Council		307-777-6134
To:	Nancy Vehr, Dept of Attorney General Attorney for DEQ / DEQ AQD		307-777-3542
To:	Kim Cannon, Davis & Cannon Attorney for Croell Redi-Mix		307-672-8955
From:	Judith Bush PO Box 861 Sundance, Wyoming 82729	ph / fax	307-283 -2835 *please phone before faxing*
date:	September 7, 2010		
no pages	9 including attachment		
Re:	**DEQ AQD Permit Application No. AP-9645** **DEQ AQD Permit No. AP / MD-9645, dated March 17, 2010**		

Notification to Parties of Expert Witness and Expert Reports

Dr. James H. Myers, DVM will be offering a professional explanation to Council Members of the term "dust pneumonia". His report will available later this month. The purpose of Dr. Myer's report is to confirm the existence of and to describe the nature of the condition often referred to in veterinary medicine as "dust pneumonia".

Dr. Myers is uncertain at this time whether he will be able to attend the hearing either in person or by telephone. I have informed Dr. Myers that the hearing may take place either on January 13th or January 14, 2010, and that neither the location of the hearing nor the time of the hearing have yet been set.

I have passed my understanding of dust pneumonia by Dr. Myers, and he has confirmed that my understanding is essentially correct - namely that dust pneumonia

is a layman's term for a phenomenon where dust is a causative / precipitating factor in the onset of pneumonia in cattle. Pneumonia in cattle, as in humans, is an inflammation / infection of the lungs, normally involving either a virus, a bacteria, or both. Often a viral infection is followed by a bacterial infection. Cattle naturally harbor and /or are exposed to a number of virus and / or bacteria which can cause pneumonia. Normally, their immune system prevents pneumonia from developing. However, there are a number of factors which can undermine cattle' immune systems' ability to resist infection, and the number one exacerbating factor is dust, particularly as it affects the upper respiratory tract.

The same holds true for other animals as well as humans, the difference is that humans normally have the option and the common sense to remove themselves from an excessively dusty outdoor environment. Cattle grazing and wintering over in pastures adjacent to a limestone mining operation are breathing in this dust 24-7. They are breathing the dust before it settles. When they graze, they are stirring up the volumes of dust which has settled and breathing in clouds of it.

Council members had no questions for my witness, Bush Ranches' Manager, Mr. Dewey Turbiville, when, on December 21, 2009, he expressed his concern about dust pneumonia affecting our cattle at the public hearing regarding the Croell Redi-Mix application to DEQ LQD to expand its operation at the Rogers Pit - the same Croell Redi-Mix limestone mining and crushing operation which DEQ AQD Permit MD 9645 modifies from a ten acre minesite with a maximum production of 100,000 tons / year to a 600.07 acre minesite with a maximum yearly production of 500,000 tons per year.

However, on January 14, 2010, during discussion preceding Council's vote to approve the Croell Redi-Mix DEQ LQD Application to expand the existing Croell Redi-Mix 10 acre LMO mining operation at its Rogers Pit location to a Regular Mining operation with a 600 acre minesite, several Council members stated, citing

no evidence, that dust pneumonia did not exist. [1]

The appropriate time for Council to have questioned the nature of dust pneumonia would have been at the December 21, 2009 public hearing , when objecting parties would have had the opportunity to respond and / or defend their concerns.

In addition, the assertion that the notion of dust pneumonia was bogus was the lead-in to imply that other (unspecified) and equally bogus issues were raised by objectors, and that issues raised by objectors at that hearing were emotional as opposed to factual and by extension of no legal significance.

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1 The following excerpts are from the transcript of the January 14, 2010 meeting of the Environmental Quality Council, at which the EQC voted in favor of approving Croell Redi-Mix DEQ LQD Application TFN 5 6/072 (EQC Docket No. 09-4806):

Tim Flitner
Council member

And, you know, there was a lot of that testimony on the other side, too, that wasn't -- just flat didn't hold water. There's no such thing as dust pneumonia in cattle. And few things like that popped up, which those kind of things bothered me. And when you get to that point and start listening to people's emotions and their opinions and get away from the facts, and that's where we spent a lot of those hours that day, was listening to people's emotions. And the facts say that, you know, this should be okay. So that's where I am.

Transcript January 14, 2010 meeting of EQC Docket 09-4806
page 14 line 21 - page 15 line 6
(District Court Civil Case No. 8016 Record pages 1178 - 1179)

Tom Coverdale
Council member

... Although there is no pneumonia in cows. I agreed with Tim (Flitner). I looked that up and it's bullshit.

Transcript January 14, 2010 meeting of EQC Docket 09-4806
page 18 line 13 - 15
(District Court Civil Case No. 8016 Record page 1182)

This latter assertion adds insult to injury, since I was denied the opportunity either to to present my legal arguments or to explain my exhibits at the December 21, 2009 public hearing.

note These exhibits had been delivered to the EQC, attorney for the DEQ LQD Mr. Burbridge, and Croell Redi-Mix on Friday, December 18, 2010.

They showed that Croell Redi-Mix had been aware of lack of legal access to and from its LMO minesite to the first public road (the Rifle Pit Road) for its mining operation since December of 2007 (Exhibits 20 and 21). (Croell Redi-Mix did not inform the LQD of this fact.)

Exhibit 22 was a LQD Form 8 Surface Landowners' Consent Form sent to me by Croell Redi-Mix which had been filled out in such a way that , had the owners of Bush Ranches signed this form, we would have signed over all of our owned mineral rights in Section 25 T 52N R 62W to Croell Redi-Mix.

Exhibits included three separate Notices of Violation issued to Croell Redi-Mix in 2007, 2008 and 2009 respectively. The 2008 Notice of Violation relating to its Rogers Pit LMO operation lumped four separate violations (including mining-related activities taking place on more than double its permitted 10 acres) into one Notice.

At the December 21, 2009 public hearing, I stated that this type of conduct did not bode well for the future compliance of Croell Redi-Mix.

Please note that within one month of having been issued its regular mining permit, Croell Redi-Mix was already in violation with the terms of that permit, having disturbed lands beyond its disturbance boundary where the expanded minesite borders Bush Ranches property. This boundary, which Croell Redi-Mix immediately violated, was described in the Mine Plan of the Application approved by Council as follows:

MP 4.9 Public Nuisance and Safety
The affected area boundary has been pulled back from the permit area to minimize impacts to adjacent lands...

Croell Redi-Mix, warned by the DEQ LQD to discontinue to disturb the land outside of the disturbance boundary, nevertheless continued to

do so, and on July 1 of this year was issued a Notice of Violation by the DEQ LQD. Unfortunately for Bush Ranches, the DEQ LQD has also issued a amended permit to Croell Redi-Mix to permit the company to continue disturb land within the minesite right up to its legal boundary eliminating what small protection which the disturbance boundary had afforded Bush Ranches in this area which our cattle graze for much of the year and where they winter over.

This is the fourth DEQ LQD Notice of Violation issued to Croell Redi-Mix, Inc. in as many years.

note The Croell Redi-Mix Application to LQD was to expand its existing 10 acre LMO mining operation at its Rogers Pit location to a regular mining operation with a 600+ acre minesite. I was told that the conduct of Croell Redi-Mix while operating its LMO was irrelevant to whether or not Council would grant the company's application to expand its activities at this location . It was further asserted by both Mr. Burbridge and the EQC at the hearing that Croell Redi-Mix was in compliance with the Environmental Quality at at the time that the December 21, 2009 public hearing took place.

I challenged these assumptions, both in my December 30, 2009 closing arguments and in my March 3, 2009 response to the Proposed Findings. There has never been a response, or even an acknowledgement of these and other objections to misstatement of facts which are a matter of record or to conclusions of law concluded on the basis is these incorrect facts.

I had thought that there had never been any response to or acknowledgement of issues addressed in either in my December 30, 2009 closing arguments or in my March 3, 2010 response to the Proposed Findings of Fact, Conclusions of Law and Order. However, I was recently provided with a recording of discussion by the EQC Council at their March 11 and 12, 2010 meeting, where the Findings of Fact, Conclusions of Law and Order regarding Docket 09-4806 was considered. Although much of the recording is not audible, I have been able to transcribe the following comments of Mr. Ruby, Executive Secretary of the EQC, relating to my March 2, 2010 response:

Mr. Ruby's comments at the March 11, 2010 Meeting of the EQC (Docket 09-4806)

Ruby Ok, what happened was the council requested Mr. Burbridge as the prevailing party to prepare a proposed Findings of Fact, Conclusions of Law and Order, ah, Mr. Burbridge did that, he delivered it to the objectors who were given, - based upon the Council's direction were given 15 days from the time of the order - the delivery to file objections to that proposed order. Ah, there was a couple of changes, insignificant changes, date changes ah in the initial order, proposed order, and so Mr. Burbridge sent out an amended Proposed Order, ah two days later I think it was and gave the parties until March 3rd to respond or the objectors until March 3rd to file their objections if any. Um, which is still in excess of the 15 days. [2] ...

Ah, the objectors filed. Mr. Turgeon ah filed ah - some objections, I think it was about a page and a half. Ah, Croell filed no objections to my recollection. And Miss Judith Bush filed a twenty-five page paper -

---

2 The Proposed Findings of Fact , Conclusions of Law and Order was sent out on February 11, 2010, and parties were asked to respond by March 3, 2010. The Amended Proposed Findings of Fact , Conclusions of Law and Order was sent out on February 19, 2010, and parties were asked to respond by March 3, 2010;

The Office of the Attorney General mailed the Proposed Orders to Canada. If the DEQ LQD had not had the courtesy to fax these documents to me, I would have had no opportunity to respond at all.

note I had written to the EQC requesting that the approved Findings of Fact, Conclusions of Law and Order be faxed to me when issued. Evidently the EQC chose not to honor this request. Council's March 12 Findings of Fact, Conclusions of Law and Order were sent to me by US mail and arrived belatedly in Canada with postage due (copy of envelope is attached)

Both Mr. Turgeon and I requested an extension of the March 3, 2010 deadline to respond after the February 19, 2010 Amended Orders were sent,. There were so many inaccuracies in both versions of these proposed orders that responding in a responsible manner, documenting the errors in the proposed orders with information contained in the record and citing appropriate statutes and rules was a gargantuan task. This request for an extension was denied.

twenty-five pages ? - I think it was of proposed objections. Most of those objections were ah not what I would quantify as objections that pertained to the proposed Order of Findings of fact they were just continued ongoing arguments about why she should win and why the department and Croell should lose. Um, or arguments about why the timing wasn't right or why the notices weren't right. They were not objections with - to the merits of the way Mr. Burbridge drafted the proposed Findings of Fact, Conclusions of law and order. [3]

In general, I believe that the EQC has shown bias and behaved unprofessionally. I have requested that Dr. Myers explain what is meant by the term "dust pneumonia" to Council Members for the following reasons:

1) Dust pneumonia is a valid concern relating to the health of our cattle and the viability of our cattle operation;

2) Council members undertook to (incorrectly) discredit this concern and to use this as a jumping off point to attack the general credibility of objectors at a time when objecting parties to the December 21, 2009 public hearing regarding EQC Docket 09-4806 had no opportunity to respond;

3) This attack on credibility could easily carry over to the upcoming hearing regarding the DEQ AQD permit relating to the expansion of the same Croell Redi-Mix limestone mining and crushing operation at its Rogers Pit location.

---

3 The document was about twice that length. It precisely followed the format of the Proposed Order, commenting upon specific findings of fact and conclusions of law. It documented objections to specific facts by citing the record, and it identified relevant statutes and rules. It challenged Conclusions of law based on incorrect findings of fact. It criticized the legal language in which the Findings of Fact had been phrased, and noted a general lack of information relating to this specific case It could have shorter, but the time to edit it down was not provided.

I will also be submitting the following two articles as exhibits for the upcoming hearing (EQC Docket # 10-2803)

1) **Pneumonia in Beef Cattle** SAC, September 2005

authors **George Caldow**, Regional Veterinary Manager, SAC
St. Boswells Veterinary Centre,
Greycrook, St Boswells TD6 0EQ
ph 01835 822456

Mark Crawshaw, Veterinary Centre Manager, SAC
Ayr Veterinary Centre, Auchincruive, Ayr KA6 6AE
ph 01292 520318

2) **Drought and Livestock Disease on the High Plains**

authors **Dr. Donal O'Toole, Dr. Meri Raisbeck and Dr. Lynn Woodard**
Wyoming State Veterinary Laboratory
Department of Veterinary Sciences
University of Wyoming

The purpose of these articles is to confirm the precipitating and /or exacerbating role that dust can play in the onset and / or severity of pneumonia in cattle, and that failure to thrive and even death are are legitimate concerns.

STATE OF WYOMING
ENVIRONMENTAL QUALITY COUNCIL
HERSCHLER BUILDING, ROOM 1714
122 WEST 25TH STREET
CHEYENNE, WYOMING 82002

17

Judith Bush
2313 County Rd. 64
Carrying Place ON Canada K0K1L0

CERTIFICATE OF SERVICE

I, Judith Bush, acting pro se, do hereby certify that a true and correct copy of the foregoing **Notification to Parties of Expert Witness and Expert Reports** was served via facsimile on Tuesday, September 7, 2010 and also by depositing the same in the U.S. mail on Tuesday, Sept 7, 2010

addressed to:

Kim D. Cannon (# 5-1401)
Davis and Cannon
40 South Main Street
P.O. Box 728
Sheridan, Wyoming 82801

by Facsimile (307)672-8955 on Sept 7, 2010
and by regular mail on Sept 7, 2010

Nancy Vehr (#6-3341)
Sr. Asst. Attorney General; and
Amanda Kroul
Office of Attorney General
123 State Capitol
Cheyenne, Wyoming 82002

by Facsimile (307) 777-3542 on Sept 7, 2010
and by regular mail on Sept 7, 2010

Environmental Quality Council
122 W. 25th, Herschler Building
Room 1714
Cheyenne, Wyoming 82002

by Facsimile (307) 777-6134 on Sept 7, 2010
and by regular mail on Sept 7, 2010

Sept 7, 2010

Judith Bush date
PO Box 861
Sundance, Wyoming
82729

tel / fax 307 - 283 -2835
please phone before faxing

Pg 10

Exhibit 25

EQC Docket 10-2803
Judith Bush

Dust Pneumonia

Dr. Myers' explanation of what is meant by the term "Dust Pneumonia"

I understand that Dr. Myers' history is as follows:

Dr. Myers practices at the Belle Fourche Veterinary Clinic
He graduated from Kansas State in 1968 (Manhatten, Kansas)
Apart from a few years in the military, he has practiced
Veterinary Medicine in Belle Fourche since 1970.

Letter dated
Sept 10, 2010

Dr. James H. Myers, DVM
PO Box 430, 406 Summit St.
Belle Fourche, SD 57717
Tel (605) 892-2618

Belle Fourche Veterinary Clinic
PO Box 430 406 Summit St.
Belle Fourche, SD 57717
(605)892-2618 Fax(605)892- 6157

September 10, 2010

To Whom It May Concern:

In Reference to Dust Pneumonia:

The term dust pneumonia is often used by producers but is not truly a scientific term. Bovine Respiratory Disease (BRD) has many causes and is often times a combination of many stressors and bacterial and viral pathogens. Usually, it is caused by a virus invading the respiratory tract and destroying its defenses. A bacteria then will come in secondary and cause pneumonia.

One of the many defenses of the bovine respiratory tract is the upper respiratory system. This consists of the nose, pharynx and trachea. Large particles such as dust can challenge the upper respiratory system, therefore making the animal more susceptible to lung problems. A highly dusty environment can predispose an animal to viral and bacterial pneumonia, however, dust does not cause pneumonia. Therefore, dust pneumonia is not a viable term.

Sincerely,

James H. Myers, DVM

Exhibit 26

EQC Docket 10-2803
Judith Bush

Dust Pneumonia

Article **Pneumonia in Beef Cattle** SAC, September 2005

authors **George Caldow**, Regional Veterinary Manager, SAC
St. Boswells Veterinary Centre,
Greycrook, St Boswells TD6 0EQ (Scotland)
ph 01835 822456

Mark Crawshaw, Veterinary Centre Manager, SAC
Ayr Veterinary Centre, Auchincruive, Ayr KA6 6AE (Scotland)
ph 01292 520318

relevant information is contained on pages 1 and 2 of this article
I have transcribed this information and attached this transcription to the article for ease of reference.

Pneumonia in Beef Cattle

Supporting the land-based industries for over a century

SAC

Technical Note

TN571

ISSN 0142 7695
ISBN 1 85482 824 X
September 2005

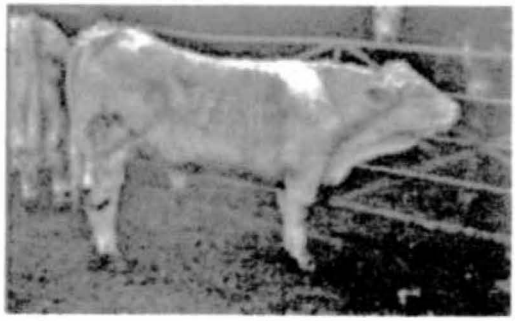
SUMMARY

- **Calf pneumonia is a significant source of financial loss in beef production.**
- **It is a multifactorial disease and husbandry and management factors are important triggers for common infectious micro-organisms to multiply and cause pneumonia.**
- **RSV, Pi3 and IBR are the most important viruses and vaccines exist to protect against them.**
- **Assessing and correcting the management and vaccination of calves is necessary to control costs and improve the efficiency of production.**
- **A pneumonia control programme should be part of the health plan for the beef herd.**

Introduction

Calf pneumonia is a disease of considerable financial significance to the beef industry. Costing of outbreaks has identified that in the average outbreak £22 will be lost per calf at risk. For a group of 100 calves where a quarter of them are treated the total loss will be around £2200. Losses arise from the cost of treatment, reduced weight gain, increased work for those looking after the cattle and most significantly of all from calf deaths. The disease is one of the so-called multifactorial diseases. This means that in addition to the range of infectious micro-organisms that cause the disease, husbandry and management factors have an essential role in precipitating outbreaks. The micro-organisms that cause the disease are by and large to be found in every herd of cattle whether or not pneumonia is a problem. The factors that allow the micro-organisms to cause the disease are those that are under the control of the management or are a result of the husbandry system.

While early antibiotic treatment can be very effective in reducing the losses caused by the disease the most cost effective approach to managing pneumonia lies in a preventive programme that includes vaccination and a positive management programme to control the contributory factors. Furthermore there is widespread concern over the development of antibiotic resistance in the bacterial micro-organisms found in animals and the possible transfer of that resistance to bacteria that cause disease in humans. Responsible use of antibiotics in beef production must be an objective for all beef farmers. Prevention of pneumonia is also clearly justifiable from a welfare perspective.



Calf with chronic pneumonia, the neck is stretched out to make breathing easier.

Background

The term pneumonia means inflammation of the lungs. The disease process will result in damage to the animal's lungs that will reduce its ability to breathe, reduce feed intake and increase feed conversion. At its most severe it will result in so much damage that the animal can no longer breathe effectively and will die because of oxygen starvation. In the course of the disease process animals will be

Pneumonia in Beef Cattle

fevered and suffer toxaemia (feel bad). The majority of animals will recover completely and indeed are likely to show compensatory growth subsequently so that by the end of the feeding or housing period affected animals will be as well grown as their unaffected pen mates. A small number of affected calves will suffer lung damage that will not repair. These animals are termed respiratory cripples and will appear ill-thriven and suffer recurrent bouts of pneumonia.

While damage to the lungs is the critical part of the disease process often the entire respiratory tract between the nose and the lungs may be affected. Indeed this part of the breathing system, known as the upper respiratory tract is important in protecting the lungs from pneumonia. Diseases such as infectious bovine rhinotracheitis (IBR) will cause so much damage to the windpipe that fatal pneumonias commonly develop. But damage does not need to be so dramatic; a range of factors can overcome the natural disease resistance of the upper respiratory tract. Dust and poor air quality is the most common factor, but acidosis caused during the acclimatisation period to a concentrate ration, trace element or vitamin deficiencies and husbandry routines such as dehorning and castration are all of importance.

The micro-organisms that are involved are split between the viruses and the bacteria. The viruses cause the early phase of the disease and will further reduce the natural disease resistance of the upper airways. Bovine respiratory syncytial virus (RSV), parainfluenza 3 (Pi3) and the IBR virus are the ones of importance. Bovine virus diarrhoea virus (BVD) does not damage the respiratory tract but lowers the immunity of the calves and so makes them more susceptible to the effects of the other infections. The RSV virus can cause pneumonia of such severity that calves can die after a very short illness, but more commonly the viral phase of the disease is less severe and a rapid recovery is seen where there is no lung damage caused by bacteria.

The bacteria that cause pneumonia usually do so following on from the viral infections or when the air quality or husbandry is very poor. The important bacteria are *Pasteurella haemolytica* (now known as *Mannheimia haemolytica*), *Pasteurella multocida*, *Histophilus somni* and *Mycoplasma bovis*. All can be found in the nasal passages of groups of healthy calves. They cause severe lung damage if they are allowed to penetrate the lower airways and it is this part of the disease that causes the majority of deaths that arise from pneumonia.

A further cause of pneumonia that has to be considered is lungworm. These parasites may have caused damage to the lungs before housing or failure to treat at housing may mean that calves are still infected when housed. Either way their significance in contributing to pneumonia problems should not be over looked.

Pneumonia is almost exclusively a disease of young cattle. The younger the calves are the more severe is the disease and the more difficult it can be to control. In calf rearing units where insufficient attention is paid to providing good quality naturally ventilated buildings calf pneumonia can be almost impossible to control adequately. However the disease can also be severe in older weaned calves that may be mixed from several sources at housing or subjected to a range of stressors simultaneously such as housing, weaning and dehorning. The difference between pneumonia problems in the young calves and that seen in the older calves is that attention to management can result in very good control of the disease in the older calves.

Signs of pneumonia

The first sign of pneumonia in a calf is a reduction in feed intake. In some calves this may be seen as a lack of gut fill. At this stage the calf will almost certainly have a fever (rectal temperature more than 39.5 degrees C.), but yet still appear bright. A watery discharge at the nose may be apparent, but often goes unnoticed, as calves are fairly adept at licking their noses clean. As the disease progresses coughing may occur and the animal may develop a "lift" as the increased effort to take air into the damaged lungs becomes obvious. The nasal discharge may now become thicker and flecked with white material (mucus and pus). As the animal progresses through this phase it will appear depressed and ill even to those not used to dealing with stock.

Pneumonia in Beef Cattle

By the time calves are seen clearly to be ill there is likely to be several more already in the early stages of the disease.

It is important to recognise that increased effort to breathe in young calves with or without a fever need not indicate pneumonia. The dehydration and acidosis that is seen with calf scour results in more frequent deep breaths and can fool even the most experienced into thinking that it is pneumonia. Failure to make this distinction may result in the death of the calf, as fluid therapy will be required for calf scour cases showing these signs.

Assessing the environment

Naturally ventilated buildings rely on the heat of the calves to generate an effective thermal current as the air is warmed by the calves and rises to exit the building through the outlets in the roof and draws fresh air in through inlets in the walls. This system must be able to provide the calves with the required air changes even on the stillest of days. In a well-ventilated building the air will appear fresh without excessive smells of ammonia or slurry gasses. Cobwebs will not be evident. If pneumonia is a recurrent problem in a building then it is necessary to review the ventilation. There are standards for design and the inlet and outlet areas can be measured for the numbers and type of stock and matched to the design requirement. Your vet or a buildings engineer will be able to advise on the adequacy of the ventilation and suggest ways in which ventilation can be improved.

Sources of dust should be avoided. Rations should not be ground or mixed in the same air space as the calves.

Drainage too is critical. If surfaces within the building are constantly wet then the relative humidity within the building will increase and favour the survival of the bacteria and viruses that cause the disease. Attention to external drainage and down pipes is important.

Assessing the management

The key is to avoid stress at the times of the year when there is a high risk of pneumonia. The two critical periods are the month after housing and the four weeks either side of the New Year. Dehorning and castration should be done when calves are young, not when they are weaned. Weaning can be done outside, but if it has to be done inside then the mothers of the calves should be kept in the next pens. Worm treatment for spring-born calves can be given prior to housing if a wormer with persistent action is used. This allows lungworm to be removed from the lungs while they are at low risk of pneumonia, prevents new infections and allows a period for the lungs to recover from the lungworm damage before housing. The final point is to ensure that the introduction of any concentrate ration is done as gradually as possible to minimise the risk of acidosis. It helps if concentrates have been available prior to housing.

The situation is less easily managed with young dairy bred calves. A good supply of colostrum is required to ensure the calves have some protection and there is little that can be done except source even batches. However colostrum is also a source of vitamins A and E that help the body to fight infection. Multi-vitamins can be administered to calves on arrival as a precaution against a poor supply from their mother. Suckled calves are unlikely to be affected in this way if born in the summer or autumn or if spring born and the winter ration of the cows is supplemented with a proprietary mineral and vitamin supplement at the correct rate.

Diagnosing the cause

There are a range of diagnostic techniques that can be employed to show what agents may be active in any herd, however enough is known about the pneumonia complex to make diagnosis of precise cause unnecessary in the majority of cases. We know that RSV and Pi3 are common in young calves and that in older calves RSV is likely to be much more important than Pi3. We know that if the herd is open with market purchased animals added then the calves would be at risk of IBR. Using this assessment your vet will usually have enough information to guide him or her in constructing a vaccination programme for your situation. Monitoring for bacteria to assess their antibiotic resistance pattern is certainly advisable where the entire group of calves may require antibiotic treatment. This can be

Pneumonia in Beef Cattle

done with nasal swabs submitted to the diagnostic lab. Nasal swabs can also be used to diagnose IBR provided early cases with a clear nasal discharge are swabbed. This can be of importance as vaccination in an outbreak of IBR is considered to be beneficial.

Where a pneumonia control programme is in place and losses occur more detailed investigation can be carried out to find out the reason in order to correct the programme.

It is recommended that where deaths occur after a very short illness or suddenly in the course of the outbreak that a post mortem examination is carried out. This is best achieved by taking the carcass to the Veterinary Investigation Centre (VIC) or failing that having the pluck (lungs, with the heart and wind pipe) removed from the carcass and taken to the VIC. In general it is not worth examining animals that have been ill for a more prolonged period and have been treated with antibiotics.

Treatment

Antibiotics are very useful in the treatment of pneumonia and in many cases a response may be seen within 24 to 48 hours. A range of antibiotics exists and each may have a different place in the treatment of this condition. Blanket treatment of the group is sometimes employed, but consideration should always be given to the development of antibiotic resistance and the possible transfer of this to the bacteria that cause disease in humans. Responsible use of antibiotics is therefore vital. These products are prescription only medicines and should only be administered on the advice of the vet to animals that are under the care of the vet.

Anti-inflammatory agents are also used in severe cases. These reduce the damage caused by inflammation within the affected lung and make the calf feel better much as aspirin does for us when we suffer a cold.

Prevention

In addition to a management programme that seeks to minimise stress and improve air quality, vaccines are essential for control of pneumonia in herds that are troubled by this disease. For most situations RSV vaccination is essential; Pi3 can be added for younger calves and IBR where calves are purchased through markets. BVD control can be achieved through vaccination of the breeding herd and so removing the risk of virus carrier calves being present, but where calves are purchased there may be a role for including protection against this agent. Multi-component vaccines exist that offer cover for all of these agents. There are also vaccines that claim protection against *Mannheimia haemolytica*, one of the bacteria in the pneumonia complex.

The key to using vaccines is to ensure that the course of injections is completed prior to the risk period for pneumonia. This means that for spring born suckled calves the vaccination should begin at six weeks before the projected housing date (for most vaccines). However it also underlines the difficulty for autumn born calves and dairy bred calves. That is it can be difficult to provide effective vaccine cover if the disease is occurring in the first six weeks of life.

A pneumonia control programme is an essential element of the health plan for a beef herd. The control programme should be drafted several months before cattle are purchased or due to be housed to allow time to assess ventilation and to correct any deficiencies, but also to ensure that the vaccination programme can be put into effect before the risk period.

Further sources of information

BS5502 Part 40. British Standards (Buildings and Structures for Agriculture). Part 40: Code of practice for design and construction of cattle buildings. 14pp.

Webster, J. Calf Husbandry, Health and Welfare. Granada Technical Books.

Pneumonia in Beef Cattle

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Pneumonia in Beef Cattle

Comment Dust pneumonia is a layman's term for a phenomenon where dust is a factor in the onset of pneumonia. Pneumonia in cattle, as in humans, is an inflammation / infection of the lungs, either by a virus or a bacteria - often a viral infection followed by a bacterial infection.

Cattle naturally carry a number of these virus and / or bacteria without falling prey to pneumonia. There are a number of factors which can undermine cattle's ability to resist infection by virus and / or bacteria which they naturally harbor - and the number one exacerbating factor is dust.

See attached **Pneumonia in Beef Cattle** SAC
September 2005

authors **George Caldow**, Regional Veterinary Manager, SAC
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Excerpts from attached article

".. The disease (calf pneumonia) is one of the so-called multifactorial diseases. This means that in addition to the range of infectious micro-organisms that cause the disease, husbandry and management factors have an essential role in precipitating outbreaks. The micro-organisms that cause the disease are by and large to be found in every herd of cattle whether or not pneumonia is a problem. The factors that allow the micro-organisms to cause the disease are those that are under the control of the management or are a result of the husbandry system....

...A small number of affected calves will suffer lung damage that will not repair. These animals are termed respiratory cripples and will appear ill-thriven and suffer recurrent bouts of pneumonia.

While damage to the lungs is the critical part of the disease process often the entire respiratory tract between the nose and the lungs may be affected. Indeed, this part of the breathing system, known as the upper respiratory tract is important in protecting the lungs from pneumonia. Diseases such as rhinotracheitis (BR) will cause so much damage to the windpipe that fatal pneumonias commonly develop. But damage does not need to be so dramatic; a range of factors can overcome the natural disease resistance of the upper respiratory tract. Dust and poor air quality is the most common factor....

The bacteria that cause pneumonia usually do so following on from the viral infections or when the air quality is very poor. The important bacteria are *Pasteurella haemolytica* (now know as *Mannheimia haemolytica*), *Pasteurella multocida, Histophilus somni* , and Mycoplasma bovis . All can be found in the nasal passages of groups of healthy calves. They cause severe lung damage if they are allowed to penetrate the lower airways and it is this part of the disease that causes the majority of deaths that arise from pneumonia.

Exhibit 27

EQC Docket 10-2803
Judith Bush

Dust Pneumonia

Article **Drought and Livestock Disease on the High Plains**

authors **Dr. Donal O'Toole, Dr. Meri Raisbeck and Dr. Lynn Woodard**
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Department of Veterinary Sciences
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DROUGHT AND LIVESTOCK DISEASE ON THE HIGH PLAINS

Dr. Donal O'Toole, Dr. Merl Raisbeck and Dr. Lynn Woodard
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University of Wyoming

Three years of drought in the High Plains have had an appreciable impact on the range of diseases that University of Wyoming diagnosticians at the Wyoming State Veterinary Laboratory (WSVL) recognize in Wyoming livestock. Many of these are just worse cases of what is seen in normal years, but some are unique to periods of extended drought.

Nitrate poisoning

A major risk during periods of drought is nitrate (NO_3) poisoning of adult ruminants. Drought stress exacerbates the tendency of many plants to accumulate nitrate, particularly oat hay and Sudan grass hybrids that were fertilized in anticipation of normal moisture. While it is a good idea to test hay before feeding it, it is especially important during a drought. Nitrate poisoning impairs the ability of blood to carry oxygen. The result is sudden death, which may strike a large number of adult cattle in a herd at once without warning. In most cases, cattle are found dead, and treatment is impractical. This is one of the more common causes of poisoning confirmed by the WSVL in cattle. Lower concentrations of dietary nitrate may also cause abortion.

Hay should be sampled for nitrate testing after it is cut and cured. Use a bale corer, which can be obtained from a county agent, to collect 10 to15 sub-samples from each stack or load of hay. Results obtained from testing samples collected by grabbing handfuls here and there are unreliable since they are likely to miss nitrate "hot-spots" in the hay. It is important to have testing done at a laboratory familiar with this type of analysis. Forage nitrate analysis is different from the similar-sounding nitrate-nitrogen test on water samples by environmental laboratories. It is recommended that samples be tested at the Wyoming Department of Agriculture's Analytical Services Laboratory in Laramie [(307) 742-2984; accession forms available online at http://wyagric.state.wy.us/aslab/aslab.htm.] Be sure you understand how results are reported, since there are several ways to express nitrate concentration. In fact, one measure of a laboratory's expertise is whether its personnel make recommendations based upon results and offer more than just a number.

The WSVL uses less than 0.5 percent NO_3 (measured as the nitrate ion) as a "safe" cutoff for forage. Many authorities suggest concentrations of less than 500 ppm as a safe cutoff for water. If both feed and water contain appreciable concentrations of nitrate, one has to consider the contribution from both sources. In other words, subtoxic concentrations of NO_3 in water combined with subtoxic concentrations in hay may result in toxicity.

Horses are resistant to nitrate intoxication. Assuming the hay is good in other respects, moderately high NO_3 hay can be fed to horses. If the NO_3 concentration is not too high (less than 1.5 percent), it can be diluted to acceptable concentrations with clean feed. Feed must be thoroughly mixed before serving (e.g., using a grinder), otherwise some cattle may still get a toxic dose. Merely throwing out one bale of "bad" and two bales of "good" hay does not constitute dilution. Fermentation may decrease NO_3 content somewhat if there is sufficient soluble carbohydrate present, but most Wyoming forages lack the necessary energy to fuel the reaction. The probiotic feed additive Bovia Pro+ (DuoMor Biochem, Milwaukee), based upon a patented *Propionibacterium* bacteria, is advertised to decrease rumen NO_3 and blood methemoglobin concentrations by 30 to 50 percent. Preliminary data looked promising when the product was introduced several years ago.

Dust and pneumonia

Bovine respiratory disease, especially due to bovine respiratory syncytial virus (BRSV) and *Pasteurella* (*Mannheimia*) bacteria, may be more serious during drought due to irritation caused by dust. Fine dust particles enter the airways and damage the lungs, setting the scene for infection by microbial agents. Feedlot and ranch operators sometimes use the term "dust pneumonia," but this is not specific and the condition seen may have nothing to do with inhaled dust. One way to minimize losses is to give

modified live vaccines for viruses like BRSV with preconditioning shots. By contrast, killed products have, in some cases, increased the disease severity in BRSV outbreaks. Stressed animals are more susceptible to infections of all kinds. It is important to stick with a good vaccination program during a drought.

Blue green algae poisoning

Blooms of toxic blue green algae leading to cattle losses occur on rare occasions in the High Plains. Blooms form on bodies of water under conditions of heat, stagnation, eutrophication (high nitrogen and nutrients), low flow rates, and a concentrating wind. Toxic algal blooms lead to sudden death due to liver damage, shock, and/or central nervous system injury. This is a rare cause of loss in Wyoming. When losses occur, death loss can be heavy and sudden.

Dehydration-salt poisoning and sulfate poisoning ("polio")

High levels of NaCl (common salt) and/or water deprivation are hazardous to livestock. Sodium may affect production in sensitive animals, particularly dairy cattle, when concentrations exceed 1,000 ppm. Concentrations in excess of 5,000 ppm will decrease production in range animals and may cause illness and/or death.

Salt poisoning leads to seizures and prostration. Salt poisoning/water deprivation is especially hazardous during times of high temperatures. High levels of magnesium (greater than 250 ppm) may aggravate the problem. Thus, complete salt screens should be requested when water samples are collected for testing. One recent case occurred when yearlings were moved to a pasture where they could not locate a water tank. The dehydrated yearlings developed constipation and/or diarrhea, weakness, emaciation, and aggressive behavior. Some died before finding water. Some dehydrated steers that found water drank to excess, developed convulsions, and died. In another recent episode, 150 cattle died in a 18-hour period as a result of salt poisoning.

Figure 1: Three of 150 dead cattle that died in March 2013 of salt poisoning over a 18-hour period in one herd are shown (arrows).

Polioencephalomalacia ("polio" or PEM) due to high sulfate (more than 2,500 ppm) water is another disease exacerbated by drought. Sulfate is concentrated in stock ponds and sinkholes by evaporation so that water sources that were previously safe become deadly under drought conditions. Like nitrate poisoning, the sulfur content of feed and water are additive in causing the disease. In spite of its name, it has nothing to do with the infectious disease poliomyelitis in children – polioencephalomalacia is a technical term for breakdown of gray matter in the brain, which is what happens in both dehydration/salt poisoning and sulfate poisoning.

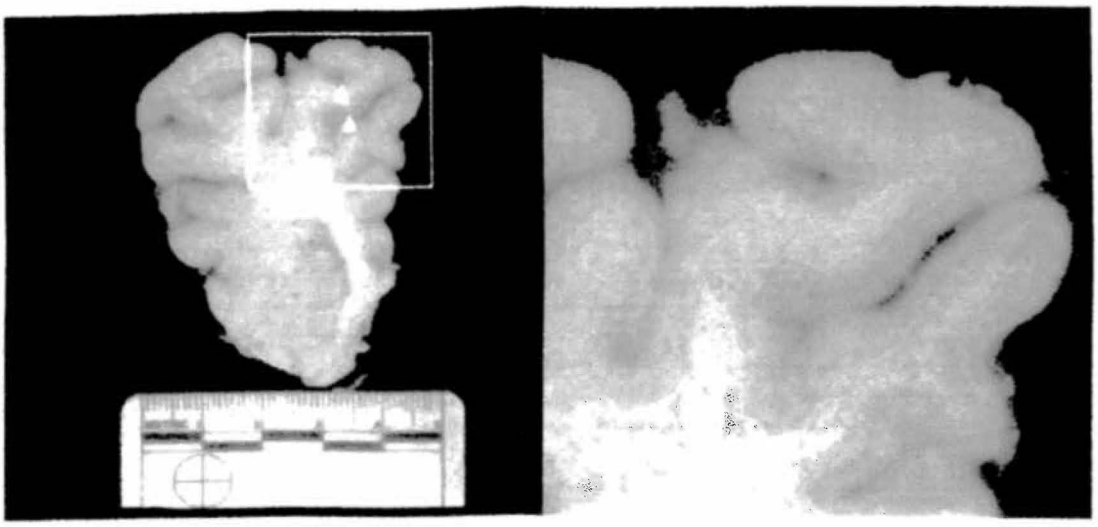


Figure 2: Sliced sample of brain of a steer with PEM. The arrowheads point to areas of damaged gray matter. Higher magnification of the boxed area shows necrotic gray matter of brain.

Ponds are the biggest problem, but well water may also be high in sulfates. Although PEM is normally a problem in spring and summer when water consumption is greatest, it may occur in any season when sulfate concentrations are high or if animals are abruptly exposed to high sulfur waters. Clinically, animals become blind and show nervous signs such as incoordination and a goose-stepping gait. Testing stock water is important to prevent problems. Cattle develop some tolerance to elevated sulfate waters if they are introduced to it gradually. There is no cost-effective method of removing sulfate from stock water. Hauling water may be the only option on some ranches with a high sulfate problem.

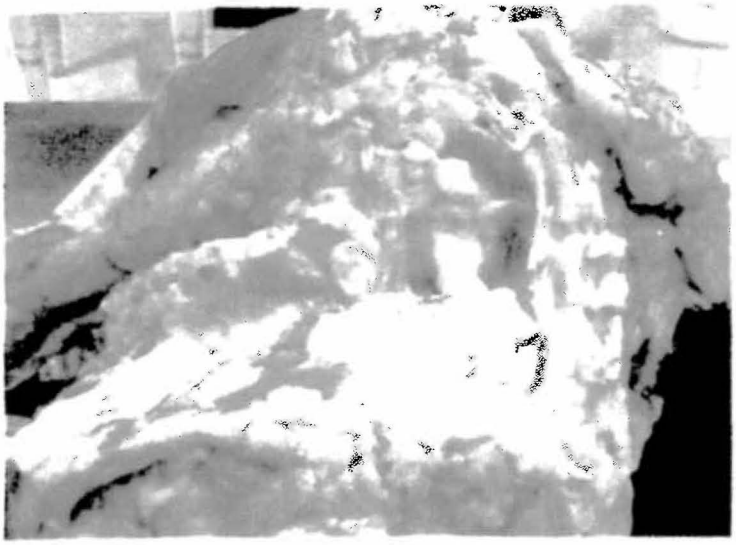
Salinity

Coarse feed

Poor quality feed can lead to disease when nutritional contents are low and/or alternate feeds are abused. Feeding large amounts of dense, poor roughage may cause extensive lesions in the mouth and throat, resulting in abscesses of the head region.

Several episodes have occurred in which adult animals had such severe oral lesions they were unable to swallow and lost weight or died due to pus draining into the lungs from mouth abscesses. In one episode, 23 of 150 adult cattle belonging to one producer developed large chronic pus-filled facial swellings. Cattle had large lymph nodes due to secondary bacterial infections. Treatment was unavailing. No foxtail or other penetrating plant fragments were found, and the owner was adamant that he avoided foxtail stands when haying. The owner ran the cattle on an arid creek where there were there were heavy stands of greasewood (*Sarcobatus vermiculatus*). Due to the drought and lack of forage, the cattle probably

grazed on greasewood and developed extensive wounds of the mouth due to the stiff spines of the plant. Opportunistic bacteria infected the wounds and created the clinical problem.



Caption for Figure 3: This is the skinned head of a cow with extensive abscess formation in the cheeks, probably due to coarse feed.

Coarse feed can also result in abomasal impaction in cattle. Heifers in late pregnancy are at most risk due to the increased nutrient demands of combining growth and gestation. Pregnant heifers develop bloat, recumbency, and die with large amounts of black fluid in the rumens and impactions in the abomasum.

Pulmonary emphysema ("cow asthma")

Pulmonary emphysema with edema ("cow asthma," "grunts," "fog fever") is associated with an abrupt change from dry pastures to meadows, especially regrowth meadows after haying. The disease occurs because of high concentrations of the amino acid L-tryptophan in forage. The amino acid is converted to a toxin in the rumen, causing an acute reaction in the lungs. The result is an acute respiratory distress syndrome in a high proportion of the herd. Cattle display characteristic breathlessness, distress, and open-mouth breathing in the absence of coughing shortly after they are turned out on fertilized or irrigated aftermath. This disease presents a challenge to producers during periods of drought. Most ranchers don't move cattle to meadows until after heavy frosts, which lower the risk. During a drought this may not be an option. Preventative strategies include gradually adapting cattle to a pasture over 10 to 12 days, cutting and windrowing the pasture before turnout, and exposing less susceptible younger stock (less than 15 months old) or sheep to the pasture first. Ionophores such as monensin will prevent or reduce pulmonary emphysema if fed in advance, but many cows won't use the blocks and they are of no value once clinical signs begin. Keep a close eye on cows for a few days after a change to lush meadows.

Toxic plants

The danger from poisonous plants is magnified during drought. Overgrazing, aggravated by poor pasture growth, forces animals to seek less palatable, potentially toxic plants. Plant populations in pastures tend to change as drought-resistant weeds begin to dominate more desirable forage plants. Drought stress may increase the toxicity of some plants such as nitrate-accumulating and cyanide-forming species. Exposure to toxic plants may occur directly on the pasture or in poor quality feeds obtained from fields stressed by drought and/or overgrown with toxic weeds. Plants containing high concentrations of soluble

oxalates (*Halogeton* and greasewood) are more toxic when ingested by sheep lacking adequate water. Locoweeds remain toxic even in winter months. Cattle may consume more locoweed during a drought. Clinical signs are abortion, nervous signs, and brisket disease. Pine needle abortion cases may occur more commonly during drought, as cattle will eat the needles more readily.

Management of plant poisonings centers on prevention. Grazing management involves the prevention of overgrazing by proper pasture rotation and by reducing stocking rates. Weed control can be attained by proper fencing, prudent application of weed killers, and mowing/plowing. If herbicides are used, beware that some can temporarily increase toxicity and/or decrease the palatability of plants.

Unusual feedstuffs

Feeding of unusual feeds or those of unknown quality and composition may be tempting to ranchers when quality feed is scarce. Unusual or unbalanced rations can lead to mineral and other dietary deficiencies leading to insidious disease in herds. An example of toxicosis due to an unusual feed involves whey, which when used as a supplement may contain toxic quantities of salt (causing seizures) or fat (causing bloat). Grazing of turnips has led to polioencephalomalacia (PEM) from excessive sulfur.

The sudden switching of feeds or increases in grains may lead to rumen acidosis and diarrhea. Drought-related acidosis is common when short feed inventories necessitate more frequent switches or when some non-traditional feeds such as baker's byproducts or dough (high carbohydrate sources) are added suddenly to rations. The prevention of abomasal impactions, rumen acidosis, and hazards of unusual feeds centers on providing a proper diet. Rations should be balanced to allow for optimal protein, mineral, energy, and roughage contents. Roughage should be of the proper density to allow for optimal gastrointestinal activity. Unusual feeds, while tempting at times, should be consciously avoided or viewed with skepticism. Sudden feed switches should be avoided. It is helpful to acclimate cattle to new rations slowly.

Pigeon fever myositis in horses

A disease that is unusual for Wyoming except in drought years is a bacterial infection that most often affects the brisket of horses. It is called pigeon fever because of the pigeon-breasted appearance of affected horses.

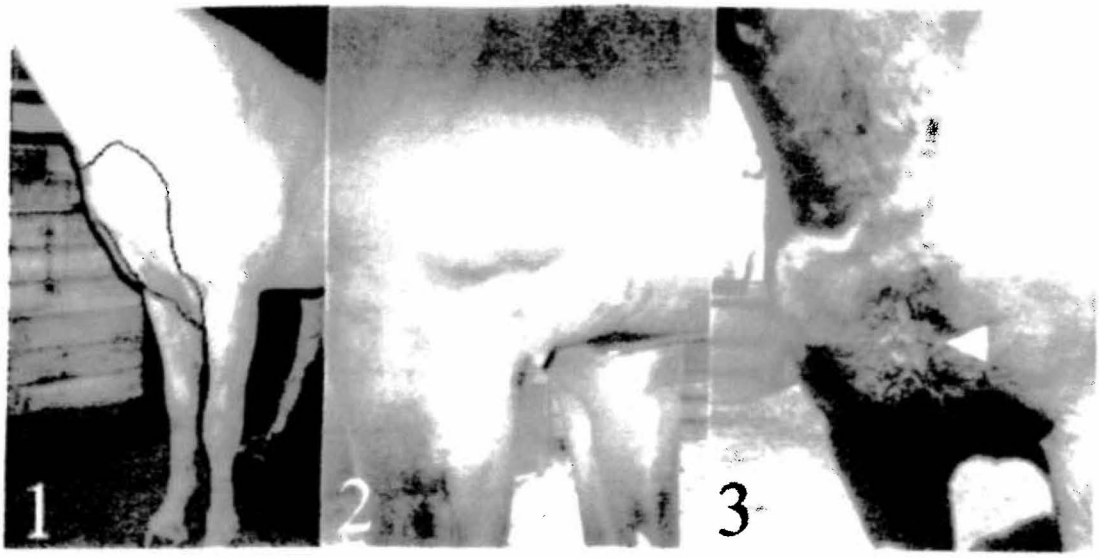


Figure 4: These three horses (1 – 3) have swelling of the brisket or shoulder area due to pigeon fever. The extent of the swelling is outlined in horse 1. Swelling may occur over the shoulder (horse 2)(arrowhead). The area of swelling may eventually rupture, discharging thick purulent exudate (arrowhead) due to infection by *Arcanobacterium pyogenes* (horse 3).

The disease is caused by a specific bacterial agent and is probably spread by flies. It is not known how drought predisposes horses to this non-fatal disease. More than 100 horses with this disease were diagnosed in Wyoming in 2002, most in the months of August to November.

March 27, 2003

Exhibit 28

EQC Docket 10-2803
Judith Bush

Dust Pneumonia

article **Bovine Respiratory Disease (BRD)**
(Pneumonia, Shipping Fever)

Pfizer Animal Health

see: **pages 2 & 3**
Robert Glock, DVM, PhD
University of Arizona

" **Dust simply serves as one of the stressors that leads into bovine respiratory disease," he says. "If an animal died of "dust pneumonia, it really died of BRD." (Bovine Respiratory Disease).**

" **Glock explains that a calf infected with BRD has bronchial pneumonia, meaning that the infection is distributed from the upper respiratory tract, down through the trachea and into the bronchioles of the lungs. "This is a sequential process: something starts it and something finishes it. Exposure to dust, either short and severe or prolonged, can open the window to the invasion of viruses and bacteria that cause BRD. So when an animal gets sick and dies, dust may start it, but terminal bacterial infection finishes it."**

BEEF HEALTH MANAGEMENT

United States

EXCENEL® RTU
(ceftiofur hydrochloride)
Sterile Suspension

Bovine Respiratory Disease (BRD) (Pneumonia, Shipping Fever)

Beef

Beef Health Index

Overview

Pneumonia. Shipping fever. Dust pneumonia. Bronchial pneumonia. Fibrinous pleuropneumonia. All of these terms really describe the same costly disease: bovine respiratory disease complex, or BRD for short.

It's the biggest health challenge facing today's feedlot - and it is a major cause of economic losses for producers.

BRD is estimated to cost the U.S. feedlot more than $500 million (U.S. dollars) each year. Incidence of the disease is approximately 20 percent of the 25 million cattle placed in U.S. feedlots annually. Mortality in the sick cattle ranges from 10 percent to 15 percent, depending on the time of year and other variables.

Depending on the organism(s) involved, death from BRD can occur within 24 to 36 hours, or the infection can proliferate and become chronic, never causing death but instead producing widespread, permanent lung damage. Once the disease has progressed to the point that fibrosis, adhesions and/or abscesses have developed in or around the lungs, no treatment will satisfactorily correct the problem. The animal may survive and even finish out, but it always will carry some residual lung problems that will impact performance. That is why early recognition and treatment of BRD - in both beef and dairy animals - are so important.

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Causes

BRD is defined as a "disease complex" for two reasons:

1. It usually is caused by a variety of pathogens, both viral and bacterial, that interact with one another to produce full-blown disease, and
2. The behavior of these pathogens follows a sequential process that, step by step, results in sick animals.

Bacterial pathogens apparently cause the acute syndrome by invading the bovine respiratory tract that has been compromised by viral infections. Preceding and contributing to the infection is the stress of weaning, shipping, change of feed and variation in ambient temperature and humidity, all of which tend to reduce energy reserves.

To this is added the exposure to pathogens by commingling with cattle of other origin in trucks, stockyards and auction barns, resulting in the high incidence of the disease as cattle are delivered to the feedlot. Most etiologic agents do not express their full virulence in the healthy calf unless other disease agents are also actively involved.

Several species of bacteria have been isolated, but the most commonly isolated species are *Mannheimia* spp. (formerly known as *Pasteurella haemolytica*), *P. multocida* and *Mycoplasma*. From all observations and experimental evidence, *Mannheimia* spp. *(P. haemolytica)* and *P. multocida* are the most important bacteria involved in BRD. At least 12 *Mycoplasma* species have been isolated from the respiratory tracts of cattle, including healthy calves, but the role of *Mycoplasmas* in BRD has not been determined. *Haemophilus somnus* is a virulent pathogen that causes septicemia in cattle; resulting manifestations have been referred to as "*Haemophilus somnus* complex," of which one form is respiratory disease. But the role of this pathogen in typical BRD is unclear.

Viruses such as infectious bovine rhinotracheitis (IBR), bovine viral diarrhea (BVD) and bovine respiratory syncytial virus (BRSV) may also be involved in the BRD complex, often opening the door to secondary bacterial infections.

Because it is virtually impossible to eliminate these organisms from the environment, the BRD complex must be approached from the standpoint of preventing these disease-causing agents from taking hold, and detecting and treating clinical cases as quickly and effectively as possible.

Is there such a thing as "dust pneumonia"?

Chances are you've heard the term "dust pneumonia." According to Robert Glock, DVM, PhD, of the University of Arizona in the United States, there really is no such thing.

"Dust simply serves as one of the stressors that leads into bovine respiratory disease," he says. "If an animal died of 'dust pneumonia,' it really died of BRD."

Glock explains that a calf infected with BRD has bronchial

> pneumonia, meaning that the infection is distributed from the upper respiratory tract, down through the trachea and into the bronchioles of the lungs. "This is a sequential process: something starts it, and something finishes it. Exposure to dust, either short and severe or prolonged, can open the window to the invasion of viruses and bacteria that cause BRD. So when an animal gets sick and dies, dust may start it, but terminal bacterial infection finishes it."

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Clinical Signs and Diagnosis

BRD manifests in numerous ways in cattle, depending on the age of the animal, causative organism(s) and stage of the disease, among other factors. While identifying sick feeder calves or beef is not an exact science, pen riders and producers should watch for these clinical signs:

- Serous nasal and eye discharge. One of the earliest indicators of BRD, this form of discharge is watery, sticky and clear. Serous discharge usually starts from the nose, then moves to the eyes as the disease progresses.
- Bloody nasal discharge. Also in acute BRD cases, blood may appear in the nasal discharge due to irritation in the respiratory tract. The protective mucosal lining is broken down and enters the respiratory system, where it is blown out.
- Purulent nasal discharge. An indicator of more advanced BRD, this discharge is thick, cloudy and pus-filled. The cloudy appearance is caused by white blood cells that have localized in the respiratory tract to attack the infection.
- Depression. Affected animals hang their heads, look lethargic and often stand away from other cattle in the pen.
- Fever. The connection between BRD and fever is extremely strong. If a feedlot animal has a fever, it almost always has respiratory disease, and vice versa.
- Inappetence. An animal's unwillingness to eat is tied closely to fever and depression. Early detection of inappetence - via frequent monitoring of a whole pen's intake - is helpful because many sick animals will reduce their intake gradually, rather than immediately. An animal that is gaunt and tucked up in the belly probably has been sick for several days, at which point the disease is further advanced and more difficult to successfully treat. A "floppy" belly is another sign of early inappetence and is caused by a shortage of fiber in the digestive tract.
- Stiff gait. Sick animals may experience muscle and joint soreness due to an increased systemic endotoxin load, similar to a person with a bad case of flu. Their movement indicates overall achiness.
- Crusty muzzle. Because it is not feeling good, the animal will tend to lick its haircoat and muzzle less and generally take poorer care of itself. At the same time, mild dehydration will cause a drying of membranes around the mouth, adding to the dry, crusty appearance.
- Salivation. Again, the animal's overall feeling of malaise may cause it to drool and gape more than usual.

- Mild diarrhea. Endotoxins in the animal's system cause displacement of body fluids, dumping more fluid into the bowel and disrupting normal absorption of food, causing loose stools.
- Rapid, shallow breathing. More blood is distributed to the infected portion of the lungs, causing occlusion of airflow. The animal has to breathe harder to get good air exchange, because parts of its lungs are not working properly. Early morning, when environmental influences are less, is the best time to evaluate breathing. A feedlot animal's threshold for heat stress is about 60 degrees F to 65 degrees F, meaning that increased respiration at or above this environmental temperature may be caused more by the external environment than disease. On the other hand, a calf breathing 60 breaths per minute at 5 a.m. when the external temperature is 55 degrees F is truly ill.
- Soft coughing. In early BRD cases, the lungs and airways are generally painful, so the animal will try to clear the airway with mild, tentative coughing. Loud, prominent coughing or "honking" indicates far more chronic, advanced cases, at which point treatment is difficult.

Using Lung Sounds for Diagnosis

One helpful way of evaluating the presence and severity of BRD is to listen to lung sounds with a stethoscope, according to Frank Garry, DVM, MS. How air is moving through an animal's lung spaces can provide telling clues as to how advanced the disease is, Garry says.

Normal, healthy lungs are relatively quiet at all locations because the air is moving freely within them. Inflammation and debris in infected lungs, on the other hand, interfere with airflow and produce much more prominent sounds, including crackles, wheezes and musical sounds.

Garry recommends evaluating lung sounds at several locations on the same animal, so the contrast between sounds in the ventral and dorsal portions can be recognized. Very little will be heard from the caudal-dorsal portion (high over the ribs) of the lung in either healthy or sick animals. The most prominent abnormal sounds will be found in the cranioventral portion (the front ribs, behind the shoulder) of sick animals' lungs.

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Management

There is no silver bullet or miracle answer to effectively managing BRD. Because it's a disease complex, determining the right treatment for each individual case is a complex process as well.

When addressing a severe BRD challenge, here are a few evaluation

tools to help you improve how you manage the disease complex:

1. Evaluation of pulling. Are sick animals being pulled too late? If so, the identification and pulling process needs to be improved, so that sick animals are pulled in time for treatment to be of greatest benefit. Personnel training can be the most important variable factor in a BRD management program.
2. Complete blood count (CBC). Blood is a window into the body. A CBC on one or a handful of animals can be helpful in determining to what stage the disease has progressed, and sometimes what main, causative organisms are involved.
3. Necropsies. Taking a look inside a dead animal can help evaluate what organisms are involved and how various treatments are working. The more history available on the dead animal, the better. Knowing when the animal got sick, what it was treated with, when it was last treated, what its temperature was, etc. will help make visual evaluation of its lungs more meaningful. The necropsy technique need not be perfect; it is most important to incorporate as much information into the observations as possible, and to perform necropsies on dead animals frequently for ongoing education and points of comparison.

The bottom line is that effective BRD management and treatment involve a series of judgment calls. There are nuances to the disease related to how each animal responds, what combination of organisms is involved, the origin and history of each animal, environmental factors, and so on. As a result, it is important that feedlot managers and dairymen place as much value on the education, training and retention of their personnel as they do on any vaccine or antibiotic.

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Treatment

Comparing one antibiotic to another can be like comparing apples to oranges. When different types of antibiotics, such as beta-lactam and macrolide, are examined, the same criteria do not always apply when making a selection decision. Because the compounds themselves - as well as the way they work - differ, it's important to understand as much as possible about an antibiotic before using it.

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Questions and Answers About BRD

Here, former Pharmacia research scientist Scott Brown, DVM, PhD, answers questions about how practitioners can and should evaluate beta-lactam and macrolide antibiotics for treatment of BRD.

How should a BRD treatment be selected?
Diagnosis is the key. Much can be accomplished through observing clinical signs of BRD, and use of the interpretive tools and information available today.

Susceptibility and/or minimum inhibitory concentration (MIC) data indicate an antibiotic's effectiveness against bacteria. In the case of BRD, the three major pathogens are *Mannheimia* spp. (formerly known

as *Pasteurella haemolytica*), *Pasteurella multocida* and *Haemophilus somnus*.

Practitioners also can make use of pharmacokinetics, the science that mathematically describes the processes of absorption, distribution, metabolism and excretion of a compound in an animal or population of animals. Coupling this information with the practitioner's knowledge about the bacteria being treated and location of the infection site, the veterinarian will be armed with important information for determining antibiotic selection and dosing regimens.

Where are BRD bacteria located?
An obvious answer would appear to be "in the lung tissue." However, this is a simplistic view.

It is true that BRD bacteria, commonly *Mannheimia* spp. (formerly known as *Pasteurella haemolytica*) and *H. somnus*, consolidate in the lung and impair respiration. However, these gram-negative bacteria are not located within the cells of lung tissue. Rather, they are located *outside* the host's cells in interstitial fluid (the fluid that bathes tissues' cells) and on the surface of the alveoli.

Why is the location of BRD bacteria important?
Knowing the location of bacteria is significant when different antibiotics are being considered. Beta-lactam and macrolide antibiotics, two classes of antibiotics commonly used to treat BRD, accumulate very differently in the host animal.

Where do beta-lactam antibiotics distribute?
Beta-lactam antibiotics, including cephalosporins like NAXCEL® (ceftiofur sodium) Sterile Powder and EXCENEL® RTU (ceftiofur hydrochloride) Sterile Suspension, tend to be very water-soluble and poorly lipid-soluble. Thus, they distribute well into the plasma and extracellular fluids of the body but don't usually penetrate the cell. Because of this limited penetration, their volume of distribution is small.

Where do macrolide antibiotics distribute?
Lipid-soluble drugs, including macrolides like tilmicosin, tylosin and erythromycin, bind to body tissues, such as the lung, and migrate into intracellular locations. Because they penetrate cells, their volume of distribution is relatively higher than beta-lactam antibiotics.

How significant are tissue concentrations of antibiotics when a BRD treatment is being evaluated?
Most "tissue concentrations" are really concentrations of antibiotic obtained from homogenized tissue. (These data often are used in drug residue studies to aid determination of withdrawal times.) However, tissue homogenate studies can distort the interpretation of drug concentrations for certain antibiotics, beta-lactams in particular.

When a tissue homogenate study is performed, the tissue is ground up and thoroughly blended. This procedure destroys tissue cells, releasing intracellular fluid in the process. If the antibiotic concentrated in *extracellular* fluid but did not enter the cells themselves, the homogenization process would alter their concentration level by causing the drug to be diluted and dispersed throughout the tissue. Thus, homogenized tissue concentrations *do not* offer an accurate assessment of a beta-lactam antibiotic's ability to concentrate at the

infection site.

What is the significance of plasma concentrations versus tissue concentrations?
In the case of BRD bacteria, plasma concentrations of beta-lactam antibiotics are the best monitor for drug concentration, because they mirror drug concentrations in extracellular fluids where BRD bacteria are located.

The best way to interpret how a drug distributes in the extracellular fluid is to look at blood concentrations. Blood concentrations mirror extracellular fluid concentrations, so plasma concentrations are an effective indicator of drug concentration at the infection site.

When's the best time to process?
"Is it better to process incoming cattle straight off the truck or give them a few days to rest?" Frank Garry, DVM, MS, and Robert Glock, DVM, PhD, agree the answer is: "It depends."

"It's impossible to take a 'one-size-fits-all' approach to processing," says Glock, "because each load of cattle comes with its own set of circumstances. Generally, I believe the more quickly cattle are processed after arrival, the better, so that their overall window of stress due to shipping and processing is smaller. That said, experience also has shown me that some calves tend to respond to vaccinations better if you give them up to 24 hours to settle down, get some feed and water into them, and start their rumens functioning again."

Garry adds that an animal's ability to respond to vaccines is hindered by its body's chemical activities - primarily the release of cortisone and epinephrine - during times of extreme stress. The longer the exposure to stress, the more immunosuppressed the animal will be. "Again, this lends credibility to the argument for early processing, because you may want to group the stress of processing as tightly as possible with shipping, to keep the stress period limited," says Garry. "The breaking point, however, is when the animals are so stressed at processing that they will not respond well to vaccines, at which point it is better to let them rest and rehydrate for a few days."

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As with all drugs, EXCENEL RTU should not be used in animals found to be hypersensitive to the product. EXCENEL RTU has a pre-slaughter withdrawal time of 3 days in cattle.

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Flitner / Coverdale - Dust Pneumonia

January 14, 2010 meeting of Environmental Quality Council
EQC Docket 09-4806 Council Approval of Croell Redi-Mix Application

Flitner
Council member

And, you know, there was a lot of that testimony on the other side, too, that wasn't -- just flat didn't hold water. There's no such thing as dust pneumonia in cattle. And few things like that popped up, which those kind of things bothered me. And when you get to that point and start listening to people's emotions and their opinions and get away from the facts, and that's where we spent a lot of those hours that day, was listening to people's emotions. And the facts say that, you know, this should be okay. So that's where I am.

Transcript January 14, 2010 meeting of EQC
page 14 line 21 - page 14 line 6

Coverdale
Council member

Although there is no dust pneumonia in cows. I agreed with Tim (Flitner). I looked that up and it's bullshit.

Transcript January 14, 2010 meeting of EQC
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