UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

In the matter of:	)	
	)	
	)	
Moran Beef, Inc.	)	DOCKET NO. CWA-07-2010-0080
	)	
	)	
Pottawattamie County, Iowa,	)	
	)	COMPLAINANT'S PREHEARING
	)	EXCHANGE
Respondent.	)	
	)	

Pursuant to 40 C.F.R. § 22.19 of the "Consolidated Rules of Practice Governing the Administrative Assessment of Civil Penalties," 40 C.F.R. Part 22 (CROP) and the Presiding Officer's Order of August 26, 2010, Complainant United States Environmental Protection Agency (EPA) submits this Prehearing Exchange.

I. WITNESSES.

1. Trevor Urban. Mr. Urban is an inspector with the Environmental Protection Agency, Region 7's (EPA) Environmental Services Division. Mr. Urban's duties include the inspection of facilities subject to regulation under the Clean Water Act (CWA), 33 U.S.C. § 1251, *et seq.*, including inspections of concentrated animal feeding operations (CAFO), and the collection of evidence regarding possible violations of the CWA at those facilities. Mr. Urban has been an EPA inspector since 1999 and has inspected CAFOs since 2006. Mr. Urban will testify regarding his observations during his inspections of Moran Beef, Inc.'s (Respondent) cattle feeding facility on June 4, 2009 and October 30, 2009, including discharges of feedlot-related pollutants from Respondent's feedlot. He will also testify regarding the results of sampling he collected at Respondent's facility on October 30, 2009. The CAFO Inspection Reports and attachments memorializing Mr. Urban's findings and sampling results with regard to the Respondent's cattle feeding operation are attached hereto as Complainant's Exhibits C1 and C2. Finally, Mr. Urban will testify as to facts relating to the nature, circumstances, extent, and gravity of the violations alleged in the Complaint, taking into account his personal observations at the facility and his review of records relevant to the facility's operations.

2. Joe Heafner. Mr. Heafner is an inspector with EPA Region 7's Environmental Services Division. Mr. Heafner's duties include the inspection of facilities subject to regulation under the CWA, including inspections of CAFOs and the collection of evidence regarding possible violations of the CWA at those facilities. Mr. Heafner has been an EPA CAFO inspector since 2008. Mr. Heafner will testify regarding his observations during his inspection of Respondent's cattle feeding facility on May 13, 2010 and September 23, 2010. The CAFO Inspection Report and attachments memorializing Mr. Heafner's findings with regard to the Respondent's CAFO

on May 13, 2010 and September 23, 2010 are attached hereto as Complainant's Exhibits C3 and C5.

3. Stephen Pollard. Mr. Pollard is an Environmental Scientist in the Water Enforcement Branch of Region 7's Water, Wetlands and Pesticides Division. Mr. Pollard has worked in Region 7's CAFO enforcement program for over six years. He will testify to his assessment of Respondent's facility and attending requirements for runoff controls based on the CWA and CAFO regulations. Mr. Pollard will also testify about observations he made during his June 23, 2010, site visit to Respondent's facility and a September 23, 2010, sampling inspection of Respondent's facility. A Trip Report memorializing Mr. Pollard's June 23, 2010, findings is attached hereto as Complainant's Exhibit C4. An Inspection Report memorializing Mr. Pollard's September 23, 2010 findings is attached hereto as Complainant's Exhibit C5.

4. Bryan Hayes. Mr. Hayes is a Fisheries Biologist who works for the Iowa Department of Natural Resources (IDNR). As part of his duties for IDNR, Mr. Hayes has conducted studies of many Iowa streams of similar size as Mosquito Creek and its tributary. In his testimony, Mr. Hayes will compare and contrast information concerning Mosquito Creek and its tributary with other aquatic studies. Mr. Hayes is expected to opine on the impact of discharges from Respondent's feedlot on the water quality and aquatic life in Mosquito Creek, the unnamed tributary to Mosquito Creek and the larger streams into which it flows. Mr. Hayes' resume is attached as Complainant's Exhibit C16.

5. Alison Manz. Ms. Manz is an Environmental Specialist who works in the Field Services and Compliance division of IDNR. Her duties include working with CAFO facilities in Iowa to help them comply with the CWA and Iowa CAFO regulations. Ms. Manz will testify regarding Respondent's compliance with state and federal requirements.

6. Midwest Laboratories, Omaha, Nebraska Staff. If the parties are unable to stipulate to the admissibility of sampling results for the September 23, 2010 sampling inspection, EPA will call the Midwest Laboratories staff necessary to establish a proper chain of custody and to testify regarding the analyses performed.

7. EPA Laboratory Staff. If the parties are unable to stipulate to the admissibility of sampling results for the October 30, 2009 sampling inspection, EPA will call the EPA Laboratory staff necessary to establish a proper chain of custody and to testify regarding the analyses performed.

8. Jonathan S. Shefftz. Mr. Shefftz is a financial analyst with JShefftz Consulting in Amherst, Massachusetts, and is contracted with Industrial Economics, Incorporated. Mr. Shefftz will testify as an expert witness regarding the economic benefit enjoyed by Respondent as a

result of non-compliance. His expert report is attached as Complainant's Exhibit C8. Mr. Shefftz's CV is attached as Complainant's Exhibit C15.

9. EPA reserves the right to call all fact witnesses named by Respondent. EPA also reserves the right to supplement its witnesses based on information provided by Respondent in its Prehearing Exchange and facts and issues that may come to light subsequent to Prehearing submissions.

II. EXHIBITS.

For purposes of the list of documents below, "Complainant's Exhibit" is abbreviated as "C___." The documents themselves are labeled "Complainant's Ex. No. XX"

C1 Report of June 4, 2009 CAFO Inspection at Moran Beef, Inc.

C2 Report of October 30, 2009 CAFO Sampling Inspection at Moran Beef, Inc.

C3 Report of May 13, 2010 CAFO Inspection at Moran Beef, Inc.

C4 Report of June 23, 2010 CAFO site visit at Moran Beef, Inc.

C5 Report of September 23, 2010 CAFO Inspection at Moran Beef, Inc. (final sample results pending and will be included in Respondent's Supplemental Prehearing Exchange)

C6 EPA Letter of Warning issued to Moran Beef, Inc., September 25, 2009

C7 EPA Finding of Violation Order for Compliance, Moran Beef, Inc. (CWA-7-2010-0046) and cover letter. Issued January 13, 2010.

C8 Economic Benefit Expert Report by Jonathan S. Shefftz, September 28, 2009

C9 *Environmental Impacts of Animal Feeding Operations*, US EPA, December 31, 1998

C10 Respondent's National Pollutant Discharge Elimination System (NPDES) permit application, July 30, 2010

C11 Respondent's draft construction plans and draft engineering report for CAFO controls, September 28, 2010

C12 Iowa Department of Natural Resources 303(d) classification of Mosquito Creek

C13 U.S. Army Corps of Engineers, Rock Island District Jurisdictional Determination of unnamed tributary to Mosquito Creek, April 14, 2006

C14 Rainfall data for Underwood, Iowa, submitted by the High Plains Regional Climate Center, University of Nebraska School of Natural Resources, September 22, 2010

C15 CV for Jonathan S. Shefftz

C16 Resume for Bryan Hayes

C17 *Beef Feedlot Systems Manual*, Iowa Beef Center, Iowa State University, 2006

III. Detailed Discussion of Proposed Penalty

A. Introduction

The CWA regulates discharges of pollutants into waters of the United States. Section 309(g)(2)(B) of the CWA, 33 U.S.C. § 1319(g)(2)(B), authorizes the administrative assessment of civil penalties in an amount not to exceed $10,000 per day for each day during which the violation continues, up to a maximum total penalty of $125,000. Pursuant to the Civil Monetary Penalty Inflation Adjustment Rule of 2004, as mandated by the Debt Collection Improvement Act of 1996, and the EPA's implementing regulations at 40 C.F.R. Parts 19 and 27, civil administrative penalties of up to $11,000 per day for each day during which a violation continues, up to a maximum of $157,500, may be assessed for violations of CWA Sections 301 and 402, 33 U.S.C. §§ 1311 and 1342, that occur after March 15, 2004. Pursuant to the Civil Monetary Penalty Inflation Adjustment Rule of 2008, civil administrative penalties of up to $16,000 per day for each day during which a violation continues, up to a maximum of $177,500, may be assessed for violations of CWA Sections 301 and 402, 33 U.S.C. §§ 1311 and 1342, that occur after January 12, 2009.

In determining the amount of penalty, the CWA requires that EPA consider the nature, circumstances, extent and gravity of the violations as well as the economic benefit or savings resulting from the violation. EPA must also consider the violator's ability to pay, prior history of such violations, the degree of culpability, and other matters as justice may require. (33 U.S.C. § 1319(g)(3)). The following is a discussion of EPA's consideration of these statutory factors in determining the amount of the proposed penalty.

B. Statutory Factors Considered in Penalty Calculation

1. Nature, Circumstances, Gravity and Extent

EPA determined the nature and extent of the violations, or "gravity factor" of the violations by taking into account the actual and potential harm to human health and the environment and the significance of the violations. Discharges of pollutants to waters of the United States without a NPDES permit and the economic benefit for delayed implementation of waste water controls at Respondent's facility are the bases for the proposed penalty.

On June 4, 2009, EPA performed a CAFO inspection at Respondent's facility located near Underwood, Iowa. The inspection was performed in order to determine Respondent's compliance status with the CWA. Inspectors observed that Respondent's facility contained open feedlot pens and a confinement building that contained approximately 1,485 head of cattle. At the time of inspection, Respondent was discharging feedlot pollutants to a tributary of Mosquito Creek. Based on observations made during the inspection, EPA determined that Respondent's feedlot did not have adequate livestock waste control structures in place to control runoff from the site. As a result, all significant precipitation events result in the discharge of livestock waste to an unnamed tributary of Mosquito Creek and Mosquito Creek. Mosquito Creek and its unnamed tributary are waters of the United States. The inspection also confirmed that Respondent was not operating under a NPDES permit.

Again, on October 30, 2009, EPA inspected Respondent's feedlot, which was confining approximately 1,400 head of cattle. At the time of the inspection, feedlot related pollutants including ammonia and phosphorous, were discharging from the open feedlot portion of the facility into a tributary of Mosquito Creek. EPA collected samples of the discharge from various areas within the unnamed tributary to Mosquito Creek. Analyses of the samples determined that pollutants, including ammonia and phosphorus, entered the tributary to Mosquito Creek, impacting the tributary's water quality.

On June 23, 2010 and September 23, 2010, EPA personnel conducted visits to Respondent's facility. During these visits, EPA observed runoff flowing into a drainage tile adjacent to Respondent's confinement building. According to statements made by Respondent on September 24, 2010, the drainage tile discharges directly into the unnamed tributary to Mosquito Creek. During the September 23, 2010, inspection, EPA observed manure solids and bedding material in close proximity to the water flowing into the drainage tile, as well as manure accumulating within the creek bed of the tributary to Mosquito Creek. During that inspection, EPA personnel took samples of water flowing into the drainage tile and next to the accumulated manure in the creek. Sample results from Respondent's facility and the creek indicate the presence of pollutants, including Escherichia coli (E. coli) and identify Respondent's facility as the source of the pollutants. Additional sample results will be forthcoming in Respondent's Supplemental Prehearing Exchange.

At all times pertinent to the present case, Respondent had greater than 1,000 head of feeder cattle confined at the feedlot and had confined as many as 1,485 head of cattle. Runoff from Respondent's facility flows from at least two areas: through erosional features connecting Respondent's open lot to a culvert and pipe that discharges directly into the unnamed tributary to Mosquito Creek; and into a tile drainage pipe adjacent to Respondent's confinement building that discharges directly into the unnamed tributary to Mosquito Creek. Pollutants from Respondent's feedlot then flow approximately one mile in the unnamed tributary into Mosquito Creek.

In 2008, Iowa classified Mosquito Creek as Primary Contact Recreation, meaning that water quality standards are to be maintained to safely allow for full body human contact within the creek. Additionally, in 2008, IDNR listed Mosquito Creek as an impaired water body for aquatic life due to low dissolved oxygen and organic enrichment. According to IDNR, these "stressors" may be attributed to runoff associated with agricultural activity. Mosquito Creek flows for approximately 20 miles before reaching the Missouri River.

The discharge of pollutants from Respondent's feedlot impacts these surface waters. Eroded sediment clouds the water, making it difficult or impossible for plants to grow and suffocates fish by clogging their gills. High levels of ammonia can be toxic to fish and other aquatic life. Excess nutrients can cause algae blooms that, along with decay of plant matter in the water, consume oxygen that is vital to plants, fish and other aquatic life. Bacterial and viral pathogens found in runoff from CAFOs can cause serious illnesses in humans and animals that come into contact with contaminated water.

Count 1 – Unpermitted Discharge of Pollutants to Waters of the U.S.

Count 1 alleges that Respondent discharged pollutants to waters of the United States without an NPDES permit. At all times pertinent to the present case, Respondent did not, and still does not, have adequate runoff controls to prevent discharge to a water of the United States. EPA inspections have documented the discharge of pollutants from Respondent's open feedlot and confinement building into an unnamed tributary to Mosquito Creek, a water of the United States. Sampling demonstrates that these discharges are impacting water quality.

Respondent is liable for up to $16,000 per day for each day it discharged. To determine the number of illegal discharge events and the corresponding days of violation, EPA used rainfall data from a National Weather Service station in Underwood, Iowa and determined that Respondent discharged from its facility on at least 18 occasions between April 27, 2009 and September 23, 2010, the date of the most recent sampling inspection. On October 30, 2009, the date of the first sampling inspection, Underwood received 0.33 inches of rain. On September 23, 2010, the date of the second sampling inspection, Underwood received 0.64 inches of rain. For the remaining 16 discharge events alleged by EPA, Underwood received over one inch of rain each of the 16 days.

Count 2 – Failure to Apply for a NPDES Permit

Count 2 alleges that Respondent failed to apply for a NPDES permit before discharging pollutants into a water of the United States. EPA is not seeking penalties for failure to apply for a NPDES permit because Respondent has applied for a NPDES permit and, due to the high number of discharges and the corresponding per-day maximum penalty of $16,000, the penalty will potentially be at or near the statutory maximum of $177,500 – not including the 400 plus days of violation associated with Respondent's failure to apply for a NPDES permit.

2. Economic Benefit

EPA performed an economic benefit analysis associated with the CWA violations at Respondent's facility. EPA calculated the economic benefit associated with Respondent's violations by looking at the delayed costs that would have been associated with the construction and operation of livestock waste controls at Respondent's facility.

The economic benefit analysis uses cost estimates that were based on the 2006 document *Beef Feedlot Systems Manual* published by the Iowa Beef Center at Iowa State University. Specifically, EPA used the cost estimates associated with a 1,500 head earthen lot with windbreak. For the purpose of calculating economic benefit, EPA considered the engineering, construction and operating costs associated with the environmental structures. Based on the Iowa State University publication, EPA estimates that construction of adequate runoff controls would cost approximately $140,000.

At hearing, EPA is prepared to present testimony that Respondent gained an economic benefit of approximately $25,000 by delaying the construction of runoff controls at its facility.

3. Ability to Pay

To date, Respondent has not raised inability to pay as a defense. The Presiding Officer's prehearing order requires the Respondent to provide documentation in its prehearing exchange to support such a claim. Should Respondent provide such a defense, EPA will evaluate the supporting information to determine if Respondent is unable to pay the proposed penalty or if the payment will have an adverse impact on Respondent's ability to continue business.

4. Prior History

As demonstrated in the Culpability section below, Respondent was aware of the need for obtaining a NPDES permit for a full eighteen months before his July 2010 application for a permit.

5. Culpability

CAFO regulations covering Respondent's facility have been in place since 1976. Respondent has had ample opportunity, as well as an obligation, to be aware of all regulations relating to its activities. In June 2008, Iowa changed its regulations to comport with federal law by requiring operators of "dual confinement" facilities – those that had both open and confined feedlots – to obtain NPDES permits. The Iowa Legislature delayed the effective date of the new law for six months in order to give operators, including Respondent, time to submit NPDES permit applications. Respondent failed to apply for a NPDES permit by the December 31, 2008 deadline, despite the State's efforts to communicate with the regulated community regarding the need for a permit. Following the December 2008 deadline, Respondent was personally contacted on at least five occasions and notified that his facility was prohibited from discharging without a NPDES permit:

- On March 5, 2009, IDNR conducted a site visit at Respondent's facility and informed Respondent that he must either apply for a NPDES permit or reduce the number of cattle to below the regulatory threshold.
- On April 24, 2009, IDNR issued a letter to Respondent that his facility "would require an NPDES permit for any discharge to a water of the state."
- On June 4, 2009, EPA issued a Notice of Potential Violation to Respondent for failure to apply for a NPDES permit and for illegal discharges.
- On September 25, 2009, EPA issued a Letter of Warning to Respondent informing him that his facility met the definition of a large CAFO and that "(a)ll large CAFOs that discharge feedlot runoff to waters of the U.S. are required to obtain a NPDES permit."
- On January 13, 2010, EPA issued an Administrative Compliance Order requiring Respondent to obtain a NPDES permit.

Respondent did not apply for an NPDES permit until July 2010, after two EPA inspections and almost two years after the Iowa deadline to submit a NPDES permit application expired. To date, Respondent has failed to implement adequate runoff controls to prevent illegal discharges.

6. Other Matters as Justice may Require

EPA is unaware of any matters that require a penalty reduction.

C. Conclusion

For all the foregoing reasons, the violations alleged in the Complaint constitute serious CWA violations warranting the assessment of penalties.

IV. LOCATION, ESTIMATE REGARDING LENGTH, AND AVAILIBILITY FOR HEARING

Location

Complainant proposes Des Moines, Iowa for a hearing location. Des Moines is located within a few hours of Respondent's feedlot and is where Respondent's attorney resides. Holding the hearing in Des Moines would be a convenient, central location for many of Respondent's and Complainant's witnesses. Des Moines also hosts a national airport and has many options for a hearing location.

As an alternative, Complainant proposes Omaha, Nebraska, for the hearing location. It is the nearest city of significant size to Respondent's feedlot with an airport and Respondent resides and his feedlot is located within a short driving distance from Omaha.

Estimated Time for Hearing

Complainant intends to present some of the testimony in the form of "written testimony" as authorized by Section 22.22 of the CROP Rules. If the parties are unable to stipulate to significant facts and findings in this case and Complainant presents its entire case orally, Complainant estimates that it will require approximately three days to present its case in chief. The length of time required for rebuttal testimony and cross examination of Respondent's witnesses will depend on the numbers and substance of documents and witnesses disclosed in Respondent's Prehearing Exchange.

Availability for Hearing

Complainant is available anytime after January 1, 2011.

IV. Paperwork Reduction Act

The Paperwork Reduction Act, 44 U.S.C. § 3501 *et seq*., has no applicability to this proceeding. Complainant has not alleged a failure to comply with any "collection of information" within the meaning of 44 U.S.C. § 3512, and no Office of Management and Budget control numbers are required for any of the documents at issue in this matter.

V. Reservations

Complainant reserves the right to call all witnesses named by Respondent. Complainant further reserves the right to submit the names of additional witnesses and to submit additional exhibits prior to the hearing of this matter, upon timely notice to the Presiding Officer and to Respondent.

RESPECTFULLY SUBMITTED this 1st day of October, 2010.

Chris Muehlberger
Assistant Regional Counsel
Region 7

CERTIFICATE OF SERVICE

I hereby certify that copies of the Prehearing Exchange in the Matter of Moran Beef, Inc., Docket No. CWA-07-2010-0080, were sent to the following persons in the manner indicated:

A true and correct copy hand delivered to:

Sybil Anderson (original plus one copy)
Headquarters Hearing Clerk
EPA Office of Administrative Law Judges
1099 14th Street NW
Suite 350, Franklin Court
Washington, DC 20005

A true and correct copy by United Parcel Service to:

Eldon McAfee
Beving, Swanson & Forrest, P.C.
321 E. Walnut St., Suite 200
Des Moines, IA 50309

Dated: September 29, 2010

Ced Mrznlhgr

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

In the matter of:	)	
	)	
	)	
Moran Beef, Inc.	)	DOCKET NO. CWA-07-2010-0080
	)	
	)	
Pottawattamie County, Iowa,	)	
	)	COMPLAINANT'S REBUTTAL
	)	PREHEARING EXCHANGE
Respondent.	)	and
	)	PENALTY PROPOSAL
	)	

Pursuant to 40 C.F.R. § 22.19 of the "Consolidated Rules of Practice Governing the Administrative Assessment of Civil Penalties," 40 C.F.R. Part 22 (CROP) and the Presiding Officer's Order of August 26, 2010, Complainant United States Environmental Protection Agency (EPA) submits this Rebuttal Prehearing Exchange and Penalty Proposal.

I. WITNESSES.

1. Donald G. Huggins, PhD. Dr. Huggins is a Senior Scientist, Professor and the Directors of the Central Plains Center for BioAssessment and the Ecotoxicology Program at the University of Kansas. For over thirty years, Professor Huggins has studied the impacts of pollutants on watersheds and is a national expert in agriculture-related runoff and its impacts on receiving water bodies. Professor Huggins is expected to testify regarding EPA's and Respondent's sample results, as well as the potential impacts of pollutants on aquatic life that were identified by the sample results. He is also likely to testify regarding conclusions made in Respondent's expert witness report. Dr. Huggins' CV is attached as Exhibit C18.

II. EXHIBITS.

For purposes of the list of documents below, "Complainant's Exhibit" is abbreviated as "C___." The documents themselves are labeled "Complainant's Ex. No. XX"

C18 Donald G. Huggins Curriculum Vitae

C19 Iowa Department of Natural Resources. (March 2010). *Iowa's Water - Ambient Monitoring Program: Water Quality Summary 2000 – 2009* [Fact Sheet]

C20 Iowa Department of Natural Resources. (2006). *Summary of Water Quality Analytical Results: 2002 – 2006 Random Stream Sampling* [Fact Sheet]

C21 Addendum to EPA Inspection Report dated September 23, 2010

C22 Iowa Department of Natural Resources. (December 4, 2008). *Livestock Producers Who House Animals Both Inside and Out May Need to Apply for a Permit* [Press Release]

C23 Iowa Department of Natural Resources. (October 2008). *NPDES Permits: Determining if a Combination Open Feedlot and Animal Confinement Must Apply for an NPDES Permit in 2008* [Factsheet]

III. Proposed Penalty

In Complainant's October 1, 2010 Prehearing Exchange, Complainant submitted a detailed discussion of the Clean Water Act statutory factors used in determining Respondent's penalty, including the nature, circumstances, extent and gravity of the violations, the economic benefit or savings resulting from the violation, and the violator's ability to pay, prior history of such violations, the degree of culpability, and other matters as justice may require.

Section B of Complainant's Prehearing Exchange discussed the actual and potential harm to human health and the environment, also known as the "gravity" factors. In that section, Complainant included as penalty factors the discharges from Respondent's open pens observed and sampled by EPA personnel, as well as discharges occurring during rainfall events of one inch or greater. To these previously considered discharges, Complainant now adds the observed and sampled continuous and uncontrolled discharges from Respondent's tile drain adjacent to its confinement building and the water basin inside Respondent's confinement building. Statements made by Frank Moran and Respondent's expert witness, Gerald Hentges, acknowledged that both the tile drain and the water basin discharge directly into the unnamed tributary of Mosquito Creek. Therefore, Complainant also includes these discharges to the gravity portion of the proposed penalty.

In its October 29, 2010 Prehearing Exchange, Respondent provided no issues of fact or law that warrants a reduction in EPA's proposed penalty, nor did Respondent assert an inability to pay a penalty. Applying the factors detailed in its Prehearing Exchange and the above paragraph, EPA believes a penalty of $79,000 is appropriate for these violations.

RESPECTFULLY SUBMITTED this 12th day of November, 2010.

Chris Muehlberger
Assistant Regional Counsel
Region 7

CERTIFICATE OF SERVICE

I hereby certify that copies of the Prehearing Exchange in the Matter of Moran Beef, Inc., Docket No. CWA-07-2010-0080, were sent to the following persons in the manner indicated:

A true and correct copy hand delivered to:

Sybil Anderson (original plus one copy)
Headquarters Hearing Clerk
EPA Office of Administrative Law Judges
1099 14th Street NW
Suite 350, Franklin Court
Washington, DC 20005

A true and correct copy by United Parcel Service to:

Eldon McAfee
Beving, Swanson & Forrest, P.C.
321 E. Walnut St., Suite 200
Des Moines, IA 50309

Dated: November 10, 2010

____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

JAN 13 2010

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Frank Moran
Moran Beef, Inc.
25794 Magnolia Road
Underwood, Iowa 51576

Re: Moran Beef, Inc.
Notice of Findings of Violation and Order for Compliance

Dear Mr. Moran:

The U.S. Environmental Protection Agency (EPA) has identified as one of its national priorities the environmental problems associated with concentrated animal feeding operations (CAFOs). Discharges from CAFOs can impact water quality, pose risks to human health, threaten aquatic life and its habitat, and impair the use and enjoyment of waterways. This letter concerns the compliance status of Moran Beef, Inc. in Underwood, Iowa (Facility). EPA inspected the Facility on June 4, 2009, and October 30, 2009.

Based on our evaluation of the inspection report and Facility records it appears that there have been significant violations of the Clean Water Act (CWA), including the failure to collect all process wastewater in a manner capable of preventing an illegal discharge to "waters of the United States."

The enclosed Order identifies the abovementioned CWA violations and requires you to take actions to ensure that the violations are corrected and that you remain in compliance in the future. The Order is effective immediately upon receipt. **Please read the Order carefully. It contains a number of specific requirements and deadlines, and compliance with the Order is mandatory.**

We trust that you recognize the importance of protecting the quality of our Nation's waters. If you have any questions, please contact Stephen Pollard of my staff at (913) 551-7582 or Chris Muehlberger, the attorney assigned to this matter, at (913) 551-7623.

Thank you for your attention to this matter.

Sincerely,

Mary Tietz Mindrup for
William A. Spratlin
Director
Water, Wetlands and Pesticides Division

Enclosure

cc: Dan Stipe
Field Office #4
Iowa Department of Natural Resources
140 Sunnyside Lane
Atlantic, Iowa 50027

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
901 NORTH 5th STREET
KANSAS CITY, KANSAS 66101

10 JAN 13 AM 9:55

ENVIRONMENTAL PROTECTION
AGENCY-REGION VII
REGIONAL HEARING CLERK

BEFORE THE ADMINISTRATOR

MORAN BEEF, INC. **UNDERWOOD, IOWA**	**Docket No. CWA-07-2010-0046**
Respondent	**FINDING OF VIOLATION** **ORDER FOR COMPLIANCE**
Proceedings under **309(a)(3) of the Clean Water Act,** **33 U.S.C. § 1319(a)(3)**	

Preliminary Statement

1. The following Findings of Violation are made and Order for Compliance ("Order") is issued pursuant to the authority of Section 309(a)(3) of the Clean Water Act ("CWA" or "Act"), 33 U.S.C. § 1319(a)(3). This authority has been delegated by the Administrator of the United States Environmental Protection Agency ("EPA") to the Regional Administrator, EPA Region 7, and redelegated to the Director of Region 7's Water, Wetlands and Pesticides Division.

2. The Respondent, Moran Beef, Inc. ("Respondent"), owns and/or operates an animal feeding operation located in the Southeast ¼ of Section 17 in Township 76N, Range 42W, Pottawattamie County, Iowa.

Statutory and Regulatory Authority

3. Section 301(a) of the CWA, 33 U.S.C. §1311(a), prohibits the discharge of pollutants except in compliance with, *inter alia*, Section 402 of the CWA, 33 U.S.C. § 1342.

4. Section 402 of the CWA, 33 U.S.C. § 1342, provides that pollutants may be discharged only in accordance with the terms of a National Pollutant Discharge Elimination System ("NPDES") permit issued pursuant to that Section.

5. Section 502(12) of the CWA, 33 U.S.C. § 1362(12), defines the term "discharge of pollutant" to include "any addition of any pollutant to navigable waters from any point source."

6. To implement Section 402 of the CWA, EPA promulgated regulations codified at 40 C.F.R. Part 122. Under 40 C.F.R. § 122.1, a NPDES permit is required for the discharge of pollutants from any point source into waters of the United States.

7. "Pollutant" is defined by Section 502(6) of the CWA, 33 U.S.C. 1362(6) to include, *inter alia*, biological materials and agricultural waste discharged to water.

8. "Point source" is defined by Section 502(14) of the CWA, 33 U.S.C. § 1362(14) to include "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, [or] concentrated animal feeding operation . . . from which pollutants are or may be discharged."

9. "Animal feeding operation" or "AFO" is defined by 40 C.F.R. § 122.23(b)(1) as a lot or facility where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any twelve-month period, and where crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

10. "Concentrated animal feeding operation" or "CAFO" is defined by 40 C.F.R. § 122.23(b)(2) as an animal feeding operation that is defined as a Large CAFO in accordance with 40 C.F.R. § 122.23(b)(4).

11. "Large CAFO" is defined according to 40 C.F.R. § 122.23(b)(4)(i) as an animal feeding operation that stables or confines as many as, or more than, "700 mature dairy cows, whether milked or dry."

12. "Waters of the United States" are defined in 40 C.F.R. § 122.2 to include intrastate rivers and streams, and tributaries thereto.

13. The Iowa Department of Natural Resources ("IDNR") is the agency within the state of Iowa authorized to administer the federal NPDES Program. EPA maintains concurrent enforcement authority with authorized state NPDES programs for violations of the CWA.

Factual Background

14. Respondent owns and operates an open cattle feedlot (hereinafter, the "Facility") that is located in the Southeast ¼ of Section 17 in Township 76N, Range 42W, Pottawattamie County, Iowa.

15. The Facility confines and feeds or maintains cattle for a total of forty-five (45) days or more in any twelve-month period.

16. Neither crops, vegetation, forage growth, nor post harvest residues are sustained over any portion of the Facility's feeding areas.

17. The Facility is an AFO as defined by 40 C.F.R. § 122.23(b)(1), and as that phrase is used in Section 502(14) of the CWA, 33 U.S.C. § 1362(14).

18. Mosquito Creek and it tributaries are waters of the United States, as defined under 40 C.F.R. Part 122.2.

19. On June 4, 2009, EPA personnel conducted a compliance evaluation inspection of the Facility.

20. At the time of the June 4, 2009, EPA inspection, the Facility was confining approximately 1,485 head of beef cattle. The number of beef cattle confined at the Facility is greater than 1,000. Therefore, the Facility is a large CAFO as that term is defined in 40 C.F.R. §122.23(b)(4).

21. On October 30, 2009, EPA personnel conducted a compliance sampling inspection of the Facility.

Findings of Violation

Count 1

22. Section 301 of the CWA prohibits discharges of pollutants from a point source to waters of the United States.

23. The Facility does not have adequate livestock waste control facilities to prevent the discharge of animal waste to Mosquito Creek and its tributaries. Samples taken by the inspectors during the October 2009 inspection, as referenced in Paragraph 21, demonstrated that pollutants from the Facility, including ammonia and nitrate, were discharging to the unnamed tributary of Mosquito Creek.

24. Based on the size of the Facility, the distance from the Facility to Mosquito Creek and its tributaries, and the slope and condition of the land across that distance, wastewater containing pollutants from the Facility will continue to discharge into Mosquito Creek and its tributaries during significant precipitation events.

25. The flow of wastewater from Respondent's facility into Mosquito Creek and its tributaries constitutes unauthorized discharges of pollutants from a point source to waters of the United States and, as such, is a violation of Section 301 of the CWA.

Order For Compliance

Based on the Findings of Violation set forth above, and pursuant to Section 309(a)(3) of the CWA, 33 U.S.C. § 1319(a)(3), Respondent is hereby ORDERED to take the following actions to eliminate its violations of the CWA:

26. Immediately upon receipt of this Order, Respondent shall cease all discharges of manure, litter or process wastewater from the Facility to waters of the United States.

27. If manure, litter, or process wastewater cannot be managed at the Facility in a manner that prevents discharges to waters of the United States, then Respondent shall reduce the number of cattle confined at the Facility below regulatory thresholds within sixty (60) days of receipt of this Order. Respondent shall not repopulate cattle above regulatory thresholds at the Facility unless the Facility can be operated in a manner that prevents all discharges to waters of the United States.

28. If Respondent cannot immediately cease all discharges from the Facility to waters of the United States, regardless of whether the number of livestock is reduced below regulatory thresholds, then Respondent shall immediately remove and properly dispose of manure, litter and process wastewater from areas that cannot be controlled in a manner to prevent discharges.

29. Within fifteen (15) days of the effective date of this Order, Respondent shall inform EPA, in writing, of all actions taken to comply with the CWA and the terms of this Order.

30. Unless Respondent permanently reduces the number of livestock confined at the Facility below regulatory thresholds, Respondent shall apply for an NPDES permit for the Facility within thirty (30) days of the effective date of this Order. Upon issuance of the NPDES Permit, Respondent shall comply with all terms contained therein, including terms related to the construction and operation of livestock waste controls.

31. If Respondent intends to construct adequate runoff control structures to allow the confinement of cattle above regulatory thresholds, then beginning thirty (30) days after receipt of this Order and continuing monthly on the seventh day of each month until Respondent submits a Notice of Construction Completion to EPA, Respondent shall submit written monthly progress reports to EPA. The monthly reports shall describe, in detail, the construction and related activities that occurred at the Facility during the reporting period, construction and related activities anticipated during the upcoming reporting period, and a description of any problems encountered or anticipated and how these problems were/will be addressed.

32. Upon completion of the runoff control structures, Respondent shall submit a Notice of Construction Completion certified by a professional engineer to EPA within thirty (30) days of completion of construction. The notification shall be in writing and shall include as-built drawings of the constructed improvements.

Effect of Order

33. This Order shall not constitute a permit under the CWA. Compliance with the terms of this Order shall not relieve Respondent of its responsibility to obtain any required local, state, and/or federal permits.

34. Compliance with the terms of this Order shall not relieve Respondent of liability for, or preclude EPA from initiating an administrative or judicial enforcement action to recover penalties for any violations of the CWA, or seek additional injunctive relief, pursuant to Section 309 of the CWA, 42 U.S.C. § 1319.

35. Nothing in this Order shall limit EPA's right to obtain access to, and/or inspect Respondent's Facility, and/or to request additional information from Respondent, pursuant to the authority of Section 308 of the CWA, 33 U.S.C. § 1318.

36. EPA may subsequently amend this Order in accordance with the authority of the CWA. For example, EPA may amend this Order to address any non-compliance with the CWA, including, but not limited to, any non-compliance with the requirements of Section 402 of the CWA. In the event of any such subsequent amendment to this Order, all requirements for performance of this Order not affected by the amendment shall remain as specified by this original Order.

37. If any provision or authority of this Order or the application of this Order to Respondent is held by federal judicial authority to be invalid, the application to Respondent of the remainder of this Order shall remain in full force and effect and shall not be affected by such a holding.

38. All submissions to EPA required by this Order shall be sent to:

Stephen Pollard
CAFO Enforcement Program
Water, Wetlands and Pesticides Division
U.S. Environmental Protection Agency Region 7
901 North 5th Street
Kansas City, Kansas 66101.

39. Pursuant to 40 C.F.R. §§ 2.201-2.311, Respondent may assert a business confidentiality claim covering any portion of the submitted information which is entitled to confidential treatment and which is not effluent data. For any such claim, describe the basis for the claim under the applicable regulation. Any material for which business confidentiality is claimed should be placed in a separate envelope labeled, "Confidential Business Information." Failure to assert a claim in the manner described in 40 C.F.R. § 2.203(b) allows EPA to release the submitted information to the public without further notice. EPA may disclose information subject to the business confidentiality claim only to the extent set forth in the above-cited regulations. Special rules governing information obtained under the CWA appear in 40 C.F.R. § 2.302.

40. Notice is hereby given that violation of, or failure to comply with, any of the provisions of the foregoing Order may subject Respondent to (1) civil penalties of up to $37,500 per day for each violation, pursuant to Section 309(d) of the CWA, 33 U.S.C. § 1319(d); or (2) civil action in federal court for injunctive relief, pursuant to Section 309(b) of the CWA, 33 U.S.C. § 1319(b).

41. The terms of this Order shall be effective and enforceable against Respondent upon its receipt of the Order.

In the Matter of Moran Beef, Inc.
Docket No. CWA-07-2010-0046

1/12/10
Date

for
William A. Spratlin
Director
Water, Wetlands and Pesticides Division

1.13.10
Date

Christopher Muehlberger
Assistant Regional Counsel

CERTIFICATE OF SERVICE

I certify that on the date note below I filed the original and one true and correct copy of the signed original Findings of Violation and Order of Compliance with the Regional Hearing Clerk, Region 7.

I further certify that I sent by certified mail, return receipt requested, a true and correct copy of the signed original Findings of Violation and Order for Compliance together with cover letter and small business assistance information, to the following:

Mr. Frank Moran
Moran Beef, Inc.
25794 Magnolia Road
Underwood, Iowa 51576.

I further certify that on the date noted below, I sent by certified mail, return receipt requested, a true and correct copy of the signed original Findings of Violation and Order for Compliance to the following representative of the State of Iowa:

Dan Stipe
Field Office #4
Iowa Department of Natural Resources
140 Sunnyside Lane
Atlantic, Iowa 50027.

Christopher Muehlberger

Date

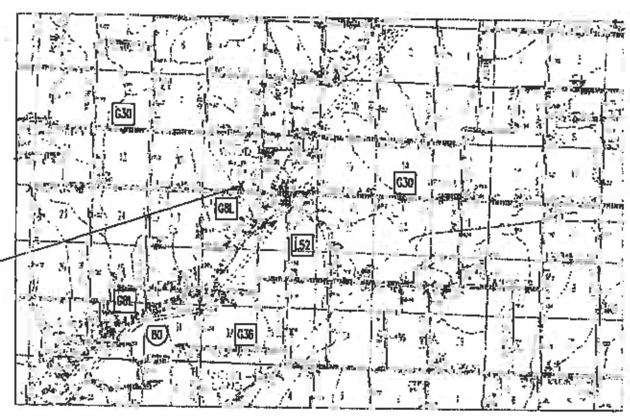
MORAN FEED LOT #2
25794 MAGNOLIA ROAD
UNDERWOOD, IA. 51579

RUNOFF CONTROL SYSTEM

SCHEDULE OF DRAWINGS

SHEET NO.	DESCRIPTION
G100	TITLE SHEET – REVISION 3
C101	ORIGINAL SURVEY
C102	SITE LAYOUT – REVISION 3
C103	EROSION CONTROL PLAN
C104	WATER SHED MAP – NEW SHEET
C301	SECTIONS
C302	DETAILS – NEW SHEET – REVISION 2
C501	SECTION & DETAILS – REVISION 2

PROJECT LOCATION



VICINITY MAP

POTTAWATTAMIE COUNTY

IOWA COUNTY MAP

NOTES:
1. TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGEMENT, AND BELIEF, THESE PLANS MEET NRCS WASTE STORAGE FACILITY (313) STANDARDS AND SPECIFICATIONS.
2. THE CONTRACTOR IS RESPONSIBLE FOR CALLING IOWA ONE CALL AT 1-800-292-8989 AT LEAST 48 HOURS PRIOR TO BEGINNING ANY EXCAVATION WORK.
3. THESE PROPOSED FEED LOT RUNOFF CONTROL FACILITIES COMPLY WITH THE REQUIREMENTS OF DNR CHAPTER 65

Designer
cwa
CURRY-WILLE & ASSOCIATES
CONSULTING ENGINEERS P.C.

Seal

Stewart W. [illegible]

Date:

Consultants

Project
Moran Feedlot
25794 MAGNOLIA RD.
UNDERWOOD, IA. 51579

Project Location
SEC 17,T76N, R42W
POTTAWATTAMIE COUNTY, IOWA

Client
FRANK MORAN

Issue & Revision Dates

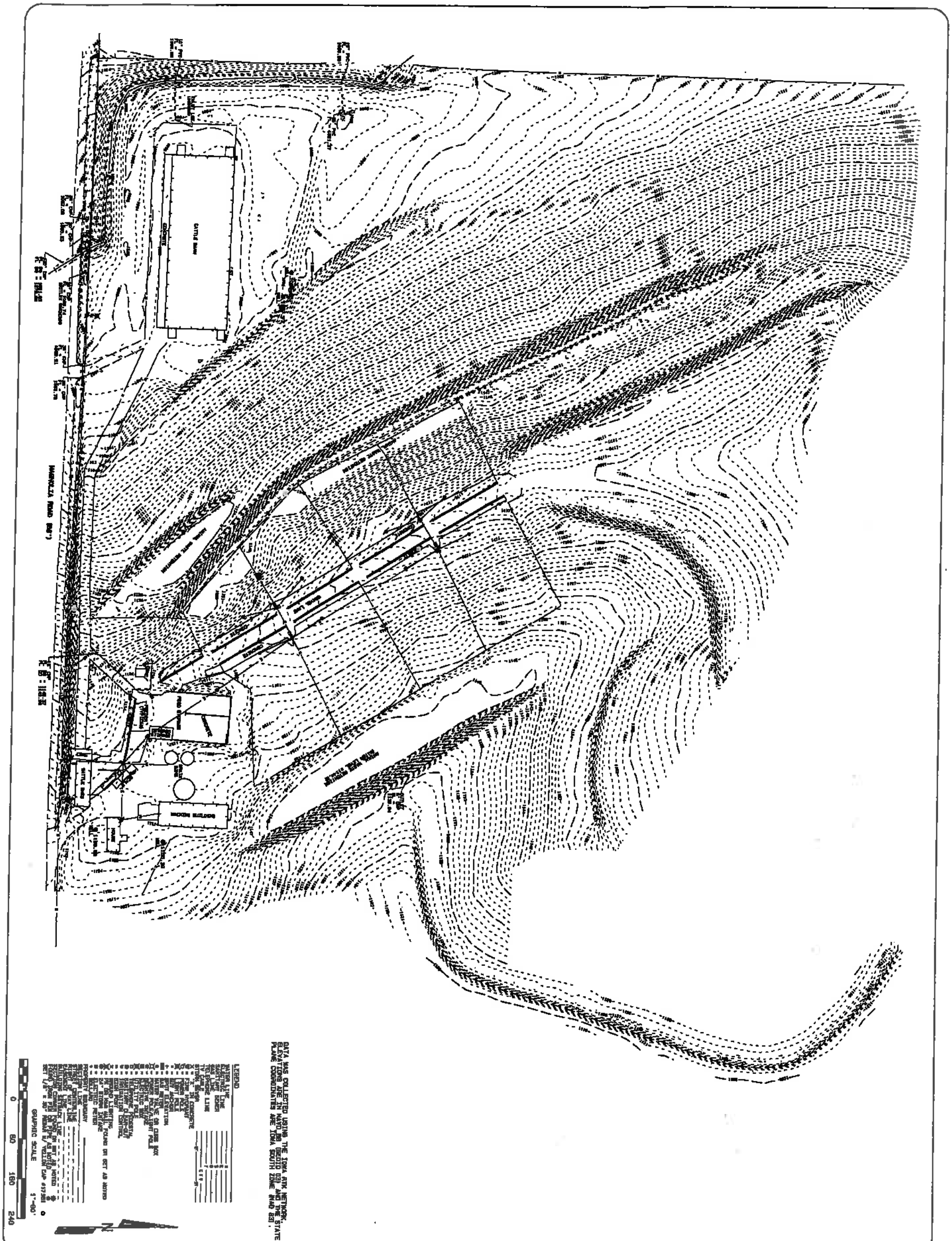
MARK	DATE	DESCRIPTION
1	[illegible]	[illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]

Sheet Title
TITLE SHEET

Project Information

Sheet Number
G100

Complainant's Ex. No. 11



STUMBO & ASSOCIATES
LAND SURVEYING, INC.

510 S. 17th STREET, SUITE 102 AMES, IOWA 50010
PHONE 515-233-3689 FAX 515-233-4403

PLAT OF TOPOGRAPHY

MORAN FEEDYARD #2
UNDERWOOD, IOWA

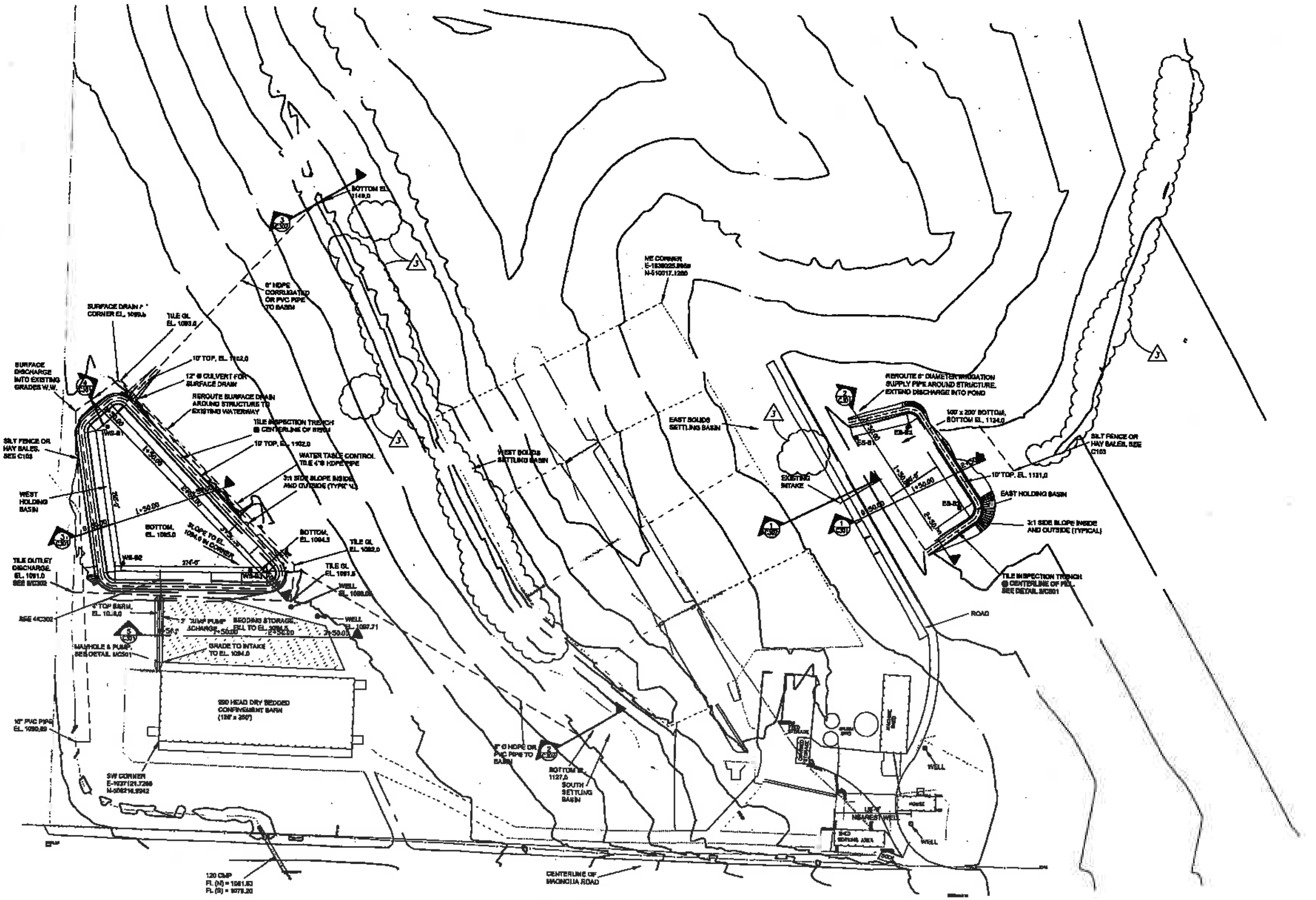
SURVEY PREPARED FOR: STEWART MELVIN, CWA

JOB #16246 DATE: 4/8/10 PAGE: 1 of 1

Certification: I hereby certify that this land surveying document was prepared and the related survey work was performed by me or under my direct personal supervision and that I am a duly licensed Land Surveyor under the laws of the State of Iowa.

_______________ Date: _______________
R. Bradley Stumbo License #17161
My license renewal date is December 31, 2011

R. BRADLEY STUMBO LICENSED 17161 IOWA LAND SURVEYOR



1 SITE PLAN
SCALE: 1" = 80'

Designer

cwa

CURRY-WILLE & ASSOCIATES
CONSULTING ENGINEERS P.C.
425 S. 2nd STREET
AMES, IA 50010
515-233-6078 PHONE
515-232-9083 FAX
www.curry-wille.com
cwa@curry-wille.com

SEAL

Consultants

Project

Moran Feedlot
25794 MAGNOLIA RD.
UNDERWOOD, IA. 51576

Project Location

SEC 17,T76N, R42W
POTTAWATTAMIE COUNTY, IOWA

Client

FRANK MORAN

Issue & Revision Dates

MARK	DATE	DESCRIPTION
1	9-30-10	REVISED NOTES
2	9-8-18	REVISED TEXT
3	9-24-18	REVISED NOTES & [illegible]

Sheet Title

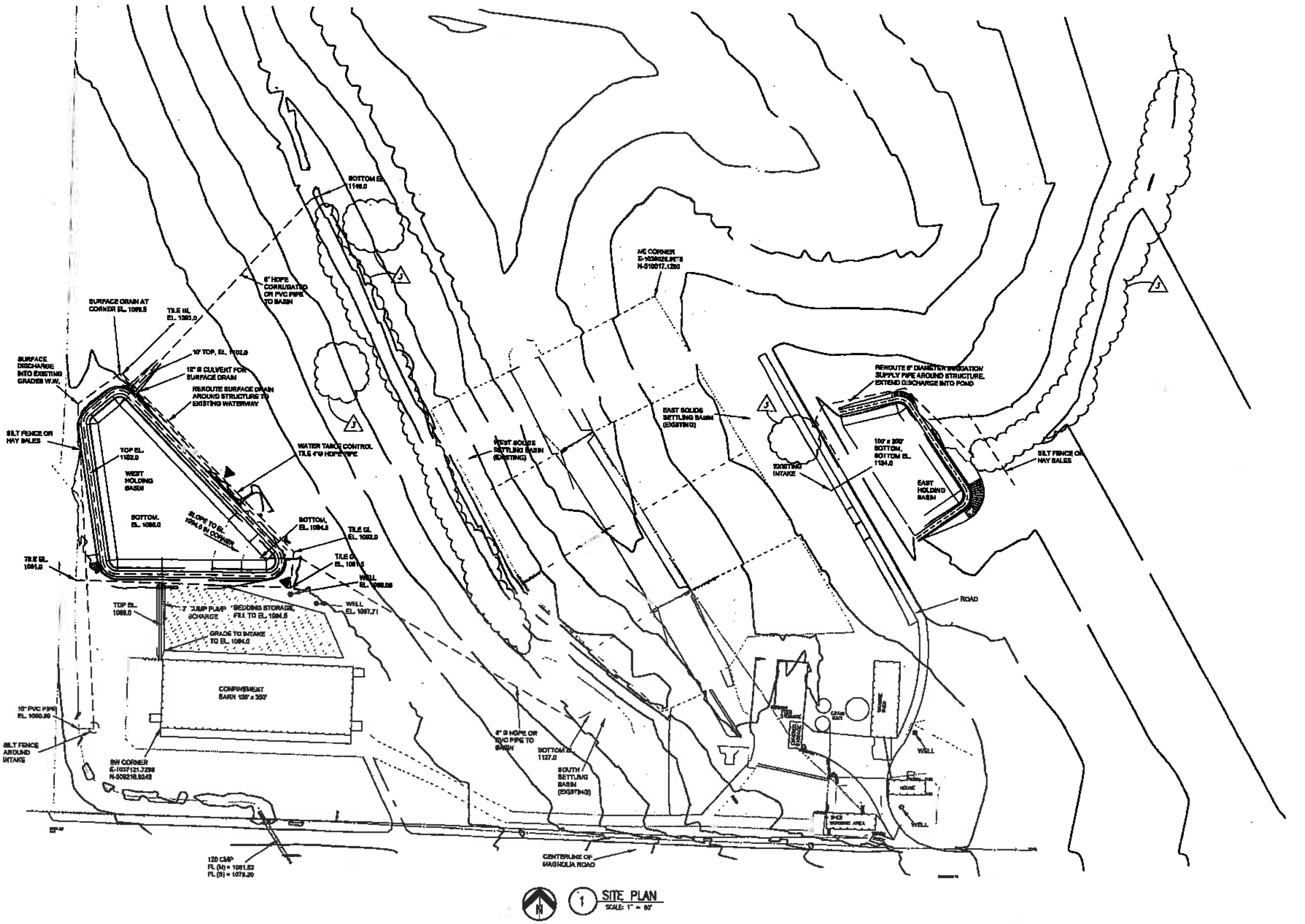
NEW SITE PLAN

Project Information

Date: JULY 26, 2018
Chck By Project Manager: S. [illegible]
Drawn By: D. [illegible]
Copyright © 2007, Curry-Wille & Associates
Project No: 18-1734

Sheet Number

C102



Designer

cwa

CURRY-WILLE & ASSOCIATES
CONSULTING ENGINEERS P.C.

SEAL

Consultants

Project

Moran Feedlot
25794 MAGNOLIA RD.
UNDERWOOD, IA, 51579

Project Location

SEC 17, T76N, R42W
POTTAWATTAMIE COUNTY, IOWA

Client

FRANK MORAN

Issue & Revision Dates

Sheet Title

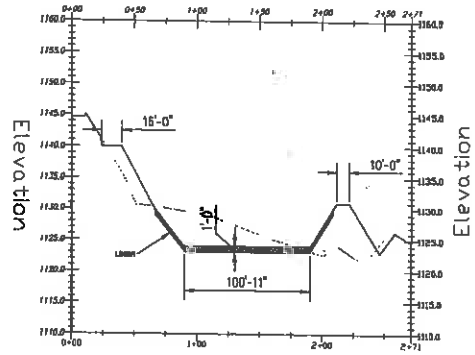
EROSION CONTROL PLAN

Project Information

Date: JULY 20, 2010

Sheet Number

C103



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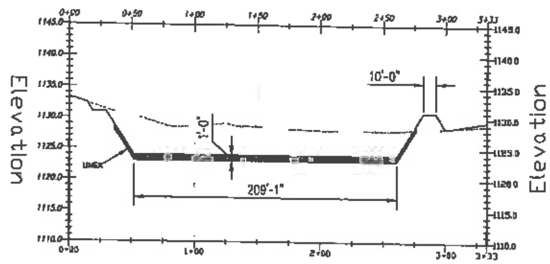

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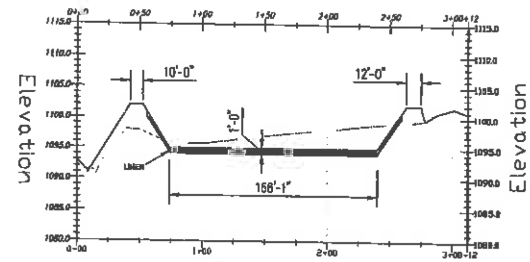
NOTE:
ALL SIDE SLOPE TO BE 3:1



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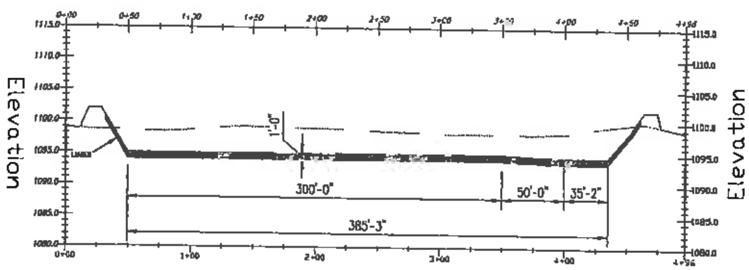

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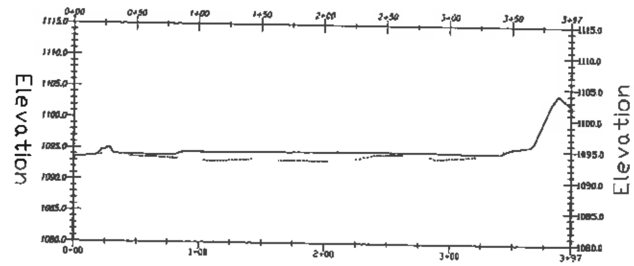


5 SECTION
SCALE: NONE

Designer
cwa
CURRY-WILLE & ASSOCIATES
CONSULTING ENGINEERS P.C.

SEAL

Consultants

Project
Moran Feedlot
25794 MAGNOLIA RD.
UNDERWOOD, IA. 51579

Project Location
SEC 17,T76N, R42W
POTTAWATTAMIE COUNTY, IOWA

Client
FRANK MORAN

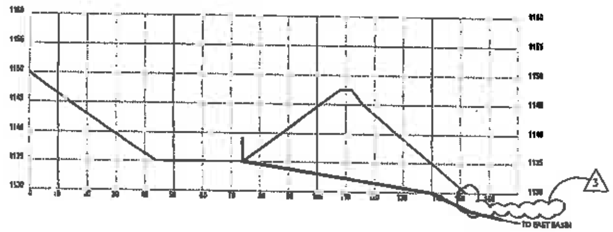
Issue & Revision Dates

MARK	DATE	DESCRIPTION

Sheet Title
PROFILES & SECTIONS

Project Information

Sheet Number
C301



1 EAST SS BASIN SECTION @ OUTLET
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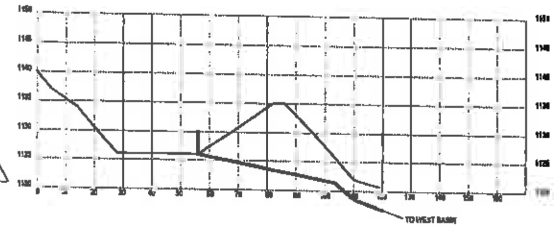

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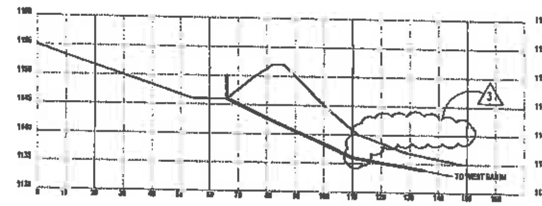

3 WEST SS BASIN SECTION @ OUTLET
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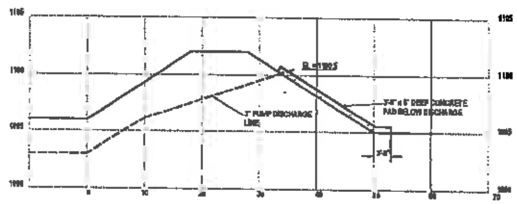

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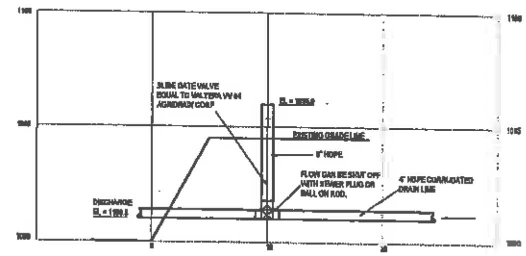


5 WEST BASIN TILE MONITORING & SHUT-OFF DETAIL
SCALE: NONE

Designer
CWA
CURRY-WILLE & ASSOCIATES
CONSULTING ENGINEERS P.C.

SEAL

Consultants

Project
Moran Feedlot
25784 MAGNOLIA RD.
UNDERWOOD, IA. 51679

Project Location
SEC 17,T75N, R42W
POTTAWATTAMIE COUNTY, IOWA

Client
FRANK MORAN

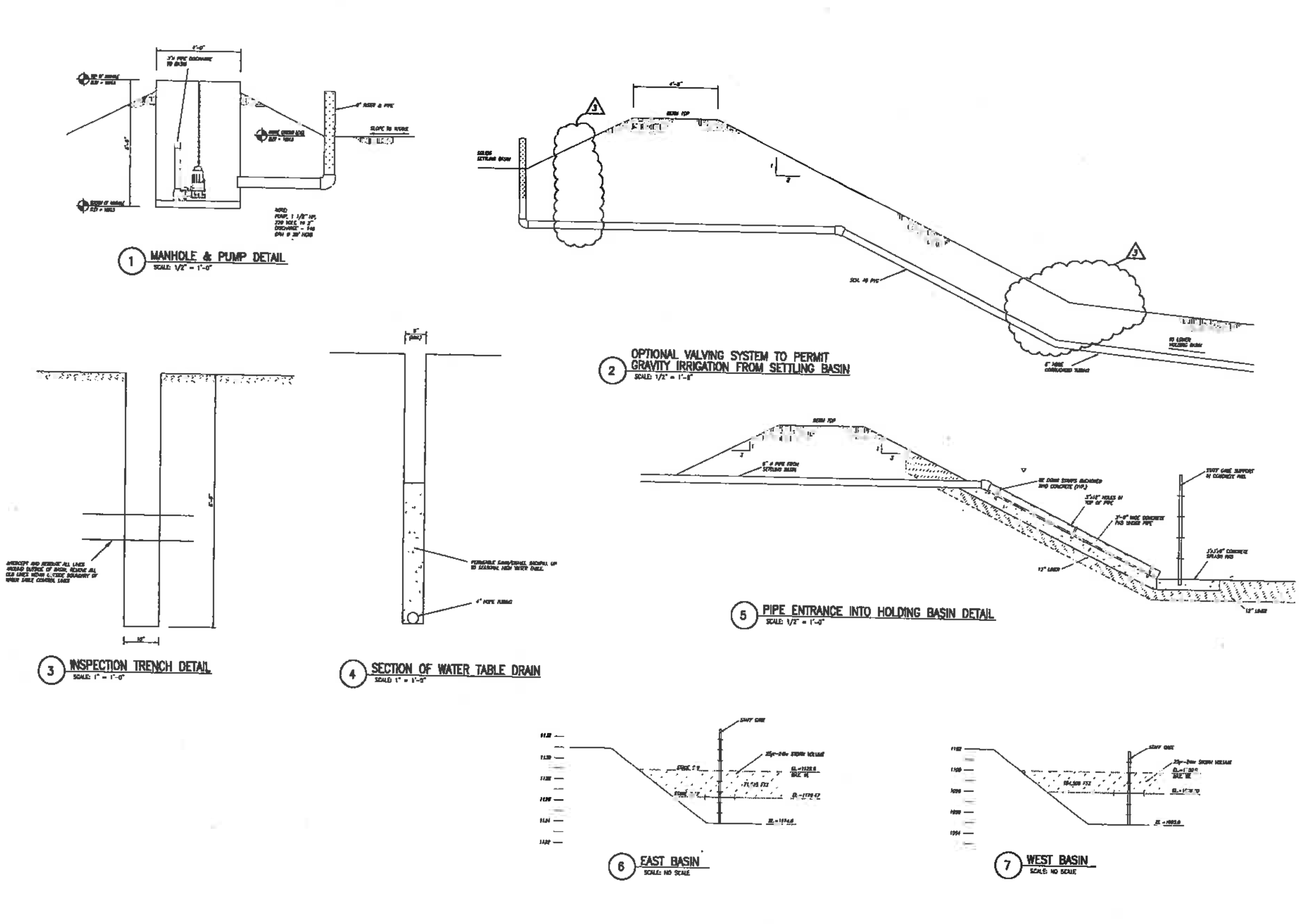
Issue & Revision Dates

MARK	DATE	DESCRIPTION
1	6-30-2010	[illegible]
2	8-6-2010	[illegible]
2	8-24-2010	[illegible]

Sheet Title
PROFILES & SECTIONS

Project Information
Date: JULY 30, 2010

Sheet Number
C302



Designer
CWA
CURRY-WILLE & ASSOCIATES
CONSULTING ENGINEERS P.C.

SEAL

Consultants

Project
Moran Feedlot
25794 MAGNOLIA RD.
UNDERWOOD, IA. 51576

Project Location
SEC 17,T76N, R42W
POTTAWATTAMIE COUNTY, IOWA

Client
FRANK MORAN

Issue & Revision Dates

Sheet Title
SECTION & DETAILS

Project Information

Sheet Number
C501

ENGINEERING REPORT
FOR
MORAN #2 FEEDLOT
POTTAWATAMIE COUNTY, IOWA

The Moran # 2 feedlot consists of an open beef feedlot with a current 990 head capacity that is located approximately 400 feet from a beef confinement barn with a 990 head capacity. The site of the feedlot is 25794 Magnolia Ave, located in the SE ¼, Sec 17, T76N, R42W, approximately 1.5 mi SW of the city of Underwood, IA. The lot naturally drains to the Mosquito Creek in Pottawattamie County. Since an NPDES permit will now be required for the facility, the owner would like to submit an application to allow the capacity of the lot to be raised to a maximum of 1400 head.

Most of the open lots are earthen but there are concrete aprons behind the bunks and in other high traffic areas. For the west solids settling basin, there is a 16 ft wide concrete bottom in the basin to allow frequent cleanout. The existing solids settling basins were constructed in the past using NRCS technical assistance. These basins have a large capacity and our analysis shows that they have the capacity to retain the runoff from a 25 yr, 24 hr storm event. The runoff control design will utilize the existing solids settling basins along with two proposed effluent holding basins. In addition, a feed storage runoff control system is designed that will discharge runoff into the west effluent holding basin.

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The holding basins are designed to meet IDNR System 2 guidelines, which requires normal pump out times at the end of July and November for land application.

The feed center is located in the south end of the open feedlot area along the ridgeline that separates the east and west drainage areas of the open lot. The feed center drains into the south west portion of the feedlot and subsequently into the south solids settling basin, which, in turn, drains to the west effluent holding basin. Figure 1 shows an aerial photo of the existing open lot and confinement barn areas along with the conceptual plan for feed and bedding storage systems and effluent basins.

West system including South SS Basin	
Type of System	Traditional containment/land application
Total number of Head	700 beef finishing animals
Total drainage area	earthen feedlots 145998 ft2 concrete open 35250 ft^2 other 147192 ft2 Total 328440 ft^2 (7.54 a)
Soils	Monona-Napier Silt loam
Feedlot type – concrete or earth	Earthen with concrete feed aprons
10 yr – 1 hr Storm size	2.6 in.
25 yr – 24 hr storm size	5.3 in.
Winter ppt (Nov 1 – Apr 1)	6.3 in
Nearest Stream name	Mosquito Creek
Treatment system	
System ID -	**Open Feedlot**
Number of head	700 hd
Settling basin ID Volume – Depth – Surface area Concrete area Volume- Depth Surface Area	West Settling channel 159,280 ft3 5ft (includes 1 ft. freeboard) 65,472 ft2 240 ft2. South Settling channel 35900 ft3 8 ft (includes 1 ft freeboard) 13,440 ft
Containment Basin Volume Depth Top of fill	 258,688 ft3 5 ft. liquid (Max liquid elev = 1100.0 Elev = 1102.0

West Effluent Basin

The effluent basin for the west system is located approximately 500 ft down slope of the west feedlot solids settling basin. The effluent holding basin will be constructed such that the water table will be controlled to be at least 2 ft below the bottom of the basin. The geologic investigation indicated that the natural GW table must be lowered artificially in order to keep the bottom of the basin two (2) ft above the GW table. Therefore, a tile line will be installed at a minimum of 25 feet from the toe of the storage basin berm. The west settling channel will discharge onto a concrete pad in the NW corner of the basin. This concrete pad will provide erosion control for the runoff water entering the basin. The south settling basin will inlet onto a concrete pad in the SE corner of the effluent basin. The basin is sized to hold 8 inches of runoff from the earthen portion of the feedlot area, and 12 inches from roofs and concrete in the runoff area to meet the "System 2" requirements. Land application will be planned for July and November time periods.

Feed Storage Runoff Control

The feed storage at the site is located north of the dry bedded confinement barn. This area will be graded to drain to an intake and wet well. A sump pump will be used to transfer the runoff from the feed and bedding storage area to the west effluent holding basin. The feed storage design summary is shown in the Appendix. Plans show the collection and pumping detail to collect and store the runoff from the bedding storage area. The design parameters are as follows:

Feed Storage System	
Total drainage area	Earthen Storage Area 38,400 ft2
Soils	Ida and Monona silt loams CN (82)
Feedlot type – concrete or earth	Earthen with concrete feed aprons
25 yr – 24 hr storm size	5.3 in.
Winter ppt (Nov 1 – Apr 1)	6.3 in
Nearest Stream name	Mosquito Creek
Treatment system	
System ID -	**Collection area and pumping to west basin**
	Use manhole as wet well and use submersible pump to transfer water to west effluent holding basin
Estimated Storage Rec'd in basin	25600 ft3

Soils Investigations

The soil investigation was performed by Certified Testing Service, Inc. Sioux City, IA. A copy of the report is included with this report in Appendix A. The soils appear to be of sufficient quality to construct the runoff holding basin to meet the minimum percolation limits set by IDNR.

The geotechnical investigation indicates a seasonal high water table near the bottom of the proposed west effluent holding basin. Therefore, subsurface drains will be required to control the water table a minimum of 2 ft below the bottom of the holding basin. The report also indicates that mottling is present to a level only one foot below the proposed bottom of the east effluent holding basin. However, the measured high water table was nearly five feet below the proposed bottom of the basin. After discussing this with the IDNR geologist who reviews plans, it was determined that no ground water control drainage system would be required on the east effluent holding basin.

The drain on the west effluent holding basin will discharge on the surface in the drainage way west of the holding structure. It will be sampled quarterly after the system is constructed.
The report indicates that the dark brown lean to fat clay slopewash material encountered with the soil borings is suitable for use as lagoon liner and dike materials.

The report indicates a concern for construction based on the existing very moist material. The testing was done in mid October of 2009 which was an exceptionally wet period. The subsoils will need to dry down sufficiently to allow compaction of fill and liner material to meet required permeability.

Wells

There are four wells on the feedlot site; two near the house at the top of the ridgeline, and two near the proposed west effluent holding basin. All wells are greater than 60 ft deep. Three of the four wells require a well variance since they are within the 400 foot separation distance from two separate settled open feedlot effluent basins (SOFEB). Two of the wells are within the 400 ft requirement of the proposed west SOFEB (Lower wells) and one of the (upper) wells is within the 400 ft limit of the proposed east SOFEB. The well closest to the east basin (No. 1 sample) has been used for water supply for the house as well as for animal facilities for many years. The other two wells (No. 2 sample) are relatively new (2002) and are used for animal watering only. There are two pairs of wells, upper and lower that are combined into two separate water supplies, upper and lower. Since both pairs of wells are combined, it is not possible to separate a water sample from each of the four wells. Each of the two pairs (upper and lower) have one water sample taken for testing.

~~All wells are greater than 60 ft deepThese wells meet the distance requirements for wells required by IDNR. As such, there should be no requirement for a well variance.~~

Operation and Maintenance

The following items list the anticipated major as well as uncommon items of Operation and Maintenance (O & M) for this system:

A. Operation
   1. Inspection
      a. Entire system weekly.
      b. Entire system after major runoff events.
      c. Vegetation to determine need for spraying, mowing, or re-vegetation.
      d. Earthwork for signs of seepage, rodent damage, settlement, misalignment or erosion.
      e. Appurtenances and/or pipes for signs of damage and needed repairs.
      f. Fences and safety signs.
      g. Amount of stored sediment, debris, and liquid.

   2. Daily Operations
      a. Confine travel of vehicles and livestock to designated areas to prevent erosion and enhance vegetation.
      b. Remove stored waste in a timely manner to maintain adequate volume for the system to function as designed.
      c. Apply wastes as determined by nutrients tests and/or nutrient utilization plan, in accordance with crop needs.
      d. Manure and wastewater will be land applied according to the requirements and limitations specified in the general permit.
      e. Inspect manure application sites daily during times of application and document the inspection.
      f. Restore the storage capacity necessary to contain the 25-year/24-hour rainfall event within 14 days of any rainfall event or accumulation of manure or process wastewater that results in storage above the maximum operating level of the holding pond (as indicated by the pond marker).
      g. All clean water should be diverted unless needed for dilution.

B. Maintenance
   1. Inspect the holding basin at least semi-annually to determine structural stability and basin liner integrity. Repair any damage noted.
   2. Repair and re-vegetate any areas of significant erosion.
   3. Repair any earthwork to original grade.
   4. Repair any damaged appurtenances or tanks.
   5. Seal any areas where seepage is noted.
   6. Repair fences and safety signs to original specifications.
   7. Remove and dispose of trash and debris that will affect the aesthetics or functioning of the system.

C. Reporting
   1. Report any discharge to DNR as soon as possible, but not later than 6 hours after onset of the discharge, or discovery phone # (515) 281-8694
   2. Submit a written report of the discharge within 30 days in accordance with Iowa Administrative Code, Chapter 65, paragraph 65.2(9).

Narrative

General
The feedlot and treatment system shall be operated and maintained in a manner necessary to prevent discharges to waters of the state. In general, management operations shall include periodic lot scraping and manure removal, solids settling area management of both liquids and solids, solids settling berm maintenance, settling basin outlet management, and containment basin management including maintenance and pumpout.

Feedlot Management
The feedlot surface shall be maintained in a smooth, well-drained condition free of potholes and/or standing water and without significant manure accumulations. Manure shall be scraped and removed quarterly or oftener, the more frequently the better. If possible, scraping and manure removal shall be done immediately ahead of impending precipitation events. This will minimize manure erosion and movement to the settling basin and will minimize contaminant concentrations in any runoff that occurs. Potholes or low spots shall be filled with compacted earth. If mounds are used they shall be maintained using clean soil as fill material; manure shall not be piled and used for mounds.

During the winter, to minimize snowmelt runoff into the settling areas, snow and manure solids shall be removed and land applied. Solids shall be spread on land with less than 5% slope, and with good crop residue cover, to minimize potential runoff & nutrient loss.

Solids Settling Area Management
The solids settling areas shall be scraped as soon as soil conditions allow after each runoff event. Scraping should occur when the area has dried adequately for machine access without creating ruts. Solids scraped from the area shall be removed and land-applied.

Earthen berms shall be maintained at design height, or higher. Maintain the berms by hauling in clean soil and compacting it on top of the berms. To minimize erosion and weed growth, maintain grass cover on berms not subject to cattle traffic.

Settling Basin Outlet Management
All porous outlets located in settling basins must be managed to promote rapid dewatering of the solids settling areas during and immediately after runoff events. This may include scraping or raking the ¾" slots by hand to remove solids that may plug the outlets. Outlet pipes shall be checked to ensure they are free of any solids or trash.

Containment Basin
Monitor the containment basin for liquid depth to verify that adequate storage is available for the 25-year, 24-hour storm at all times by checking the steel post installed as a high elevation marker. *Remove liquid anytime the liquid level reaches the post, or sooner.*

The only time the liquid level should change in the basin is during and immediately after precipitation events. Monitor the liquid level between events to be sure it is not declining, which might indicate leakage. If levels are observed declining, examine the structure closely for any seepage, rodent holes, or other sources of leakage. Repair any that are found immediately. Although the basin is designed to be pumped only twice a year, it can be pumped anytime that land is available to receive the liquid and the soil is dry. Do not pump onto saturated ground. Refer to IDNR regulations regarding application on frozen or snow covered ground between Feb. 15 and April 15 each year.

Emergency Procedures
In the event of an emergency, such as eminent discharge of contaminated runoff, or a discharge in progress, every effort must be made to stop and contain the runoff to minimize any damage.

Contact the IDNR immediately if possible or at the very latest within 6 hours (specified by Iowa law) of discovering the discharge. The following steps shall be executed to minimize discharge:

- Assess the situation; know what factors are at risk.
- Reduce risk through implementation of planned steps.
  - Prevent spills or discharges by maintaining equipment and following emergency plans.
  - Eliminate the source of manure if spill or discharge occurs.
  - Contain the spill.
- Contact appropriate authorities to report emergencies or accidents.

IDNR phone:	**Atlantic Field Office**	**(712)-243-1934**
	Emergency (anytime)	**(515) 281-8694**

- Assess damages.

Maintain a list of emergency contact numbers per the following sheet from ISU Extension Publication Pm-1859 "Emergency Action Plans", to call in case help is ever needed to control a spill.

IOWA DEPARTMENT OF NATURAL RESOURCES FIELD OFFICE

State law requires that you report manure spills or leaks to the Iowa Department of Natural Resources as soon as possible, but not later than 6 hours from onset or discovery of the problem (see *Contact Names and Numbers*).

Work Days 8 a.m. - 4:30 p.m.
Phone: ATLANTIC OFFICE -712-243-1934

Weekends, Holidays, and After Business Hours
Phone: (515) 281-8694

COUNTY SHERIFF
Name: ______________________________
Phone: ______________________________

CONTRACTORS
Earth Moving
Name: ______________________________
Phone: ______________________________

Pumping Equipment
Name: ______________________________
Phone: ______________________________

Hauling Equipment
Name: ______________________________
Phone: ______________________________

Equipment Owners
Name: ______________________________
Phone: ______________________________

County Engineer
Name: ______________________________
Phone: ______________________________

Others
Name: ______________________________
Phone: ______________________________

IDNR FIELD OFFICE – LOCATION AND PHONE NUMBER

1 - 909 W. Main, Suite 4 • Manchester, IA 52057 319-927-2640
2 - 2300 15th St. SW • Mason City, IA 50401 641-424-4073
3 - 1900 North Grand Ave. • Spencer, IA 51301 712-262-4177
4 - 1401 Sunnyside Lane • Atlantic, IA 50022 712-243-1934
5 - 401 SW 7th St., Suite I • Des Moines, IA 50309 515-725-0268
6 - 1004 West Madison • Washington, IA 52353 319-653-2135

IOWA MANURE SPILL HOTLINE (24 HR)
515-281-8694

IOWA ONE CALL
1-800-292-8989

Curry-Wille & Associates Consulting Engineers, P.C.

TILE DRAIN INSPECTION AROUND HOLDING BASINS

1. SCOPE

The work shall consist of investigating the site of the proposed liquid holding basin for any existing drainage tile, and removing or rerouting them as necessary to insure the longevity of the basin after construction, and to conform to IDNR rules requirements.
All perforated tile lines within the holding basin berm shall be destroyed and replaced with non-perforated tile or rerouted.

2. EXCAVATION

The investigation shall be made by digging a core trench around the perimeter of the proposed basin to a depth of at least six feet deep below exisiting ground level at the projected center of the basin berm. If a drainage tile line is discovered, one of the following solutions shall be implemented:

a. The drainage tile line shall be rerouted around the perimeter of the basin at a distance of least twenty-five feet horizontally separated from the outside toe of the berm of the basin. For an area of the basin where there is not a berm, the drainage tile line shall be rerouted at least fifty feet horizontally separated from the edge of the basin.

b. The drainage tile line shall be replaced with a non-perforated tile line under the basin floor. The non-perforated tile line shall be continuous and without connecting joints. There must be a minimum of three feet between the non-perforated tile line and the basin floor.

A written record of the investigation shall be submitted as part of the construction certification required in rule 65.111(81GA, HF805).

3. SPECIAL SPECIFICATIONS

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-1 SITE PREPARATION

1. SCOPE
Site preparation work shall consist of clearing, grubbing, stripping, refuse removal, banksloping and structure removal on the site as necessary to rid the site of all undesirable materials on or near the surface and prepare the site for the structure. All woody growth within the construction area shall be cleared and all stumps and roots one inch in diameter or larger shall be grubbed from the site. In addition, all areas within 25 feet of the footprint of the structure shall be cleared and grubbed except as directed by CWA. The work shall also consist of the removal and disposal of structures (including fences) that must be removed to perform other items of work.

2. FOUNDATION PREPARATION
The construction areas shall be stripped of all unsuitable materials such as organic matter, grasses, weeds, sod, debris, and stones larger than 6 inches in diameter.
In an earth embankment foundation area, all channel banks and sharp breaks shall be sloped to no steeper than 1.5:1. The foundation area shall be thoroughly scarified before placement of fill material. The surface shall have moisture added or shall be compacted if necessary so that the first layer of fill material can be compacted and bonded to the foundation.

3. STRIPPED MATERIAL DISPOSAL
Suitable soil material shall be stockpiled for use as topsoil. The other stripped materials shall be buried, removed from the site, or disposed of as directed by the owner or CWA. Stockpiled materials around a construction site should not hinder subsequent construction operations.

4. DISPOSAL OF REFUSE MATERIALS
Waste materials from clearing and structure removal shall be burned or buried at locations approved by the owner. Buried materials shall be covered with a minimum of 2 feet of earthfill. All refuse shall be disposed of in a manner which complies with all local and state regulations.

5. SALVAGE
Items to be salvaged shall be as shown on the drawings. Structures and fencing materials that are designated to be salvaged shall be carefully removed and neatly placed in the specified storage areas.

6. SPECIAL SPECIFICATIONS

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-26 TOPSOILING

1. SCOPE

The work shall consist of salvaging topsoil from borrow areas or required excavations and spreading it on the exposed disturbed areas.

2. QUALITY OF TOPSOIL

Topsoil shall consist of friable surface soil reasonably free of grass, roots, weeds, sticks, stones, or other foreign materials.

3. EXCAVATION

After the site has been cleared and grubbed, the topsoil shall be removed from borrow areas and required excavation areas to the depth as shown on the drawings. Topsoil shall be stockpiled at locations approved by CWA.

4. SPREADING

Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Surfaces designated to be covered shall be lightly scarified just prior to the spreading operation. Where compacted fills are designated to be covered by topsoil, the topsoil shall be placed concurrently with the fill and shall be bonded to the compacted fill with the equipment. Topsoil shall be placed to the minimum depth shown on the drawings. After the spreading operation is completed, the surface shall be finished to a reasonably smooth surface.

5. SPECIAL SPECIFICATIONS

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

COMPACTED EARTHFILL

1. SCOPE
The work shall consist of the construction of earthfills required by the drawings and specifications.

2. MATERIALS
All fill materials shall be obtained from required excavations and designated borrow areas. Fill materials shall contain no sod, brush, roots or other bio-degradable materials. Rocks larger than 6 inches in diameter shall be removed prior to compaction of the fill.

3. FOUNDATION PREPARATION
Foundations for earthfill shall be stripped to remove vegetation and other unsuitable materials.
Foundation surfaces shall be scarified to a minimum depth of 2 inches. Foundation and abutment surfaces shall not be sloped steeper than 1.5:1 unless otherwise shown on the drawings.

4. PLACEMENT
Fill shall not be placed until the required excavation and foundation preparation have been completed. Fill shall not be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill. Adjacent to structures or pipes, fill shall be placed in a manner which will prevent damage. The height of the fill adjacent to structures or pipes shall be increased at approximately the same rate on all sides. The materials used throughout the earthfill shall be essentially uniform. Selective placement shall be as shown on the drawings or approved by the engineer. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified to a depth of not less than 2 inches before the next layer is placed. The top surfaces of embankments shall be maintained approximately level during construction, except that a cross-slope of approximately 2% shall be maintained to ensure effective drainage.

5. CONTROL OF MOISTURE CONTENT
The moisture content of the fill material shall be adequate for obtaining the required compaction. Material that is too wet shall be dried to meet this requirement, and material that is too dry shall have water added and mixed until the requirement is met. The moisture content of the fill material shall be such that a ball formed with the hands does not crack or separate when struck sharply with a pencil and will easily ribbon out between the thumb and finger.
Earth foundations under and adjacent to concrete structures shall be prevented from drying and cracking before concrete and backfill are placed. The application of water to the fill materials shall be accomplished at the borrow areas insofar as possible.

6. COMPACTION
Earthfill shall be compacted by one of the following methods as specified on the plans. If no method is specified, compaction will be in accordance Method 1.
Method 1 - Earthfill shall be placed so that the wheels of the loaded, rubber tired, hauling equipment traveling in a direction parallel to the centerline of fill pass over the entire surface of the layer being placed.
Method 2 - Two (2) complete passes of a tamping-type roller will be made over each

layer. The roller shall be capable of exerting a minimum of one-hundred (100) pounds per square inch.

Method 3 - Minimum density shall be 90% of the maximum density as determined by ASTM D 698. The liner material should be compacted to 95% of ASTM D698

The maximum thickness of a lift of fill before compaction shall be 8 inches, unless otherwise indicated on the drawings. Fill adjacent to structures, pipe conduits, and anti-seep collars shall be placed in layers not more than 4 inches thick and compacted to a density equivalent to that of the surrounding fill by hand tamping, manually directed power tampers, or plate vibrators. Care should be taken so that compaction around the spillway pipe does not cause uplift of the pipe resulting in a void beneath the pipe. Hand tamping only shall be used to compact the earthfill under the bottom half of circular pipes. Equipment shall not be operated within 2 feet of any structure or pipe. Compacting of fill adjacent to structures shall not be started until the concrete is 7 days old.

7. LINER REQUIREMENTS

A clay liner shall be constructed with a minimum thickness of 12 inches, or the minimum thickness required to have a percolation rate that shall not exceed one-sixteenth (1/16th) inch per day at the design depth of the basin.

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

CONCRETE

1. SCOPE

The work shall consist of furnishing, forming, placing, finishing, and curing Portland cement concrete including steel reinforcement.

2. MATERIALS

Portland Cement shall conform to ASTM C 150 and shall be Type I or Type II.
Fine Aggregates shall conform to ASTM C 33 and shall be composed of clean, uncoated grains of material.

Coarse Aggregates shall be gravel or crushed stone conforming to ASTM C 33 and shall be clean, hard, durable and free from clay or coating of any character. The maximum size of coarse aggregate shall be 1 1/2 inches.

Water shall be clean and free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances.

Air entraining agent shall conform to ASTM C 260.

Pozzolan (fly ash) shall be in strict compliance with ASTM C 618, Class F or C. The loss by ignition shall not exceed 6.0 percent.

Water-reducing admixtures shall conform to ASTM C 494 and may be the following types:

1. Type A - Water-reducing admixture
2. Type D - Water-reducing and retarding admixture
3. Type F - Water-reducing, high range admixture (superplasticizer).
4. Type G - water-reducing, high range, and retarding admixture (superplasticizer).

Type D or G admixture may be used when the air temperature is over 80 degrees F. at the time of mixing and/or placement.

Calcium Chloride or other antifreeze compounds or accelerators will not be allowed.
Preformed expansion joint filler shall be a commercially available product made of bituminous, sponge rubber or closed cell foam materials with a minimum thickness of 1/2 inch.

Reinforcing steel shall be free from loose rust, oil, grease, paint, or other deleterious matter.

Reinforcing steel shall conform to one or more of the following:
1. Reinforcing Bars - ASTM A 615, A 616 or A617, Grade 40 or greater, deformed.
2. Welded Wire Fabric - ASTM A 185 or A 497.

Waterstops shall be either metallic or nonmetallic. Metallic waterstops shall be fabricated from sheets of copper or galvanized steel. Nonmetallic waterstops shall be made of natural or synthetic rubber or vinyl chloride polymer or copolymer. Rubber, polymer and copolymer waterstops shall have ribbed or bulb-type anchor flanges and a hollow tubular center bulb, unless otherwise shown on the drawings. Waterstops shall be installed as shown on the drawings. Curing compound shall be a liquid membrane-forming compound suitable for spraying on the concrete surface. The curing compound shall meet the requirements of ASTM C 309 Type 2 (white pigmented).

3. CONCRETE DESIGN MIX

The contractor will be responsible for the determining the design mix proportions in accordance with the requirements included in this paragraph and shall provide a copy of the mix to the Engineer prior to placing any concrete. The concrete mix shall be of such proportions as to provide a minimum strength of 3500 p.s.i. in 28 days, unless otherwise shown on the drawings. The air content shall be 4 to 8 percent of the volume of the concrete at the time of placement. The slump shall be 2 to 5 inches except when superplasticizer is used. The slump shall be 3 inches or less prior to the addition of superplasticizer admixture and shall not exceed 7 1/2 inches following addition and mixing. The fine aggregate shall be 30-50 percent of the total combined aggregate based on oven dry weights. The contractor shall provide tests to verify that the design mix meets the requirements. In lieu of this, either of the following mix proportions per cubic yard may be used:

Mix Number	Minimum Cement Bags/Pounds	Fly Ash Pounds	Maximum** Water Gallons
1	6.0/564	0	36
2	5.0/470	45-90	33

**Total of available aggregate moisture, mixing water added at the plant and mixing Water added at the site.

4. MIXTURES AND MIXING

Ready-mixed concrete shall be batched, mixed and transported in accordance with ASTM C 94. Concrete shall be uniform and thoroughly mixed when delivered to the forms. No mixing water in excess of the amount shown for the design mix or in an amount that would cause the maximum slump to be exceeded shall be added to the concrete during mixing, hauling or after arrival at the point of delivery. The concrete shall be batched and mixed so that the temperature of the concrete at the time of placing shall be between 50 and 90 degrees F.

5. BATCH TICKET

The contractor shall obtain from the supplier a delivery ticket for each batch of concrete before unloading at the site. The following information shall be included on the ticket: name of concrete supplier, job name or location, date, truck number, amount of concrete, time loaded or time of first mixing cement, aggregate, and mixing water added at the plant, type and amount of cement, type and amount of admixtures, oven dry weights of fine and coarse aggregate, and moisture content(%) or weight of water contained in the aggregates.

The following information shall be added to the batch ticket on site: mixing water added on site, time concrete arrived on site and time concrete was unloaded.

Upon completion of the concrete placement, copies of all batch tickets shall be provided to CWA.

6. REINFORCING STEEL

Before reinforcement is placed, the surfaces of the bars or mesh shall be cleaned to remove any loose, flaky rust, mill scale, oil, grease, or other foreign substances. After placement, the reinforcement shall be maintained in a clean condition until it is completely embedded in the concrete.

Reinforcing bars shall be cut and bent according to ACI Standard 315. Tack welding of bars shall not be permitted. Reinforcement shall be accurately placed as shown on the drawings and secured in position in a manner that will prevent its displacement during placement of concrete. Metal chairs, metal hangers, metal spacers or concrete chairs shall be used to support reinforcement. Precast concrete chairs shall be manufactured from concrete equal in quality to the concrete being placed. Precast concrete chairs shall be moist at the time concrete is placed.

Splices of reinforcing bars shall be made only at the locations shown on the drawings, unless other wise approved by CWA. All reinforcing splices and placement shall be in accordance with ACI 318 and shown on the drawings.

After placement of the reinforcement, concrete shall not be placed until the reinforcement has been inspected and approved by NRCS.

7. PREPARATION OF FORMS AND SUBGRADE

Prior to placement of concrete, the forms and subgrade shall be free of woodchips, sawdust, debris, water, ice, snow, extraneous oil, mortar, or other harmful substances or coatings. Any oil on the reinforcing steel or other surfaces required to be bonded to the concrete shall be removed. All surfaces shall be firm and damp prior to placing concrete. Placement of concrete on mud, dried earth, uncompacted fill, or frozen subgrade will not be permitted.

The forms and associated false-work shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and elevations. Forms will be mortar tight. Forms with torn surfaces, worn edges, dents or other defects will not be used. Forms shall be coated with a nonstaining form release agent before being set into place. Excess form coating material shall not stand in puddles in the forms or come in contact with the steel reinforcement or hardened concrete against which fresh concrete is to be placed.

Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be of a commercially manufactured type. Non fabricated wire shall not be used. Form ties shall be constructed so that the ends or end fasteners can be removed without causing spalling at the surface of the concrete.

Metal form ties used within the forms on hydraulic structures with a total volume of concrete exceeding five cubic yards shall be equipped with cones or other devices that permit their removal to a depth of at least one inch without damage to the concrete. The holes resulting from cones and other devices shall be patched in accordance with Section 9.

Form ties except those specifically covered by the preceding paragraph shall be broken off flush with the formed surface. Any surface areas which have been spalled or otherwise damaged shall be repaired in accordance with Section 9.

Steel tying and form construction adjacent to new concrete shall not be started until concrete has cured at least 12 hours.

Concrete joints shall be of the type and at the locations shown on the drawings. Splices in metal waterstops shall be brazed, welded or overlapped and bolted. Splices in nonmetallic waterstops shall be cemented or joined as recommended by the manufacturer.

8. PLACING CONCRETE

Concrete shall be delivered to the site and discharged into the forms within 1 1/2 hours after the introduction of the cement to the aggregates. When a superplasticizer is used, the concrete shall be discharged within the manufacturer's recommended time limit for discharge after addition of the admixture. In hot weather or under conditions contributing to quick setup of the concrete, discharge of the concrete shall be accomplished in 45 minutes unless a set-retarding admixture is used, in which case the manufacturer's recommended time limit will apply.

Addition of water at the job site may be done at the beginning of placement of each load of concrete in order to obtain allowable slump, provided that the maximum water content and water/cement ratio in the design mix is not exceeded. Addition of water will not be permitted after placement of the load has started.

The concrete shall be deposited as closely as possible to its final position in the forms and shall be worked into corners and around reinforcement and other embedded items in a manner which prevents segregation. Formed concrete shall be deposited in layers 24 inches or less in depth and shall be continuously deposited so that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of "cold joints". Concrete containing superplasticizer shall be placed in lifts not exceeding 5 feet in depth. If the surface layer of concrete sets during placement to the degree that it will not flow and merge with the succeeding layer when tamped or vibrated, the contractor shall discontinue placing concrete and install a construction joint. Construction joints shall be completed as shown on the drawings or by one of the following methods:

1. The joint shall be constructed using a 6 inch wide by 1/4 inch steel plate. The surfaces of the construction joint shall be prepared by washing and scrubbing with a wire brush or wire broom to expose coarse aggregate. The steel plate shall be embedded 3" in the concrete.
2. The joint surface shall be cleaned to expose coarse aggregate by sandblasting or air-water cutting after the concrete has gained sufficient strength to prevent displacement of the coarse aggregate or cement fines. The surface of the concrete shall not be cut so deep as to undercut the coarse aggregate. The joint shall be washed to remove all loose material after cutting.

The surfaces of all construction joints shall be kept continuously moist for at least 1 hour prior to placement of the new concrete. The new concrete shall be placed directly on the cleaned and washed surface. New concrete shall not be placed until the hardened concrete has cured at least 12 hours.

Concrete shall not be dropped more than 5 feet vertically unless suitable equipment is used to prevent segregation. Concrete containing superplasticizer shall not be dropped more than 12 feet vertically.

Immediately after the concrete is placed in the forms, it shall be consolidated by vibration, spading or hand tamping as necessary to insure smooth surfaces and dense concrete.

Care should be taken not to over-vibrate concrete containing superplasticizer. Vibration shall not be supplied directly to the reinforcing steel, the forms or concrete which has hardened to the degree that it does not insure a monolithic bond with the preceding layer.

The use of vibrators to transport concrete in the forms or conveying equipment will not be permitted.

9. FORM REMOVAL AND FINISHING

Forms shall be left in place for at least 24 hours after placing concrete. Forms shall be removed in such a way as to prevent damage to the concrete. Supports shall be removed in a manner that will permit concrete to take the stresses due to its own weight uniformly and gradually. Immediately after removal of the forms, concrete which is honey combed, damaged or otherwise defective shall be repaired or replaced. All cavities or depressions resulting from form tie removal shall be patched with a non-shrink grout, mortar mix or epoxy-type sealer. Non-shrink grout consists of 1 part cement and 2-1/2 parts sand that will pass a No. 16 sieve. Only enough water shall be added to produce a filling which is at the point of becoming rubbery when the material is solidly packed.
All repaired and patched areas shall be cured as required in Section 10.

10. CURING

Concrete shall be cured for a period of not less than 7 consecutive days by one of the following approved methods:

A. Membrane Curing: Concrete shall be cured with white pigmented curing compound. The compound shall be sprayed on moist concrete as soon as free water has disappeared, but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. Curing compound shall not be applied to surfaces requiring bond to subsequently placed concrete, such as construction joints, shear plates, reinforcing steel, and other embedded items. Surfaces subjected to heavy rainfall or running water within 3 hours after curing compound has been applied or surfaces damaged by subsequent construction operations during the curing period, shall be reapplied in the same manner as the original application.

B. Moist Curing: Concrete shall be cured by maintaining all surfaces continuously wet for the entire curing period.

C. Cover: Adequately cover an exposed structure with burlap mats, or other material and continually soak with water.

11. BACKFILLING

Backfilling may begin when the curing period has ended. Backfill against the structure will be placed in no more than 4-inch layers and compacted by hand tamping or with manually directed power tampers or plate vibrators. Layers compacted in this manner shall extend not less than 2 feet from any part of the concrete structure.

12. HOT AND COLD WEATHER CONCRETING

When the atmospheric temperature may be expected to drop below 40° F. at the time concrete is delivered to the work site , during placement, or at any time during curing period, concrete shall be mixed, placed and protected in accordance with ACI Standard 306, "Recommended Practice for Cold Weather Concreting."

When climatic or other conditions are such that the temperature of the concrete may reasonably be expected to exceed 90° F. at the time of delivery to the work site, during placement or during the first 24 hours after placement, concrete shall be mixed, placed and protected in accordance with ACI Standard 305, "Recommended Practice for Hot Weather Concreting."

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-32 CONCRETE FOR NONSTRUCTURAL SLABS

1. SCOPE

The work shall consist of forming, placing, finishing, and curing Portland cement concrete slabs including steel reinforcement.

2. MATERIALS

Cement shall be Type I or Type II Portland cement. Aggregate shall meet Iowa Department of Transportation requirements for Coarse and Fine Aggregate for Concrete, Sections 4110 and 4115 of IDOT Standard Specifications for Highway and Bridge Construction. Water shall be clean and free of harmful chemicals. Reinforcing steel shall be deformed billet-steel bars, Grade 40 or 60. Welded wire fabric shall conform to the requirements of ASTM A 185.

3. CONCRETE MIX

The concrete mix shall provide a minimum strength of 3500 psi at 28 days. The mix shall contain not less than 6 sacks of cement per cubic yard and not more than 6 gallons of water per sack of cement. The water/cement ratio shall not exceed 0.53:1 including free water in the aggregates. Air entrainment shall range from 4% to 8%. Slump shall be 2" to 5".

The contractor shall be responsible for determining the design mix proportions and shall provide a copy of the mix to the CWA Inspector at least 3 days prior to placing any concrete. A concrete batch ticket shall be supplied to the inspector at the time of delivery to the site. The minimum information to be included shall be the name of the supplier, size of load, time of loading, type and amount of cement, type and amount of admixtures, saturated surface dry weights of fine and coarse aggregate, mixing water added at the plant and free water in aggregates.

4. REINFORCING STEEL

Reinforcing steel shall be free from loose rust, concrete, oil, grease, or paint. Reinforcing shall be accurately placed and secured in position in a manner that will prevent its displacement during placement of concrete. The use of heat or welding in cutting, bending and splicing of reinforcing steel will not be permitted.

In slabs, steel shall be supported by precast concrete bricks, corrosion resistant metal chairs, or non-metal chairs. The concrete brick shall have strength equal to or greater than 3500 psi.

Metal chairs shall have a protective epoxy coating, plastic coating, galvanized finish or be stainless steel.

Splices of reinforcing bars shall be lapped 30 diameters but not less than 12 inches. Bars shall not be spliced by welding. Welded wire fabric shall be lapped at least one mesh width.

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5. FORMS FOR CONCRETE

All edges shall be formed. All forms shall be true to line and grade, mortar tight, and rigid. Forms shall be left in place for a minimum of 24 hours.

6. PLACING CONCRETE

Concrete shall be placed in final position within one and one-half hours after mixing the aggregate with cement and shall be consolidated by spading or mechanical vibration. The concrete shall not be forced to flow laterally to its final location. Concrete shall not be dropped more than 5 ft. vertically.

Addition of water at the job site may be done at the beginning of placement of each load of concrete in order to obtain allowable slump, provided that the specified water/cement ratio will not be exceeded. Addition of water will not be permitted after placement of the load has proceeded.

All concrete placed on earth shall be placed on clean firm damp surfaces, free of frost, ice, running water, or mud.

Concrete shall be placed at air temperatures between 40°F and 80°F, unless special measures are taken to protect the concrete. Review special concrete placement procedure with CWA prior to placement of concrete. Concrete shall be protected from freezing for 7 days after placement.

7. JOINTS

Install joints as shown on the drawings. A formed construction joint shall be made at the locations shown on the drawings, at the end of the day or at any time when a cold joint would occur.

Control joints are required every 8 to 12 ft. in both directions, unless otherwise shown on the drawings. They shall be tooled or sawed to a depth of 1/4 of the slab thickness.

8. CURING CONCRETE

Concrete shall be cured for 7 days by either:

1) Applying white pigmented curing compound at a rate of 1 gallon per 150 square feet or as recommended by the manufacturer.
2) Water soak exposed surface for the entire 7 days.
3) Cover with burlap, mats or other material and maintain in a moist condition.
4) Cover with 4 mil plastic sheeting while concrete is still wet.

9. SPECIAL SPECIFICATIONS

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

Construction Specification 34—Steel Reinforcement

1. Scope
The work shall consist of furnishing and placing steel reinforcement for reinforced concrete or pneumatically applied mortar.

2. Material
Steel reinforcement shall conform to the requirements of Material Specification 539, Steel Reinforcement (for concrete). Before reinforcement is placed, the surface of the bars and fabric and any metal supports shall be cleaned to remove any loose, flaky rust, mill scale, oil, grease, or other undesirable coatings or foreign substances. Epoxy-coated steel reinforcement shall be free of surface damage. After placement, the reinforcement shall be maintained in a clean and serviceable condition until it is completely embedded within the concrete.

3. Bar schedule, lists and diagrams
Any supplemental bar schedules, bar lists or bar-bending diagrams required in section 10 of this specification to accomplish the fabrication and placement of steel reinforcement shall be provided by the contractor. Before reinforcement is placed, the contractor shall furnish four copies of any such lists or diagrams to the contracting officer for approval. Acceptance of the reinforcement is not based on approval of these lists or diagrams, but on inspection of the steel reinforcement after it has been placed, tied, and supported and is ready to receive concrete.

4. Bending
Reinforcement shall be cut and bent in compliance with the requirements of the American Concrete Institute Standard 315. Bars shall not be bent or straightened in a manner that will injure or weaken the material. Bars with kinks, cracks, or improper bends will be rejected.

5. Splicing bar reinforcement
Method 1—Splices of reinforcement shall be made only at locations shown on the drawings and provided by the steel schedule. Placement of bars at the lap splice locations shown, when not in contact, shall not be farther apart than one-fifth the shown lap length and in any case no greater than 6 inches.

Method 2—Splices of reinforcement shall be limited to those locations shown on the drawings. Splice lengths shall be determined before fabrication and meet the requirements of ACI Standard 318, Building Code Requirements for Reinforced Concrete, based upon design information in section 10 of this specification. Bar placement drawings and schedules shall be provided for approval before fabrication. The drawings shall show all splice locations, layouts, and lap dimensions.

6. Splicing welded wire fabric
Unless otherwise specified, welded wire fabric shall be spliced in the following manner:

End-to-end—Adjacent sections shall be spliced end-to-end (longitudinal lap) by overlapping a minimum of one full mesh plus 2 inches plus the length of the two end overhangs. The splice length is measured from the end of the longitudinal wires in one piece of fabric to the end of the longitudinal wire in the lapped piece of fabric.

Side-to-side—Adjacent sections shall be spliced side to side (transverse lap) a minimum of one full mesh plus 2 inches. The splice length shall be measured from the centerline of the first longitudinal wire in one piece of fabric to the centerline of the first longitudinal wire in the lapped piece of fabric.

7. Placing

Reinforcement shall be accurately placed and secured in position to prevent its displacement during the placement of concrete. Tack welding of bars is not permitted. Metal chairs, metal hangers, metal spacers, and concrete chairs may be used to support the reinforcement. Metal hangers, spacers, and ties shall be placed in such a manner that they are not exposed in the finished concrete surface. The legs of metal chairs or side form spacers that may be exposed on any face of slabs, walls, beams, or other concrete surfaces shall have a protective coating or finish. The coating or finish can be hot dip galvanizing, epoxy coating, plastic coating, or stainless steel. Metal chairs and spacers not fully covered by a protective coating or finish shall have a minimum cover of 0.75 inch of concrete over the unprotected metal part. The exception is that those with plastic coatings may have a minimum cover of 0.5 inch of concrete over the unprotected metal part. Precast concrete chairs shall be manufactured of the same class of concrete as specified for the structure and shall have the tie wires securely anchored in the chair or a V-shaped groove at least 0.75 inch in depth molded into the upper surface to receive the steel bar at the point of support. Precast concrete chairs shall be clean and moist at the time concrete is placed.

High density or structural plastic rebar accessories designed to ensure maximum concrete bond may be substituted for metal or concrete accessories in spacer applications as approved by the contracting officer. Exposure of plastic rebar accessories at the finished concrete surface shall be kept to a minimum. Plastic rebar accessories, when used, shall be staggered along adjacent parallel bars and shall be placed at intervals no closer than 12 inches. Plastic rebar accessories shall not be used in concrete sections 6 inches or less in thickness.

Reinforcement shall not be placed until the prepared site has been inspected and approved. After placement of the reinforcement, concrete shall not be placed until the reinforcement has been inspected and approved by the contracting officer's technical representative (COTR).

8. Storage

Steel reinforcement stored at the work site shall be placed on platforms, skids, or other supports. This is done so that contact with the ground is avoided and the material is protected from mechanical damage and/or corrosion.

9. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, the weight of steel reinforcement placed in the concrete in accordance with the drawings is determined to the nearest pound by computation from the placing drawings. Measurement of hooks and bends is based on the requirements of ACI Standard 315. Computation of weights of reinforcement is based on the unit weights established in tables 34–1 and 34–2 of this specification. Computation of weights for welded wire fabric not shown in table 34–2 shall be based on ACI Standard 315. The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings is determined to the nearest square foot by computation from the placing drawings with no allowance for required laps. The weight of steel reinforcing in extra splices or extra-length splices approved for the convenience of the contractor or the weight of supports and ties is not included in the measurement for payment.

Payment for furnishing and placing reinforcing steel is made at the contract unit price. Such payment constitutes full compensation for all labor, material, equipment, and all other items necessary and incidental to the completion of the work including preparing and furnishing bar schedules, lists, or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, storing, cutting, bending, cleaning, and securing all reinforcements.

Method 2—For items of work for which specific unit prices are established in the contract, the weight of bar reinforcement placed in the concrete in accordance with the drawings is determined to the nearest pound by computation from the placing drawings. Measurement of hooks and bends is based on the requirements of ACI Standard 315. Computation of weights of bar reinforcement is based on the unit weights established in table 34–1 of this specification. The weight of steel reinforcing in extra splices or extra length splices approved for the convenience of the contractor or the weight of supports and ties is not included in the measurement for payment.

The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings is determined to the nearest square foot by computation from the placing drawings with no allowance for required laps.

Payment for furnishing and placing bar reinforcing steel is made at the contract unit price for bar reinforcement. Payment for furnishing and placing welded wire fabric reinforcing steel is made at the contract unit price for welded wire fabric reinforcement. Such payment constitutes full compensation for all labor, material, equipment, and all other items necessary and incidental to the completion of the work including preparing and furnishing bar schedules, lists, or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, cutting, bending, cleaning, and securing all reinforcement.

All Methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items to which they are made subsidiary are identified in section 10 of this specification.

10. Items of work and construction details

Table 34–1 Standard reinforcing bars

Bar size no.	Weight (lb/ft)
3	0.376
4	0.668
5	1.043
6	1.502
7	2.044
8	2.670
9	3.400
10	4.303
11	5.313

14	7.650
18	13.600

Table 34–2 Rectangular welded wire fabric

Style designation 1/ by steel wire gauge	by W-number	Weight (lb/100 ft²)
6 x 6 – 10 x 10	6 x 6 – W1.4 x W1.4	21
6 x 6 – 8 x 8	6 x 6 – W2.1 x W2.1	30
6 x 6 – 6 x 6	6 x 6 – W2.9 x W2.9	42
6 x 6 – 4 x 4	6 x 6 – W4.0 x W4.0	58
4 x 4 – 10 x 10	4 x 4 – W1.4 x W1.4	31
4 x 4 – 8 x 8	4 x 4 – W2.1 x W2.1	44
4 x 4 – 6 x 6	4 x 4 – W2.9 x W2.9	62
4 x 4 – 4 x 4	4 x 4 – W4.0 x W4.0	85
4 x 12 – 8 x 12	4 x 12 – W2.1 x W0.9 2/	25
4 x 12 – 7 x 11	4 x 12 – W2.5 x W1.1 2/	31

1/ Style designation is defined in ACI Standard 315 of the American Concrete Institute.
2/ Welded smooth wire fabric with wires smaller than size W1.4 is manufactured from galvanized wire.

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

PLASTIC (PVC, PE) PIPE

1. SCOPE

The work shall consist of furnishing and installing plastic pipe and the necessary fittings specified herein or as shown on the drawings. This specification does not cover subsurface drainage systems.

2. MATERIALS

12 inch HDPE pipe shall be ADS N-12 double walled pipe with corrugated exterior and smooth walled interior, or equivalent, with integral soil tight bell joints.

Corrugated Polyethylene (PE) Tubing. Corrugated PE tubing and fittings shall conform to the requirements of the applicable specification listed below:

Kind of Pipe	ASTM Specification
Corrugated PE Tubing and Fittings, Size 3 to 6 inch, inclusive	F 405
Large Diameter Corrugated PE Tubing and Fittings, Size 8 to 24 inch, inclusive	F 667
PE Large Diameter Profile Wall Sewer and Drain Pipe	F 894

Poly Vinyl Chloride (PVC) Plastic Pipe. PVC pipe and fittings shall conform to the requirements of the applicable specification listed below:

Kind of Pipe	ASTM Specification
PVC Plastic Pipe, Schedules 40, 80 and 120	D 1785
PVC Pressure-Rated Pipe (SDR Series)	D 2241

3. FITTINGS AND JOINTS

Pipe joints shall conform to the details shown on the drawings. Pipe shall be installed and joined in accordance with the manufacturer's recommendations.

Joints may be bell and spigot type with elastomeric gaskets, coupling type with elastomeric gasket on each end, or solvent cemented. Solvent cemented joints may not be used for ponds.

Solvent cemented joints for PVC pipe and fittings shall be in accordance with ASTM D 2855. When a lubricant is required to facilitate joint assembly, it shall be a type having no detrimental effect on the gasket or pipe material.

Mechanical joints (split couplings and snap couplings) may be used when joining PE pipe and fittings when the pipe is used for non-pressure flow and a free draining sand or gravel bedding material is provided. Elastomeric-sealed mechanical joints shall be used when joining PE pipe and fittings under pressure flow or where seepage cannot be tolerated. Where non-pressure pipe is specified, the fittings shall be of the same or similar materials as the pipe and shall provide the same durability and strength as the pipe.

Where pressure pipe is specified, fittings shall have a design capacity equal to or exceeding that specified for the pipe to which it is attached. Fittings shall be cast iron, steel, one piece injection molded plastic filling or fabricated from plastic pipe and one piece injection molded plastic fittings. Pressure pipe fittings shall conform to the requirements of the applicable specification listed below.

Kind of Fitting	ASTM Specification
Threaded PVC Plastic Pipe Fittings, Schedule 80	D 2464
PVC Plastic Pipe Fittings, Schedule 40	D 2466
Socket-Type PVC Plastic Pipe Fittings, Schedule 80	D 2467
Butt Heat Fusion PE Plastic Fittings for PE Plastic Pipe and Tubing	D 3261
Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	D 3139
PVC Pressure Pipe, 4-12 in., for Water	C 900
PVC Water Transmission Pipe, Nominal Diameters, 14-36 in.	C 905

4. HANDLING AND STORAGE

Pipe shall be delivered to the job site and handled by means which provide adequate support to the pipe and does not subject it to undue stresses or damage. When handling and placing plastic pipe, care shall be taken to prevent impact blows, abrasion damage, and gouging or cutting (by metal surfaces or rocks). All special handling requirements of the manufacturer shall be strictly observed. Special care shall be taken to avoid impact when the pipe must be handled at temperatures of 40oF (4.4oC) or less.

Pipe shall be stored on a relatively flat surface so that the barrels are evenly supported. Unless the pipe is specifically coated to withstand exposure to ultraviolet radiation, it shall be covered with an opaque material when stored outdoors for a period of 15 days or longer.

5. LAYING AND BEDDING THE PIPE

Plastic pipe conduits and fittings shall be installed as shown on the drawings and specified herein. The pipe shall be laid so that there is no reversal of grade between joints, unless otherwise shown on the drawings. The pipe shall be placed with the bell end upstream, unless otherwise specified. The pipe shall be carefully placed on the bedding or into the pipe trench.

Care shall be taken to prevent distortion and damage during unusually hot (over 90oF) or cold weather (under 40oF). After the pipe has been assembled in the trench, it shall be allowed to reach ground temperature before backfilling to prevent pull out of joints due to thermal contraction.

The pipe ends and the couplings shall be free of foreign material when assembled. During the placement of the pipe, each open end of the pipeline shall be closed off by a suitable cover or plug at the end of work on the pipeline each day and until work resumes or installation is complete.
Perforated pipe shall be laid with the perforations down and oriented symmetrically about the vertical centerline. Perforations shall be clear of any obstructions when the pipe is laid.

Pipe shall be firmly and uniformly supported throughout the entire length. Bell-holes shall be made in the bedding under bells or couplings and other fittings to prevent the pipe from being supported by fittings.

a. Earth Bedding. When bedding is specified, the pipe shall be firmly and uniformly bedded in a shaped bedding groove that closely conforms to the bottom of the pipe for a depth equal to a minimum of 1 inch or 5 percent of the diameter of the pipe, whichever is greater. The bedding material shall be free of rocks or stones greater than 0.5 inch diameter and earth clods greater than 2 inch diameter.

b. Sand or Gravel Bedding. When sand or gravel bedding is specified, the pipe shall be firmly and uniformly placed on a sand or gravel bed. Sand or gravel fill shall be carefully placed and compacted as specified herein and as shown on the drawings.

6. BACKFILL

The pipe shall be held down during backfilling to the top of the pipe to prevent its being lifted from its original placement.

Within 2 feet of the pipe, backfill shall be carefully placed and compacted by means of hand tamping or manually directed power tampers or plate vibrators to form a continuous uniform support around the pipe. Maximum thickness of layers before compaction within 2 feet of the pipe shall be 4 inches and at more than 2 feet from the pipe a maximum thickness before compaction shall be 9 inches. Unless otherwise specified, the initial backfill shall be compacted to a density equivalent to that of the adjacent fill or foundation materials.

The water content of cohesive backfill material shall be such that, kneaded in the hand, the soil will form a ball which does not readily separate. For non-cohesive sand and gravel backfill material, water content is not a concern for thin lifts.

7. SPECIAL SPECIFICATIONS

All OSHA safety regulations shall be observed for the installation of deep pipe.

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-46 TILE DRAINS FOR LAND DRAINAGE

1. SCOPE

The work shall consist of furnishing and installing drainage tubing and tile and the necessary fittings and appurtenances.

2. MATERIALS

Concrete drain tile shall conform to the requirements of ASTM C 412 and clay drain tile shall conform to the requirements of ASTM C 4. Corrugated polyethylene tubing and fittings shall conform to ASTM F 405 or F 667, as appropriate. Perforated tubing shall have a water inlet area of at least 1 square inch per foot, provided by perforations spaced uniformly along the long axis of the tubing. The perforations shall be circular or slots. Circular perforations shall not exceed 3/16 inch in diameter. Slots shall not be more than 1/8 inch wide.

3. EXCAVATION

Unless otherwise specified, excavation for and subsequent installation of each drain line shall begin at the outlet end and progress upstream. The trench or excavation for the tile shall be constructed to the line, depths, cross sections, and grade shown on the drawings or as directed by CWA. Trench shields, shoring and bracing, or other methods, necessary to safeguard the workers and work, and to prevent damage to the existing improvements shall be furnished, placed, and subsequently removed by the contractor.

4. PREPARING THE BEDDING

Unless otherwise specified, no filter or envelope is required. In stable soils the bottom of the trench shall be shaped to form a semicircular, trapezoidal, or 90 degree "V" groove in its center. The groove shall be shaped to fit the size of tile.
If the bottom of the trench does not provide a sufficiently stable or firm foundation for the drain tile, a sand-gravel mix or other approved materials shall be used to stabilize the bottom of the trench. Drain tile shall not be laid on a rock foundation. In the event that boulders, rock or ledge rock or cemented materials that prevent satisfactory bedding are encountered at the required grade, the trench shall be excavated to a depth of at least 6 inches below grade and backfilled to grade with a sand-gravel mixture or other approved material.

5. FILTER OR ENVELOPE MATERIAL

When a filter is specified, the shape of the bottom of the trench, gradation and the thickness of the filter or envelope material to be placed around the tile will be as shown on the drawings. The envelope or filter material shall be placed in the bottom of the trench just prior to the laying of the tile. The tile shall then be laid and the envelope or filter material placed over the tile.

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6. PLACEMENT AND JOINT CONNECTIONS

All drains shall be laid to grade. Joints between lateral drain tile shall vary with soil type as follows:

a. Peat and muck - 1/4 inch preferred, 3/8 inch maximum
b. Clay - 1/8 inch preferred, 1/4 inch maximum
c. Silt and loam - 1/16 inch preferred, 1/8 inch maximum

d. Sand - tightest possible fit.

Joint between main drain tile which serve only to collect and transport drainage water from lateral tile lines should be the tightest fit possible. Where the joint width exceeds the maximum above, the joint shall be covered with a permanent type material such as coal tar pitch treated roofing paper, fiber glass sheet or mat, or plastic sheet. After placement and blinding of plastic tubing, but prior to backfilling, sufficient time shall elapse to allow the tubing to reach the ambient temperature of the trench. All split fittings shall be securely tied with nylon cord before backfill is placed.

7. CONNECTIONS

Lateral connections will be made with manufactured appurtenances (wyes, tees, etc.) comparable in strength and durability with the specified tile or tubing unless otherwise shown on the drawings. Existing tile lines not shown on the drawings but encountered during installation shall be bridged across the trench or connected into the new line, as directed.

8. BLINDING

After the tubing or tile is placed in the excavated groove, friable material from the sides of the trench shall be placed around the tubing, completely filling the trench to a depth of not less than three inches over the top of the tubing. For material to be suitable it must not contain hard clods, rocks, frozen soil, or fine material which will cause a silting hazard to the drain. Tubing placed during any one day shall be blinded by the end of the day's work.

9. BACKFILLING

The backfilling of the trench shall be completed as rapidly as consistent with the soil conditions. Automatic backfilling machines may be used. Backfill shall extend above the ground surface and be well rounded over the trench.

10. SPECIAL SPECIFICATIONS

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-27 DIVERSION

1. SCOPE

The work shall consist of constructing diversions at locations shown on the drawings or as staked in the field.

2. MATERIAL

The earth material used in constructing earthfill portions of the diversion shall be obtained from the diversion channel, designated borrow areas, or other approved sources.

3. FOUNDATION PREPARATION

The base area of the ridge sections shall be stripped of unsuitable material and scarified prior to placing fill.

4. PLACEMENT

Fill material shall contain no frozen particles, rocks greater than 6" in diameter, sod, brush, or other unsuitable material. The earthfill materials used to construct the diversion shall be compacted by routing the hauling and spreading equipment over the fill in such a manner that the entire surface of the fill will be traversed by not less that one tread track of the loaded equipment. The completed diversion shall conform to the cross-section shown on the drawings. When an excess of earth material results from cutting the diversion to the cross-section and grade, it shall be deposited adjacent to the diversion at locations approved by CWA. The final alignment of diversions shall be determined in the field by CWA before construction.
Diversions shall be constructed in a manner so as to have complete and positive drainage of the channel. Diversions shall have a non-erosive natural outlet or shall be shaped to have a satisfactory transition to the inlets as shown on the drawings.
The moisture content of the fill material shall be such that a ball, formed with the hands, does not crack or separate when struck sharply with a pencil and will easily ribbon out between the thumb and finger.

5. SPECIAL SPECIFICATIONS

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

Construction Specification 6 - Seeding, Sprigging and Mulching

1. Scope

The work consists of preparing the area for treatment; furnishing and placing seed, sprigs, mulch, fertilizer, inoculant, lime, and other soil amendments; and anchoring mulch in designated areas as specified.

2. Material

Seed—All seed shall conform to the current rules and regulations of the state where it is being used and shall be from the latest crop available. It shall meet or exceed the standard for purity and germination listed in section 7.

Seed shall be labeled in accordance with the state laws and the U.S. Department of Agriculture rules and regulations under the Federal Seed Act in effect on the date of invitations for bids. Bag tag figures are evidence of purity and germination. No seed will be accepted with a test date of more than 9 months before the delivery date to the site.

Seed that has become wet, moldy, or otherwise damaged in transit or storage will not be accepted. The percent of noxious weed seed allowable shall be as defined in the current State laws relating to agricultural seeds. Each type of seed shall be delivered in separate sealed containers and fully tagged unless exception is granted in writing by the contracting officer.

Fertilizer—Unless otherwise specified, the fertilizer shall be a commercial grade fertilizer. It shall meet the standard for grade and quality specified by State law. Where fertilizer is furnished from bulk storage, the contractor shall furnish a supplier's certification of analysis and weight. When required by the contract, a representative sample of the fertilizer shall be furnished to the contracting officer for chemical analysis.

Inoculants—The inoculant for treating legume seeds shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species and shall not be used later than the date indicated on the container or as otherwise specified. A mixing medium, as recommended by the manufacturer, shall be used to bond the inoculant to the seed. Two times the amount of the inoculant recommended by the manufacturer shall be used except four times the amount shall be used when seed is applied using a hydraulic seeder. Seed shall be sown within 24 hours of treatment and shall not remain in the hydraulic seeder longer than 4 hours.

Lime and other soil amendments—Lime shall consist of standard ground agriculture limestone, or approved equivalent. Standard ground agriculture limestone is defined as ground limestone meeting current requirements of the State Department of Agriculture. Other soil amendments shall meet quality criteria and application requirements specified in section 7.

Mulch tackifiers—Asphalt emulsion tackifiers shall conform to the requirements of ASTM D 977, Specification for Emulsified Asphalt. The emulsified asphalt may be rapid setting, medium setting, or slow setting. Nonasphaltic tackifiers required because of environmental considerations shall be as specified in section 7.

Straw mulch material—Straw mulch shall consist of wheat, barley, oat or rye straw, hay, grass cut from native grasses, or other plants as specified in section 7. The mulch material shall be air-dry, reasonably light in color, and shall not be musty, moldy, caked, or otherwise of low quality. The use of mulch that contains noxious weeds is not permitted. The contractor shall provide a method satisfactory to the contracting officer for determining weight of mulch furnished.

Other mulch materials—Mulching materials, such as wood cellulose fiber mulch, mulch tackifiers, synthetic fiber mulch, netting, and mesh, are other mulching materials that may be required for specialized locations and conditions. These materials, when specified, must be accompanied by the manufacturer's recommendations for methods of application.

3. Seeding mixtures, sod, sprigs, and dates of planting
The application rate per acre for seed mixtures, sprigs or sod and date of seeding or planting shall be as shown on the plans or as specified in section 7.

4. Seedbed preparation and treatment
Areas to be treated shall be dressed to a smooth, firm surface. On sites where equipment can operate on slopes safely, the seedbed shall be adequately loosened (4 to 6 inches deep) and smoothed. Depending on soil and moisture conditions, disking or cultipacking, or both, may be necessary to properly prepare a seedbed. Where equipment cannot operate safely, the seedbed shall be prepared by hand methods by scarifying to provide a roughened soil surface so that broadcast seed will remain in place.

If seeding is to be accomplished immediately following construction operations, seedbed preparation may not be required except on a compacted, polished, or freshly cut soil surface.

Rocks larger than 6 inches in diameter, trash, weeds and other debris that will interfere with seeding or maintenance operations shall be removed or disposed of as specified in section 7.

Seedbed preparation shall be discontinued when soil moisture conditions are not suitable for the preparation of a satisfactory seedbed as determined by the contracting officer's technical representative (COTR).

5. Seeding, sprigging, fertilizing, mulching, and stabilizing
All seeding or sprigging operations shall be performed in such a manner that the seed or sprigs are applied in the specified quantities uniformly in the designated areas. The method and rate of seed application shall be as specified in section 7. Unless otherwise specified, seeding or sprigging shall be accomplished within 2 days after final grading is completed and approved.

Fertilizer, lime, and other soil amendments shall be applied as specified in section 7. When specified, the fertilizer and soil amendments shall be thoroughly incorporated into the soil immediately following surface application.

The rate, amount, and kind of mulching or mesh shall be as specified in section 7. Mulches shall be applied uniformly to the designated areas. They shall be applied to areas seeded not later than 2 working days after seeding has been performed. Straw mulch material shall be stabilized within 24 hours of application using a mulch crimper or equivalent anchoring tool or by a suitable tackifier. When the mulch crimper or equivalent anchoring tool is used, it shall have straight blades and be the type manufactured expressly for and capable of firmly punching the mulch into the soil. Where the equipment can be safely operated, it shall be operated on the contour. Hand methods shall be used where equipment cannot safely operate to perform the work required.

The tackifier shall be applied uniformly over the mulch material at the specified rate, or it shall be injected into the mulch material as it is being applied. Mesh or netting stabilizing materials shall be applied smoothly, but loosely on the designated areas. The edges of these materials shall be buried or securely anchored using spikes or staples as specified in section 7.

The contractor shall maintain the mesh or netting areas until all work under the contract has been completed and accepted. Maintenance shall consist of the repair of areas damaged by water erosion, wind, fire, or other causes. Such areas shall be repaired to reestablish the intended condition and to the design lines and grades required by the contract. The areas shall be refertilized, reseeded, and remulched before the new application of the mesh or netting.

Curry-Wille & Associates Consulting Engineers, P.C.
Adapted from NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

IA-5 EROSION CONTROL

1. SCOPE

The work shall consist of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water during construction operations.

2. MATERIALS

All materials furnished shall meet the requirements shown on the drawings or in the specifications.

3. EROSION AND SEDIMENT CONTROL MEASURES AND WORKS

The measures and works shall include, but are not limited to, the following:

Staging of Earthwork Activities: The excavation and moving of soil materials shall be scheduled so that areas unprotected from erosion will be minimized. These areas will be unprotected for the shortest time feasible.

Seeding: Structures and disturbed areas shall be seeded as soon as possible after construction is completed.

Temporary seedings may be used as an alternative to other stabilization measures as approved by CWA.

Mulching: Construction areas that have been disturbed but have no construction activity scheduled for 21 days or more shall have erosion protection measures applied by the 14th day. This erosion protection may be mulching or other approved temporary measures. Construction areas left open during a winter shutdown period shall be protected by mulching.

The following works may be temporary. If they are installed as a temporary measure, they shall be removed and the area restored to its original state when they are no longer needed or when permanent measures are installed.

Diversions: Diversions may be required to divert clean runoff water away from work areas and to collect runoff from work areas for treatment and safe disposition.

Stream Crossings: Culverts or bridges may be required where construction equipment must cross streams.

Sediment Basins: Sediment basins may be required to settle and filter out sediment from eroding areas to protect properties and streams below the construction site.

Sediment Filters: Straw bale filters, geotextile sediment fences, or other equivalent methods may be used to trap sediment from areas of limited runoff. Sediment filters shall be properly anchored to prevent erosion under them

Waterways: Waterways may be required for the safe removal of runoff from fields, diversions, and other structures or measures.

4. CHEMICAL POLLUTION

The Contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to be used to dispose of chemical pollutants, such as drained lubricating or transmission oils, greases, soaps, concrete mixer wash water, asphalt, etc., produced as a by-product of the construction work. At the completion of the construction work, sumps shall be removed and the area restored without causing pollution.

Sanitary facilities such as chemical toilets or septic tanks shall not be placed adjacent to live streams, wells, or springs. They shall be located at a distance sufficient to prevent contamination of any water sources. At the completion of construction work, facilities shall be disposed of without causing pollution.

5. AIR POLLUTION

The burning of brush or trash or disposal of other materials shall adhere to local and state regulations.

Fire prevention measures shall be taken to prevent the start or the spreading of wild fires, which result from project work. Fire breaks or guards shall be constructed at locations shown on the drawings.

All public access or haul roads used by the contractor during construction of the project shall be sprinkled or otherwise treated to fully suppress dust as required by CWA. All dust control methods shall insure safe operations at all times. If chemical dust suppressants are used, the material shall be a commercially available product specifically designed for dust suppression and the application shall follow manufacturer's requirements and recommendations. A copy of the product data sheet and manufacturer's recommended application procedures shall be provided to the Engineer five working days before use.

6. MAINTENANCE, REMOVAL, AND RESTORATION

All pollution control measures and works shall be adequately maintained in a functional condition as long as needed during the construction operation. All temporary measures shall be removed and the site restored to as near original conditions as practical.

APPENDIX A- COMPUTATIONS

Computation Sheets

Moran Beef Feedlot Runoff Calculations (Based on TR-55 spreadsheets in next section)

East System

Feedlot Area

	Earthen:	156,280 ft2
	Concrete/Roof	6,600 ft2
	Other	74,880 ft2
Total Area:		237,760 ft2

Hydrology

CN-	Earthen	90
	Concrete	97
	Other	71
TR-55	25 yr, 24 hr storm	5.3 in
	10 yr, 1 hr storm	2.6 in

25 yr, 24 hr RO volumes

Concrete	2,720 ft3
Earthen lot	54,257 ft3
Other	14,638 ft3
Total	71,615 ft3

HOLDING BASIN CALCULATIONS

Assume System 2- July/Nov pumping

Required storage:

8 in. from earthen lot	156280 x 8/12=	104,187 ft3
12 in. from concrete/roof	6600 x 12/12=	6,600 ft3
Other-(25 yr-24 hr volume)	=	14,638 ft3
		125,425

Total Required Minimum	**125,425 ft3**
Calculated Actual Volume	**129,300 ft3**

West System (Including west ss basin, south ss basin and feed storage)

West Solids Settling

Earthen lot	102624 ft2 x 8/12=	68,450 ft3
Concrete/Roof	13600 ft2 x 12/12=	13,600 ft3
Other (25 yr-24hr)	1135600 ft2 =	22,442 ft3

South Solids Settling

Earthen lot	43374 ft2 x 8/12=	28,916 ft3
Concrete/Roof	22650 ft2 x12/12=	21,650 ft3
Other (25yr-24hr)	30,592 ft2 =	5,660 ft3

Bedding Storage			
Other(25 yr-24 hr)	38400 ft2	=	10,716
Total Required Storage		**=**	**171,436 ft3**
Total Available		**=**	**258,688 ft3**

Hydrology

CN-	Earthen lot	90
	Earthen feed storage	82
	Concrete/Roof	97
	Other cropland	71

TR-55	25 yr, 24 hr storm	5.3 in
	10 yr, 1 hr storm	2.6 in

25 yr, 24 hr RO volumes

Concrete	14,530 ft3
Earthen lot	50,688 ft3
Earthen feed storage	10,716 ft3
Other cropland	28,187 ft3
Total	104,121 ft3

Sediment Basin Design Worksheet >100 AU

Producer:	Martin Feedlot #2	Date:	April 16, 2010
County:	Pottawatomie	Legal Description:	East Settling Basin Design
Designed By:	SWM	Checked By:	
CWA Project no.	10-1754		

Section I: (Non excluded roof areas may be included with concrete)

Concrete Area, ft^2	6,600	97 CN	10-yr/1hr storm event:	2.6 in.
Earthen Area, ft^2	156,280	90 CN		
Other Area, ft^2	74,880	71 CN	25yr/24hr storm event:	5.3 in.
Total Area, ft^2	237,760			

Section II:

1. Solid Manure Runoff into Settling Basin

0.6in. of runoff depth

3.6 per month

71,328 C.F. of runoff into basin

2. Storm Volume (10yr/1hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	2.26 in.	Concrete	622 C.F.	
Earthen	1.62 in.	Earthen	10,552 C.F.	
Other	0.54 in.	Other	1,691 C.F.	12,865 C.F.

3. Emergency Storm Volume (25yr/24hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	4.95 in.	Concrete	2,720 C.F.	
Earthen	4.17 in.	Earthen	54,257 C.F.	
Other	2.35 in.	Other	14,638 C.F.	71,615 C.F.

4. Required storage volume if 25yr/24hr storm runoff is stored within sedimentation basin

155,809 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

5. Required storage volume without storing the 25yr/24hr storm event

84,193 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

Section III:

The emergency spillway may be sized using the charts provided on the standard drawings for sediment basins and filter fences. If the size of the feedlot is smaller than 15,000 ft^2, use a minimum flow depth of 0.5 ft and minimum channel width of 5 ft.

Section IV:

Once the size of the basin has been established, make sure there is at least 450 ft^2 surface area of basin per cfs from a 10yr/1hr storm event.

Area of basin: 65,472 ft^2

10yr/1hr flow: 9.90 cfs (using equation 16.9, Nat'l Engr. Handbook, Section 4)

6,616 ft^2/cfs > 450 ft^2/cfs

Sedimentation Basin meets the requirements of Section IV

Sediment Basin Design Worksheet >100 AU

Producer:	Moran Feedlot #2	Date:	September 7, 2010
County:	Pottawattamie	Legal Description:	West Settling Basin Design
Designed By:	SWM	Checked By:	
CWA Project no.	10-1754		

Section I: (Non excluded roof areas may be included with concrete)

Concrete Area, ft^2	13,600	97 CN	10-yr/1hr storm event:	2.6 in.
Earthen Area, ft^2	102,624	90 CN		
Other Area, ft^2	113,600	71 CN	25yr/24hr storm event:	5.3 in.
Total Area, ft^2	229,824			

Section II:

1. Solid Manure Runoff into Settling Basin

0.6in. of runoff depth per month-

3.6 unpaved

68,947 C.F. of runoff into basin

2. Storm Volume (10yr/1hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	2.26 in.	Concrete	1,282 C.F.	
Earthen	1.62 in.	Earthen	6,929 C.F.	
Other	0.54 in.	Other	2,565 C.F.	10,776 C.F.

3. Emergency Storm Volume (25yr/24hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	4.95 in.	Concrete	5,606 C.F.	
Earthen	4.17 in.	Earthen	35,629 C.F.	
Other	2.35 in.	Other	22,207 C.F.	63,442 C.F.

4. Required storage volume if 25yr/24hr storm runoff is stored within sedimentation basin

143,165 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

5. Required storage volume without storing the 25yr/24hr storm event

79,723 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

Section III:

The emergency spillway may be sized using the charts provided on the standard drawings for sediment basins and filter fences. If the size of the feedlot is smaller than 15,000 ft^2, use a minimum flow depth of 0.5 ft and minimum channel width of 5 ft.

Section IV:

Once the size of the basin has been established, make sure there is at least 450 ft^2 surface area of basin per cfs from a 10yr/1hr storm event.

Area of basin: 65,472 ft^2

10yr/1hr flow: 8.29 cfs (using equation 16.9, Nat'l Engr. Handbook, Section 4)

7,898 ft^2/cfs > 450 ft^2/cfs

Sedimentation Basin meets the requirements of Section IV

Sediment Basin Design Worksheet >100 AU

Producer:	Moran Feedlot #2	Date:	April 19, 2010
County:	Pottawattamie	Legal Description:	South Settling Basin Design
Designed By:	SWM	Checked By:	
CWA Project no.	10-1754		

Section I: (Non excluded roof areas may be included with concrete)

Concrete Area, ft^2	21,650	97 CN	10-yr/1hr storm event:	2.6 in.
Earthen Area, ft^2	43,374	90 CN		
Other Area, ft^2	30,592	71 CN	25yr/24hr storm event:	5.3 in.
Total Area, ft^2	95,616			

Section II:

1. Solid Manure Runoff into Settling Basin

0.6in. of runoff depth

3.6 per month — 28,685 C.F. of runoff into basin

2. Storm Volume (10yr/1hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	2.26 in.	Concrete	2,041 C.F.	
Earthen	1.62 in.	Earthen	2,929 C.F.	
Other	0.54 in.	Other	691 C.F.	5,660 C.F.

3. Emergency Storm Volume (25yr/24hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	4.95 in.	Concrete	8,924 C.F.	
Earthen	4.17 in.	Earthen	15,059 C.F.	
Other	2.35 in.	Other	5,980 C.F.	29,962 C.F.

4. Required storage volume if 25yr/24hr storm runoff is stored within sedimentation basin

64,308 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

5. Required storage volume without storing the 25yr/24hr storm event

34,345 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

Section III:

The emergency spillway may be sized using the charts provided on the standard drawings for sediment basins and filter fences. If the size of the feedlot is smaller than 15,000 ft^2, use a minimum flow depth of 0.5 ft and minimum channel width of 5 ft.

Section IV:

Once the size of the basin has been established, make sure there is at least 450 ft^2 surface area of basin per cfs from a 10yr/1hr storm event

Area of basin: 65,472 ft^2

10yr/1hr flow: 4.35 cfs (using equation 16.9, Nat'l Engr. Handbook, Section 4)

15,037 ft^2/cfs > 450 ft^2/cfs

Sedimentation Basin meets the requirements of Section IV

Sediment Basin Design Worksheet >100 AU

Producer: Moran Feedlot #2
County: Pottawattamie
Designed By: SWM
CWA Project no. 18-1754

Date: April 16, 2018
Legal Description: Bedding Storage Area/West Basin Calc
Checked By:

Section I: (Non excluded roof areas may be included with concrete)

Concrete Area, ft^2		97 CN	10-yr/1hr storm event:	2.6 in.
Earthen Area, ft^2		90 CN		
Other Area, ft^2	38,400	82 CN	25yr/24hr storm event:	5.3 in.
Total Area, ft^2	38,400			

Section II:

1. Solid Manure Runoff into Settling Basin
   0.6in. of runoff depth
   0 per month
   \- C.F. of runoff into basin

2. Storm Volume (10yr/1hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	2.26 in.	Concrete	-	
Earthen	1.62 in.	Earthen	-	
Other	1.07 in.	Other	1,715 C.F.	1,715 C.F.

3. Emergency Storm Volume (25yr/24hr Storm Event)

Runoff Depth		Runoff Volume		Total
Concrete	4.95 in.	Concrete	-	
Earthen	4.17 in.	Earthen	-	
Other	3.35 in.	Other	10,716 C.F.	10,716 C.F.

4. Required storage volume if 25yr/24hr storm runoff is stored within sedimentation basin
   12,431 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

5. Required storage volume without storing the 25yr/24hr storm event
   1,715 C.F. (Solids, Concrete, Earthen, & Other Runoff from 10 yr & 25 yr storm)

Section III:

The emergency spillway may be sized using the charts provided on the standard drawings for sediment basins and filter fences. If the size of the feedlot is smaller than 15,000 ft^2, use a minimum flow depth of 0.5 ft and minimum channel width of 5 ft.

Section IV:

Once the size of the basin has been established, make sure there is at least 450 ft^2 surface area of basin per cfs from a 10yr/1hr storm event.

Area of basin: 65,472 ft^2
10yr/1hr flow: 1.32 cfs (using equation 16.9, Nat'l Engr. Handbook, Section 4)

49,622 ft^2/cfs > 450 ft^2/cfs

Sedimentation Basin meets the requirements of Section IV

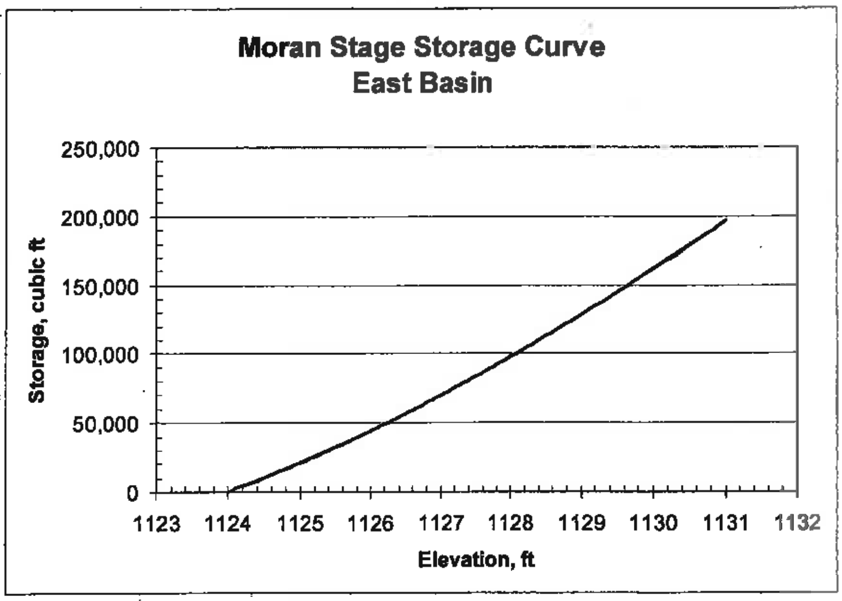
EAST BASIN STORAGE CALCULATIONS

Producer: Frank Moran
County:
Designed By:
CWA Project no. 10-1754

Date:
Legal Description: East Basin
Checked By: SWM

Map Scale: 1 inch = 80 ft
1 in^2 = 6400 ft^2

Elevation ft	Map Area in^2	Actual Area ft^2	ΔH ft^2	Storage ft^3	Cumulative ft^3
1124	3.28	20,992		0	0
1126	3.71	23,744	2	44,736	44,736
1128	4.59	29,376	2	53,120	97,856
1130	5.26	33,664	2	63,040	160,896
1131	6.04	38,656	1	36,160	197,056



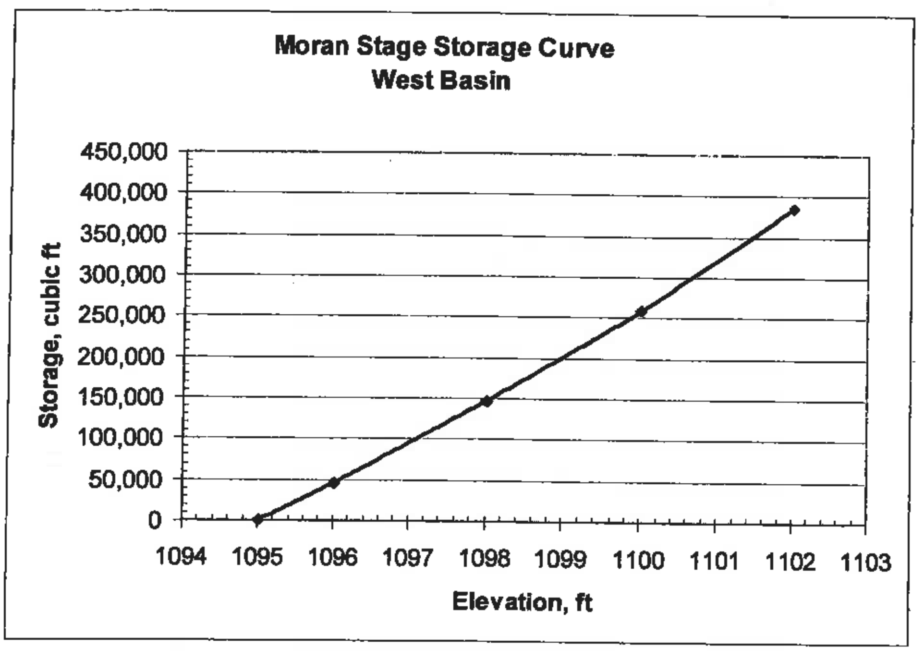
41B

WEST BASIN STORAGE CALCULATIONS

Producer:	Frank Moran	Date:	
County:		Legal Description:	West Basin
Designed By:		Checked By:	SWM
CWA Project no.	10-1754		

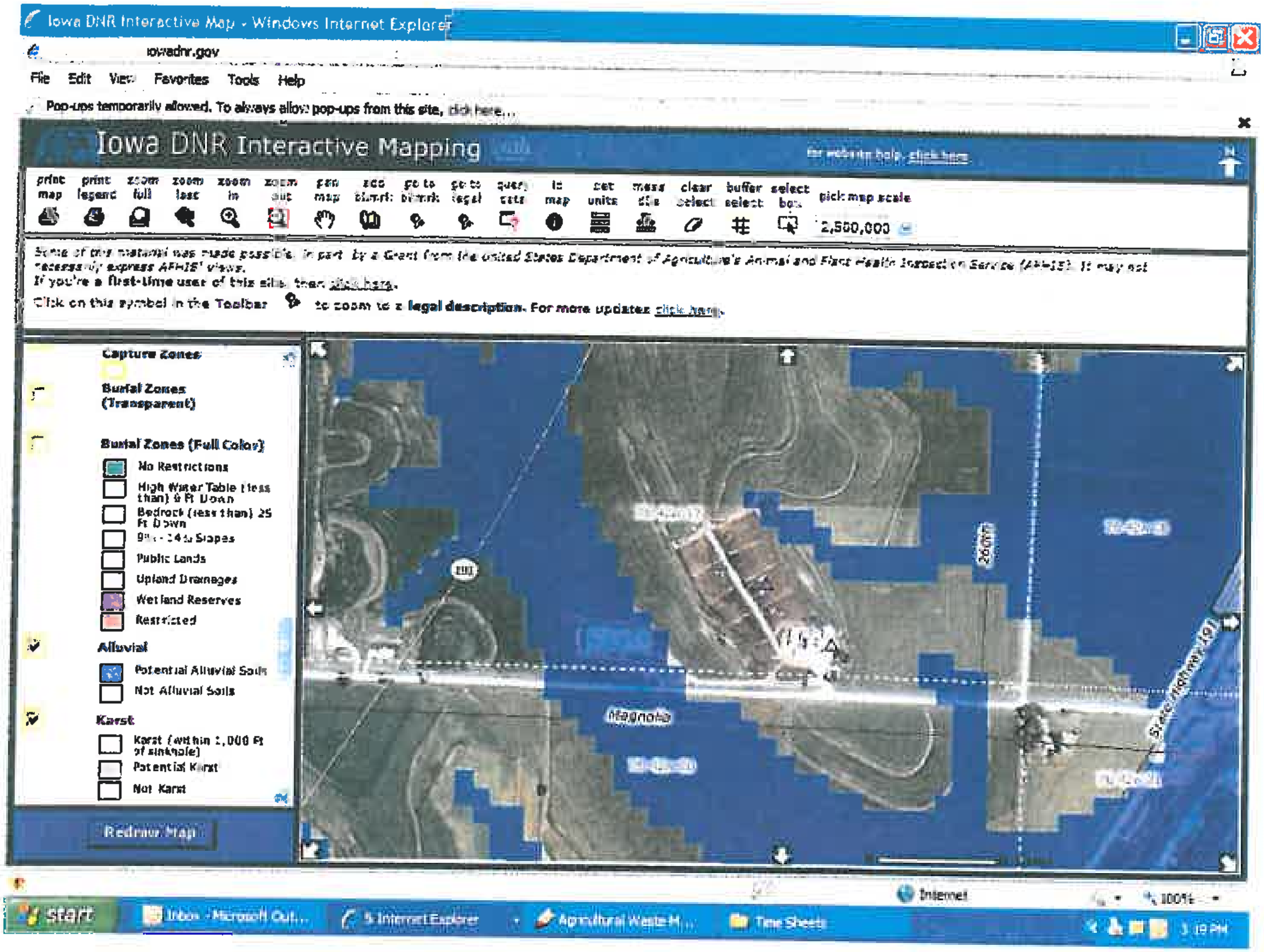
Map Scale: 1 inch = 80 ft
1 in^2 = 6400 ft^2

Elevation ft	Map Area in^2	Actual Area ft^2	ΔH ft^2	Storage ft^3	Cumulative ft^3
1095	6.94	44,416		0	0
1096	7.38	47,232	1	45,824	45,824
1098	8.29	53,056	2	100,288	146,112
1100	9.30	59,520	2	112,576	258,688
1102	10.42	66,688	2	126,208	384,896



41A

APPENDIX B- SITING REQUIREMENTS


Iowa DNR Interactive Map - Windows Internet Explorer
iowadnr.gov
File Edit View Favorites Tools Help
Pop-ups temporarily allowed. To always allow pop-ups from this site, click here...
Iowa DNR Interactive Mapping
print map
print legend
zoom full
zoom last
zoom in
zoom out
pan map
pick map scale
2,500,000
If you're a first-time user of this site, then click here.
to zoom to a legal description. For more updates click here.
Capture Zones
Burial Zones (Transparent)
Burial Zones (Full Color)
No Restrictions
Public Lands
Upland Drainages
Wetland Reserves
Restricted
Alluvial
Potential Alluvial Soils
Not Alluvial Soils
Karst
Potential Karst
Not Karst
Redraw Map
Magnolia
Internet
start

The location of the west effluent holding basin is within the potential alluvial soils area, but not in the 100 year flood plain. This position is in an upland position nearly 50 ft above the Mosquito Creek flood plain. Therefore, the construction will be above the 100yr flood plain elevation.

Groundwater:

The only driller's log record for Sec. 17, T 76N, R 42W , is shown on the next page. The wells at feedlot site are all over 60 ft deep and are considered deep wells, similar to the one with the record.

Iowa Department of Natural Resources Geological Survey Bureau
109 Trowbridge Hall Iowa City, Ia. 52242-1319 PH (319) 335-1575

WELL RECORD 45612 Permit No. 78-97-

Site Identification

Property Owner: Hedegaard Glen Well Number: [illegible]

Address:

Tenant:

Well Depth: 217 ft Date Completed: 9/ / 22 / 97

Location County: POTTAWATTAMIE

____ mi. N/S and ____ mi. E/W of intersection of ____ and ____

____ 1/4 of the ____ 1/4 of the ____ 1/4 of Sec 17 TWP 76 RNG 42 E (W)

Show exact location of well in section grid with a dot (●).

Sketch map of well location on property

N / W / E / S — 1 mile — 200 ft

☐ upland ☐ hillside ☐ valley Elevation (if known) ____

Formation log

From	To	Color	Hardness	Formation description
0	60'	LT BROWN		CLAY
60	175	LT GRAY		CLAY
175	180	YELLOW		FINE SAND
180	190	YELLOW		MEDIUM SAND
190	215	YELLOW		COARSE SAND
215	230	YELLOW & GRAY SHALE		

use additional sheets as needed

Remarks (including depth of lost drilling fluids, materials, or tools)

Well use

☐ Domestic ☐ Municipal ☐ Industrial
☐ Livestock ☐ Public Supply ☐ Monitoring
☒ Test Well ☐ Irrigation ☐ Other ____ (explain)

Drill method ☒ rotary ☐ auger ☐ cable other ____

Hole size

[illegible] inch from 0 ft to ____ ft

8.75 inch from 0 ft to 217 ft

hole size continued: ____ inch from ____ ft to ____ ft; ____ inch from ____ ft to ____ ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing Drive shoe (yes/no) Pitless adaptor (yes/no) ?

Size (ID/OD)	Type/Wt	Depth top	Depth bottom	Amount (length)
4" ID	Sch-40	+1'	205'	206'

Perforated or slotted casing? (yes/no)

Perforated/slotted from ____ ft to ____ ft

Perforated/slotted from ____ ft to ____ ft

Casing grouted? (yes/no)

Type	Depth Top	Depth Bottom	Amount
BENTONITE	8'	18'	

Well screen? (yes/no)

Diameter	Slot size	Depth Top	Depth Bottom	Length	Material
4"	.018	205	215'	10'	PVC

Bottom capped (yes/no) with SCH40 PVC 4"

Seals/Packers (yes/no) kind ____ depth ____ ft

Gravel packed (yes/no) from 18' ft to 217' ft

type REDIMIX amount 6000 LBS

Well developed? (yes/no)

Explain: BAILED FOR 1 HR, PUMPED W/185 CFM OF AIR 2 HOURS @ 25 - 30 GPM

Pump installed? (yes/no) Date 10 / 24 / 97

Installer's name: Jim Gurney

Type of pump: 1 1/2 hp Depth to intake: 217 ft

Pump diameter: 4" Rated capacity: 12 GPM

Water information Aquifer: ☐ sand/gravel ☐ limestone ☐ sandstone

Main water-supply zone from 185 ft to 210 ft

Final water level (static water level) 173 ft (below/above) GL

Pumping water level 173 ft below GL; ☐ tape ☐ airline ☐ E-line

At yield of 12 GPM; ☐ orifice ☐ volumetric ☐ estimate Date 10-24-97

Water quality test? (yes/no) Date tested 9 / 23 / 97

Tested by: MidWest Labs

Test results: Nitrate 5.8 mg/L

Contractor: JENSEN WELL CO., INC

Address: 767 IOWA, BLAIR NE Jim Gurney

Driller: Jensen Well J. WARRICK 40081 Certification no. 40243

white copy - Iowa DNR, Geological Survey Bureau   blue copy - Well Contractor   pink copy - Customer   yellow copy - County Health Officer

APPENDIX C- GEOTECHNICAL ENGINEERING REPORT

Iowa DNR 305(b) Water Quality Assessment Database

Mosquito Creek

2008 Water Quality Assessment: Assessment results from 2004 through 2006

Release Status: Final

Segment Summary

Waterbody ID Code: IA 06-WED-0020_3
Location: from confluence with Little Mosquito Cr. S29, T75N, R43W, Pottawattamie Co.) to confluence with Spring Cr. in S9, T78N, R41W, Harrison Co.
Waterbody Type: River
Segment Size: 27.7 Miles
Segment Classes: Class A1 Class B(WW-2)

Assessment Comments

Assessment is based on results of 2004 IDNR/UHL biological REMAP monitoring: FIBI = 8 (poor). FIBI BIC = 31.

Assessment Summary and Beneficial Use Support

Overall Use Support - Not supporting
Aquatic Life Support - Not supporting
Primary Contact Recreation - Not assessed

Assessment Type: Monitored
Integrated Report Category: 5b

Basis for Assessment and Comments

[Note: Prior to the current (2008) Section 305(b) cycle, this stream segment was designated only for Class B(LR) aquatic life uses. Due to changes in Iowa's surface water classification that were approved by U.S. EPA in February 2008 (see http://www.iowadnr.com/water/standards/files/06mar_swc.pdf), this segment is now presumptively designated for Class A1 (primary contact recreation) uses. The stream remains designated for aquatic life uses (now termed Class B(WW2) aquatic life uses). Thus, for the current (2008) assessment, the available water quality monitoring data will be compared to the applicable Class A1 and Class B(WW2) water quality criteria.]

SUMMARY: The presumptive Class A1 (primary contact recreation) uses are "not assessed" due to the lack of information upon which to base an assessment. The Class B(WW2) aquatic life uses are assessed (monitored) as "not supported" based on results of one IDNR/UHL biological REMAP sampling location.

EXPLANATION: This assessment was based on data collected in 2004 as part of the DNR/UHL stream REMAP project. A series of biological metrics which reflect stream water quality and habitat integrity were calculated from the biocriteria sampling data. The biological metrics are based on the numbers and types of fish species that were collected in the stream sampling reach. The biological metrics were combined to make a fish community index of biotic integrity (F-IBI) and the index ranks the biological integrity of a stream sampling reach on a rising scale from 0 (minimum) to 100 (maximum). The 2004 REMAP FIBI score was 8 (poor) and the BMIBI score could not be calculated. The aquatic life use support was assessed as not supporting (=NS) based on a comparison of the FIBI score with biological impairment criteria (BIC) established for previous Section 305(b) reports. The biological impairment criteria were determined from a statistical analysis of data collected at stream ecoregion reference sites from 1994-2004. The FIBI BIC for this ecoregion is 31.

Monitoring and Methods

Assessment Key Dates

10/6/2004 Biological Monitoring

Methods

- Fish surveys
- Quan. measurements of instream parms-- channel morphology-- floodplain-- 1-2 seasons-- by prof
- Non-fixed station physical/chemical monitoring (conventional pollutant only)
- Regional reference site approach

Causes and Sources of Impairment

Causes	Use Support	Cause Magnitude	Sources	Source Magnitude
Other habitat alterations	Aquatic Life Support	High	Agriculture Hydromodification Channelization	Moderate High High
Organic enrichment/Low DO	Aquatic Life Support	Moderate	Municipal Point Sources Agriculture	Moderate Moderate

Iowa DNR 305(b) Water Quality Assessment Database

Mosquito Creek

IA 06-WED-0020_3

Segment Description:	from L. Mosquito Cr. to Spring Cr. near Persia, Harrison Co.
Location Description:	from confluence with Little Mosquito Cr. S29, T75N, R43W, Pottawattamie Co.) to confluence with Spring Cr. in S9, T78N, R41W, Harrison Co.
Segment Size:	27.7 Miles
HUC8:	10230006
Current Designated Uses:	Aquatic Life Primary Contact (Recreation)
Current Designated Use Classes:	Class A1 Class B(WW-2)
Portions of this segment are located within the following counties:	Harrison Pottawattamie

This segment is currently on the 303(d) Impaired waters list for the following:

Cycle Listed: 2004
Listing Status: Final
IR Category: 5b
Impaired Use: Aquatic Life
Cause/Stressor: Biological
TMDL Priority: Low
Biological Stressors potentially include:
Habitat Modification
Low DO
Organic Enrichment
Listing Rationale: Low biotic index
Data Source: IDNR/UHL biocriteria monitoring, 2000

JURISDICTIONAL DETERMINATION
U.S. Army Corps of Engineers

DISTRICT OFFICE: Rock Island District (MVR) (Schafer)
FILE NUMBER: CEMVR-OD-P-2006-0321 (Moran Beef, Inc.)

PROJECT LOCATION INFORMATION:

State: Iowa
County: Pottawattamie
Center coordinates of site (latitude/longitude): 41.3768 / -95.6986
Approximate size of area (parcel) reviewed, including uplands: 10 acres.
Name of nearest waterway: Unnamed tributary of Mosquito Creek
Name of watershed: Mosquito Creek / Missouri River

JURISDICTIONAL DETERMINATION

Completed: Desktop determination ☒ Date: 4-14-2006
Site visit(s) ☒ Date(s): 4-3-2006

Jurisdictional Determination (JD):

☐ Preliminary JD - Based on available information, ☐ *there appear to be* (or) ☐ *there appear to be no* "waters of the United States" and/or "navigable waters of the United States" on the project site. A preliminary JD is not appealable (Reference 33 CFR part 331).

☒ Approved JD – An approved JD is an appealable action (Reference 33 CFR part 331).
Check all that apply:

☐ *There are* "navigable waters of the United States" (as defined by 33 CFR part 329 and associated guidance) within the reviewed area. Approximate size of jurisdictional area: .

☒ *There are* "waters of the United States" (as defined by 33 CFR part 328 and associated guidance) within the reviewed area. Approximate size of jurisdictional area: 0.1 acre.

☐ *There are "isolated, non-navigable, intra-state* waters or wetlands" within the reviewed area.
☐ Decision supported by SWANCC/Migratory Bird Rule Information Sheet for Determination of No Jurisdiction.

BASIS OF JURISDICTIONAL DETERMINATION:

A. Waters defined under 33 CFR part 329 as "navigable waters of the United States":
☐ The presence of waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

B. Waters defined under 33 CFR part 328.3(a) as "waters of the United States":
☐ (1) The presence of waters, which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
☐ (2) The presence of interstate waters including interstate wetlands[1].
☐ (3) The presence of other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate commerce including any such waters (check all that apply):
☐ (i) which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ (ii) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ (iii) which are or could be used for industrial purposes by industries in interstate commerce.
☐ (4) Impoundments of waters otherwise defined as waters of the US.
☒ (5) The presence of a tributary to a water identified in (1) – (4) above.
☐ (6) The presence of territorial seas.
☐ (7) The presence of wetlands adjacent[2] to other waters of the US, except for those wetlands adjacent to other wetlands.

Rationale for the Basis of Jurisdictional Determination (applies to any boxes checked above). *If the jurisdictional water or wetland is not itself a navigable water of the United States, describe connection(s) to the downstream navigable waters. If B(1) or B(3) is used as the Basis of Jurisdiction, document navigability and/or interstate commerce connection (i.e., discuss site conditions, including why the waterbody is navigable and/or how the destruction of the waterbody could affect interstate or foreign commerce). If B(2, 4, 5 or 6) is used as the Basis of Jurisdiction, document the rationale used to make the determination. If B(7) is used as the Basis of Jurisdiction, document the rationale used to make adjacency determination:* The project site is an unnamed tributary stream of Mosquito Creek which flows to the Missouri River.

Complainant's Ex. No. 13

Lateral Extent of Jurisdiction: (Reference: 33 CFR parts 328 and 329)

☒ Ordinary High Water Mark indicated by:
- ☒ clear, natural line impressed on the bank
- ☒ the presence of litter and debris
- ☒ changes in the character of soil
- ☒ destruction of terrestrial vegetation
- ☒ shelving
- ☐ other:

☒ High Tide Line indicated by:
- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gages
- ☐ other:

☒ Mean High Water Mark indicated by:
☐ survey to available datum; ☒ physical markings; ☒ vegetation lines/changes in vegetation types.

☒ Wetland boundaries, as shown on the attached wetland delineation map and/or in a delineation report prepared by:

Basis For Not Asserting Jurisdiction:

☒ The reviewed area consists entirely of uplands.
☒ Unable to confirm the presence of waters in 33 CFR part 328(a)(1, 2, or 4-7).
☒ Headquarters declined to approve jurisdiction on the basis of 33 CFR part 328.3(a)(3).
☒ The Corps has made a case-specific determination that the following waters present on the site are not Waters of the United States:
- ☐ Waste treatment systems, including treatment ponds or lagoons, pursuant to 33 CFR part 328.3.
- ☐ Artificially irrigated areas, which would revert to upland if the irrigation ceased.
- ☐ Artificial lakes and ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.
- ☐ Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.
- ☐ Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States found at 33 CFR 328.3(a).
- ☐ Isolated, intrastate wetland with no nexus to interstate commerce.
- ☐ Prior converted cropland, as determined by the Natural Resources Conservation Service. Explain rationale:
- ☐ Non-tidal drainage or irrigation ditches excavated on dry land. Explain rationale:
- ☐ Other (explain):

DATA REVIEWED FOR JURSIDICTIONAL DETERMINATION (mark all that apply):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant.
☒ Data sheets prepared/submitted by or on behalf of the applicant.
- ☐ This office concurs with the delineation report, dated , prepared by (company):
- ☐ This office does not concur with the delineation report, dated , prepared by (company):

☒ Data sheets prepared by the Corps.
☒ Corps' navigable waters' studies:
☒ U.S. Geological Survey Hydrologic Atlas:
☒ U.S. Geological Survey 7.5 Minute Topographic maps:
☒ U.S. Geological Survey 7.5 Minute Historic quadrangles:
☒ U.S. Geological Survey 15 Minute Historic quadrangles:
☒ USDA Natural Resources Conservation Service Soil Survey:
☒ National wetlands inventory maps:
☒ State/Local wetland inventory maps:
☒ FEMA/FIRM maps (Map Name & Date):
☒ 100-year Floodplain Elevation is: (NGVD)
☒ Aerial Photographs (Name & Date):
☒ Other photographs (Date):
☒ Advanced Identification Wetland maps:
☒ Site visit/determination conducted on: April 3, 2006
☒ Applicable/supporting case law:
☒ Other information (please specify):

Marlyn W. Schafer

[1]Wetlands are identified and delineated using the methods and criteria established in the Corps Wetland Delineation Manual (87 Manual) (i.e., occurrence of hydrophytic vegetation, hydric soils and wetland hydrology).

[2]The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes, and the like are also adjacent.

UNIVERSITY OF Nebraska Lincoln

High Plains Regional Climate Center
School of Natural Resources

September 22, 2010

Stephen Pollard
United States Environmental Protection Agency
901 North 5th Street
Kansas City, KS 66101

The attached *Quality Controlled NWS COOP Data* for *Underwood, IA* for *January 01, 2009 – June 30, 2010* are true and correct copies of documents filed with the National Climatic Data Center under the authority of the U.S. Government. The undersigned is a custodian of the documents authorized to provide true and correct copies of the documents so filed.

Sincerely,

Natalie Umphlett

Natalie Umphlett, Regional Climatologist
High Plains Regional Climate Center

In witness whereof I have subscribed my name and affixed my seal this 22nd day of September 2010.

Shellie J. Hanneman
(Signed)

GENERAL NOTARY - State of Nebraska
SHELLIE J. HANNEMAN
My Comm. Exp. April 1, 2012
(Seal)

712 Hardin Hall /3310 Holdrege Street/ Lincoln, NE 68583-0997
(402) 472-6764 / FAX (402) 472-2946

Station: UNDERW
State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700
(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
	2009	01	1							0		0		0
	2009	01	2							0		0		0
	2009	01	3							0		0		0
	2009	01	4							0.05		0		0
	2009	01	5							0		0		0
	2009	01	6							0		0		0
	2009	01	7							0		0		0
	2009	01	8							T		T		T
	2009	01	9							0		0		0
	2009	01	10							0.12		2.8		3
	2009	01	11							0		0		3
	2009	01	12							0.15		2.3		5
	2009	01	13							T		T		5
	2009	01	14							T		T		5
	2009	01	15							0		0		5
	2009	01	16							T		T		5
	2009	01	17							0		0		4
	2009	01	18							0		0		4
	2009	01	19							0		0		2
	2009	01	20							0		0		2
	2009	01	21							0		0		1
	2009	01	22							0		0		1
	2009	01	23							0		0		0
	2009	01	24							0		0		0
	2009	01	25							0.11		2.7		3
	2009	01	26							T		T		3
	2009	01	27							T		T		3
	2009	01	28							T		T		3
	2009	01	29							0		0		3
	2009	01	30							0		0		2
	2009	01	31							0		0		2

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							0.43	7.8

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copy of the original data
archived by the HPRCC
Natalie Umphlett

Station: UNDERW

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
	2009	02	1							0		0		0
	2009	02	2							T		T		T
	2009	02	3							0		0		0
	2009	02	4							0		0		0
	2009	02	5							0		0		0
	2009	02	6							0		0		0
	2009	02	7							0		0		0
	2009	02	8							0		0		0
	2009	02	9							T		0		0
	2009	02	10							0.15		0		0
	2009	02	11							0		0		0
	2009	02	12							0		0		0
	2009	02	13							0		0		0
	2009	02	14							0.33		7.3		7
	2009	02	15							0		0		6
	2009	02	16							0		0		5
	2009	02	17							0		0		3
	2009	02	18							0		0		1
	2009	02	19							0		0		T
	2009	02	20							0		0		T
	2009	02	21							0		0		0
	2009	02	22							0		0		0
	2009	02	23							0		0		0
	2009	02	24							0		0		0
	2009	02	25							0		0		0
	2009	02	26							0		0		0
	2009	02	27							0.15		0		0
	2009	02	28							0.27		4.2		4

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							0.90	11.5

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Certified to be a true copy of the original data archived by the HPRCC

Natalie Umphlett

Station: UNDER[illegible]D

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2009	03	1							T		T		4									
	2009	03	2							0		0		3									
	2009	03	3							0		0		3									
	2009	03	4							0		0		2									
	2009	03	5							0		0		0									
	2009	03	6							0		0		0									
	2009	03	7							0.53		0		0									
	2009	03	8							0.10		0		0									
	2009	03	9							0		0		0									
	2009	03	10							0.11		0		0									
	2009	03	11							T		T		T									
	2009	03	12							0		0		0									
	2009	03	13							0		0		0									
	2009	03	14							0		0		0									
	2009	03	15							0		0		0									
	2009	03	16							0		0		0									
	2009	03	17							0		0		0									
	2009	03	18							0		0		0									
	2009	03	19							0		0		0									
	2009	03	20							0		0		0									
	2009	03	21							0		0		0									
	2009	03	22							0		0		0									
	2009	03	23							0.16		0		0									
	2009	03	24							0.52		0		0									
	2009	03	25							0		0		0									
	2009	03	26							0		0		0									
	2009	03	27							0		0		0									
	2009	03	28							0		0		0									
	2009	03	29							0		0		0									
	2009	03	30							0		0		0									
	2009	03	31							0.50		0		0								1.92	0

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Natalie Umphlett

Station: UNDERWC

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2009	04	1							T		0		0									
	2009	04	2							0		0		0									
	2009	04	3							0		0		0									
	2009	04	4							0		0		0									
	2009	04	5							0.38		T		T									
	2009	04	6							0.24		2.5		T									
	2009	04	7							0		0		0									
	2009	04	8							0		0		0									
	2009	04	9							0		0		0									
	2009	04	10							T		0		0									
	2009	04	11							0		0		0									
	2009	04	12							0		0		0									
	2009	04	13							0.26		0		0									
	2009	04	14							T		0		0									
	2009	04	15							0		0		0									
	2009	04	16							0		0		0									
	2009	04	17							0		0		0									
	2009	04	18							0.05		0		0									
	2009	04	19							0.12		0		0									
	2009	04	20							0		0		0									
	2009	04	21							0		0		0									
	2009	04	22							0		0		0									
	2009	04	23							0		0		0									
	2009	04	24							0		0		0									
	2009	04	25							0		0		0									
	2009	04	26							0.15		0		0									
	2009	04	27							2.22		0		0									
	2009	04	28							0.11		0		0									
	2009	04	29							0		0		0									
	2009	04	30							T		0		0								3.53	2.5

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Natalie Umphlett

Station: UNDERW
State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
	2009	05	1							0.12		0		0
	2009	05	2							T		0		0
	2009	05	3							0		0		0
	2009	05	4							0		0		0
	2009	05	5							T		0		0
	2009	05	6							0		0		0
	2009	05	7							0.64		0		0
	2009	05	8							T		0		0
	2009	05	9							0		0		0
	2009	05	10							0		0		0
	2009	05	11							0		0		0
	2009	05	12							0		0		0
	2009	05	13							0.68		0		0
	2009	05	14							0.15		0		0
	2009	05	15							0		0		0
	2009	05	16							0.22		0		0
	2009	05	17							0		0		0
	2009	05	18							0		0		0
	2009	05	19							0		0		0
	2009	05	20							0		0		0
	2009	05	21							0		0		0
	2009	05	22							0		0		0
	2009	05	23							0		0		0
	2009	05	24							T		0		0
	2009	05	25							0		0		0
	2009	05	26							0		0		0
	2009	05	27							0.08		0		0
	2009	05	28							0		0		0
	2009	05	29							0		0		0
	2009	05	30							T		0		0
	2009	05	31							0		0		0

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							1.89	0

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Natalie Umphlett

Station: UNDERW

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2009	06	1							0.12		0		0									
	2009	06	2							0.27		0		0									
	2009	06	3							0.06		0		0									
	2009	06	4							T		0		0									
	2009	06	5							0		0		0									
	2009	06	6							2.48		0		0									
	2009	06	7							0.42		0		0									
	2009	06	8							1.03		0		0									
	2009	06	9							0		0		0									
	2009	06	10							T		0		0									
	2009	06	11							0		0		0									
	2009	06	12							0		0		0									
	2009	06	13							0.57		0		0									
	2009	06	14							0		0		0									
	2009	06	15							0		0		0									
	2009	06	16							0		0		0									
	2009	06	17							0		0		0									
	2009	06	18							0		0		0									
	2009	06	19							0		0		0									
	2009	06	20							0		0		0									
	2009	06	21							0		0		0									
	2009	06	22							0		0		0									
	2009	06	23							0		0		0									
	2009	06	24							0		0		0									
	2009	06	25							0.07		0		0									
	2009	06	26							0		0		0									
	2009	06	27							0		0		0									
	2009	06	28							0		0		0									
	2009	06	29							0		0		0									
	2009	06	30							0		0		0								5.02	0

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Natalie Umphlett

Station: UNDER w

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

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Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
	2009	07	1							0		0		0
	2009	07	2							0		0		0
	2009	07	3							0		0		0
	2009	07	4							1.85		0		0
	2009	07	5							0		0		0
	2009	07	6							0		0		0
	2009	07	7							0		0		0
	2009	07	8							1.62		0		0
	2009	07	9							0.38		0		0
	2009	07	10							T		0		0
	2009	07	11							0		0		0
	2009	07	12							0		0		0
	2009	07	13							0.70		0		0
	2009	07	14							0		0		0
	2009	07	15							0		0		0
	2009	07	16							0		0		0
	2009	07	17							0.98		0		0
	2009	07	18							0		0		0
	2009	07	19							0		0		0
	2009	07	20							0		0		0
	2009	07	21							0.86		0		0
	2009	07	22							T		0		0
	2009	07	23							0		0		0
	2009	07	24							0		0		0
	2009	07	25							T		0		0
	2009	07	26							0		0		0
	2009	07	27							0		0		0
	2009	07	28							T		0		0
	2009	07	29							T		0		0
	2009	07	30							0		0		0
	2009	07	31							0		0		0

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							6.39	0

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Natalie Umphlett

Station: UNDERWOOD
State: IA County: POTTAWATTAMIE Standard Time: CENTRAL
Observation Time Temperature: Precipitation: 0700
(LST)

Record of Climatological Observations

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Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2009	08	1							0.22		0		0									
	2009	08	2							0		0		0									
	2009	08	3							0		0		0									
	2009	08	4							T		0		0									
	2009	08	5							T		0		0									
	2009	08	6							0		0		0									
	2009	08	7							1.37		0		0									
	2009	08	8							T		0		0									
	2009	08	9							0		0		0									
	2009	08	10							0.39		0		0									
	2009	08	11							0		0		0									
	2009	08	12							0		0		0									
	2009	08	13							0		0		0									
	2009	08	14							0		0		0									
	2009	08	15							T		0		0									
	2009	08	16							1.06		0		0									
	2009	08	17							T		0		0									
	2009	08	18							0		0		0									
	2009	08	19							T		0		0									
	2009	08	20							0.53		0		0									
	2009	08	21							T		0		0									
	2009	08	22							0		0		0									
	2009	08	23							0		0		0									
	2009	08	24							0		0		0									
	2009	08	25							0		0		0									
	2009	08	26							T		0		0									
	2009	08	27							1.90		0		0									
	2009	08	28							0		0		0									
	2009	08	29							0		0		0									
	2009	08	30							0		0		0									
	2009	08	31							0		0		0								5.47	0

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Certified to be a true
copy of the original data
archived by the HPRCC

Station: UNDERW
State: IA **County:** POTTAWATTAMIE **Standard Time:** CENTRAL

Observation Time Temperature: **Precipitation:** 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
	2009	09	1							0		0		0
	2009	09	2							0		0		0
	2009	09	3							0.17		0		0
	2009	09	4							0.88		0		0
	2009	09	5							0		0		0
	2009	09	6							0		0		0
	2009	09	7							0		0		0
	2009	09	8							0		0		0
	2009	09	9							0		0		0
	2009	09	10							0		0		0
	2009	09	11							0		0		0
	2009	09	12							T		0		0
	2009	09	13							0.26		0		0
	2009	09	14							0		0		0
	2009	09	15							0		0		0
	2009	09	16							0		0		0
	2009	09	17							0		0		0
	2009	09	18							0		0		0
	2009	09	19							0		0		0
	2009	09	20							0		0		0
	2009	09	21							T		0		0
	2009	09	22							0.08		0		0
	2009	09	23							0		0		0
	2009	09	24							0		0		0
	2009	09	25							0		0		0
	2009	09	26							0.12		0		0
	2009	09	27							T		0		0
	2009	09	28							0		0		0
	2009	09	29							0		0		0
	2009	09	30							0		0		0

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							1.51	0

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Certified to be a true copy of the original data archived by the HPRCC

Station: UNDERWOOD

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2009	10	1							T		0		0									
	2009	10	2							0.07		0		0									
	2009	10	3							0.15		0		0									
	2009	10	4							T		0		0									
	2009	10	5							0		0		0									
	2009	10	6							0.27		0		0									
	2009	10	7							0		0		0									
	2009	10	8							0.06		0		0									
	2009	10	9							0		0		0									
	2009	10	10							0.22		2.7		3									
	2009	10	11							0.16		4.0		1									
	2009	10	12							T		T		0									
	2009	10	13							T		T		0									
	2009	10	14							0.32		0		0									
	2009	10	15							0.19		0		0									
	2009	10	16							T		0		0									
	2009	10	17							0		0		0									
	2009	10	18							0		0		0									
	2009	10	19							0		0		0									
	2009	10	20							0		0		0									
	2009	10	21							0.07		0		0									
	2009	10	22							0.71		0		0									
	2009	10	23							1.17		0		0									
	2009	10	24							T		0		0									
	2009	10	25							T		0		0									
	2009	10	26							0		0		0									
	2009	10	27							0		0		0									
	2009	10	28							0		0		0									
	2009	10	29							0.47		0		0									
	2009	10	30							0.33		0		0									
	2009	10	31							T		0		0								4.19	6.7

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Certified to be a true copy of the original data archived by the HPRCC

Station: UNDERWOOD
State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2009	11	1							0		0		0									
	2009	11	2							0		0		0									
	2009	11	3							0		0		0									
	2009	11	4							0		0		0									
	2009	11	5							0		0		0									
	2009	11	6							0		0		0									
	2009	11	7							0		0		0									
	2009	11	8							0		0		0									
	2009	11	9							0		0		0									
	2009	11	10							0		0		0									
	2009	11	11							0		0		0									
	2009	11	12							0		0		0									
	2009	11	13							0		0		0									
	2009	11	14							T		0		0									
	2009	11	15							0		0		0									
	2009	11	16							0		0		0									
	2009	11	17							T		0		0									
	2009	11	18							0		0		0									
	2009	11	19							0		0		0									
	2009	11	20							0		0		0									
	2009	11	21							0		0		0									
	2009	11	22							0		0		0									
	2009	11	23							0		0		0									
	2009	11	24							0.57		0		0									
	2009	11	25							0.21		0		0									
	2009	11	26							0		0		0									
	2009	11	27							0		0		0									
	2009	11	28							0		0		0									
	2009	11	29							0		0		0									
	2009	11	30							0		0		0								0.78	0

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Certified to be a true copy of the original data archived by the HPRCC

Station: UNDERWOOD

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
	2009	12	1							0		0		0
	2009	12	2							0		0		0
	2009	12	3							0		0		0
	2009	12	4							T		T		0
	2009	12	5							0		0		0
	2009	12	6							0		0		0
	2009	12	7							0.03		1.8		2
	2009	12	8							0.21		2.3		4
	2009	12	9							0.83		10.0		14
	2009	12	10							0		0		13
	2009	12	11							0		0		12
	2009	12	12							0		0		10
	2009	12	13							0		0		9
	2009	12	14							T		T		8
	2009	12	15							0.07		1.0		8
	2009	12	16							0		0		7
	2009	12	17							0		0		7
	2009	12	18							0		0		6
	2009	12	19							0		0		4
	2009	12	20							0		0		4
	2009	12	21							T		T		4
	2009	12	22							0		0		3
	2009	12	23							T		T		3
	2009	12	24							0.81		T		3
	2009	12	25							1.13		10.2		13
	2009	12	26							0.26		3.0		16
	2009	12	27							0.07		2.0		15
	2009	12	28							T		T		15
	2009	12	29							0		0		15
	2009	12	30							T		T		14
	2009	12	31							T		0.5		14

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							3.41	30.8

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Certified to be a true copy of the original data archived by the HPRCC

Natalie Umphlett

Station: UNDERWOOD

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2010	01	1							T		T		14									
	2010	01	2							T		T		14									
	2010	01	3							0.16		3.0		17									
	2010	01	4							T		T		17									
	2010	01	5							0		0		17									
	2010	01	6							0		0		16									
	2010	01	7							0.06		3.2		19									
	2010	01	8							T		T		19									
	2010	01	9							T		T		19									
	2010	01	10							0		0		19									
	2010	01	11							0		0		16									
	2010	01	12							0		0		16									
	2010	01	13							0		0		16									
	2010	01	14							0		0		14									
	2010	01	15							0		0		14									
	2010	01	16							0		0		14									
	2010	01	17							0		0		14									
	2010	01	18							0		0		13									
	2010	01	19							0		0		13									
	2010	01	20							0.42		0		99999									
	2010	01	21							0.06		0		12									
	2010	01	22							0		0		12									
	2010	01	23							0.37		0		8									
	2010	01	24							0		0		6									
	2010	01	25							0.10		1.2		7									
	2010	01	26							0.03		0.5		7									
	2010	01	27							T		T		7									
	2010	01	28							0		0		7									
	2010	01	29							0		0		7									
	2010	01	30							0		0		7									
	2010	01	31							0		0		6									
																						1.20	7.9

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Station: UNDERW[illegible]D

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
	2010	02	1							0		0		6
	2010	02	2							T		0.2		6
	2010	02	3							0		0		6
	2010	02	4							0		0		4
	2010	02	5							0.32		3.8		7
	2010	02	6							0.06		1.0		7
	2010	02	7							0.08		1.1		7
	2010	02	8							0.04		0.5		7
	2010	02	9							T		0.2		7
	2010	02	10							T		T		7
	2010	02	11							0		0		7
	2010	02	12							T		T		6
	2010	02	13							0		0		6
	2010	02	14							T		T		6
	2010	02	15							0.05		1.4		7
	2010	02	16							0		0		7
	2010	02	17							0		0		6
	2010	02	18							0		0		6
	2010	02	19							0		0		5
	2010	02	20							0.04		1.2		6
	2010	02	21							0		0		5
	2010	02	22							0		0		5
	2010	02	23							0		0		5
	2010	02	24							0		0		5
	2010	02	25							0		0		5
	2010	02	26							0		0		5
	2010	02	27							0		0		5
	2010	02	28							0		0		5

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							0.59	9.4

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Station: UNDERW[illegible]D

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2010	03	1							0		0		4									
	2010	03	2							0		0		3									
	2010	03	3							0		0		3									
	2010	03	4							0		0		2									
	2010	03	5							0		0		1									
	2010	03	6							0.28		0		0									
	2010	03	7							0.25		0		0									
	2010	03	8							0		0		0									
	2010	03	9							0.41		0		0									
	2010	03	10							0.18		0		0									
	2010	03	11							0.52		0		0									
	2010	03	12							0.22		T		T									
	2010	03	13							0		0		0									
	2010	03	14							0		0		0									
	2010	03	15							0		0		0									
	2010	03	16							0		0		0									
	2010	03	17							0		0		0									
	2010	03	18							0		0		0									
	2010	03	19							0		0		0									
	2010	03	20							0.18		1.8		2									
	2010	03	21							0		0		1									
	2010	03	22							0		0		0									
	2010	03	23							0		0		0									
	2010	03	24							0		0		0									
	2010	03	25							0		0		0									
	2010	03	26							0		0		0									
	2010	03	27							T		0		0									
	2010	03	28							0.11		0		0									
	2010	03	29							0		0		0									
	2010	03	30							0		0		0									
	2010	03	31							0		0		0								2.15	1.8

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Natalie [illegible]

Station: UNDER[illegible]D
State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
	2010	04	1							0		0		0									
	2010	04	2							0		0		0									
	2010	04	3							T		0		0									
	2010	04	4							0		0		0									
	2010	04	5							0		0		0									
	2010	04	6							0.95		0		0									
	2010	04	7							0		0		0									
	2010	04	8							T		0		0									
	2010	04	9							0		0		0									
	2010	04	10							0		0		0									
	2010	04	11							0		0		0									
	2010	04	12							0		0		0									
	2010	04	13							0		0		0									
	2010	04	14							0		0		0									
	2010	04	15							0.06		0		0									
	2010	04	16							0.17		0		0									
	2010	04	17							0		0		0									
	2010	04	18							0		0		0									
	2010	04	19							0		0		0									
	2010	04	20							0		0		0									
	2010	04	21							0.05		0		0									
	2010	04	22							0.24		0		0									
	2010	04	23							0.34		0		0									
	2010	04	24							0.28		0		0									
	2010	04	25							0		0		0									
	2010	04	26							0.07		0		0									
	2010	04	27							0.10		0		0									
	2010	04	28							0		0		0									
	2010	04	29							0		0		0									
	2010	04	30							1.05		0		0								3.31	0

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Certified to be a true copy of the original data archived by the HPRCC

Station: UNDER[illegible]D

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F): 24 hrs. ending at observation time: Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **): 24 Hour Amounts ending at observation time: Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time: Snow, ice pellets, hail, ice on ground (Inches)	Monthly Temperature (°F): Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation: Precip	Snowfall
	2010	05	1							0		0		0									
	2010	05	2							0		0		0									
	2010	05	3							0.05		0		0									
	2010	05	4							T		0		0									
	2010	05	5							0		0		0									
	2010	05	6							0		0		0									
	2010	05	7							0.37		0		0									
	2010	05	8							0		0		0									
	2010	05	9							0		0		0									
	2010	05	10							0		0		0									
	2010	05	11							0.89		0		0									
	2010	05	12							0.30		0		0									
	2010	05	13							0.92		0		0									
	2010	05	14							0		0		0									
	2010	05	15							0		0		0									
	2010	05	16							0		0		0									
	2010	05	17							0		0		0									
	2010	05	18							0		0		0									
	2010	05	19							0		0		0									
	2010	05	20							T		0		0									
	2010	05	21							0.43		0		0									
	2010	05	22							0		0		0									
	2010	05	23							0		0		0									
	2010	05	24							0		0		0									
	2010	05	25							0		0		0									
	2010	05	26							0		0		0									
	2010	05	27							0.15		0		0									
	2010	05	28							0		0		0									
	2010	05	29							0		0		0									
	2010	05	30							0		0		0									
	2010	05	31							0.06		0		0								3.17	0

The '*' flags in Preliminary indicate the data has not completed processing and quality control and may contain errors

All 9's (e.g. 999999, 99999.9, etc.) in the data column indicate that the value was not received or is missing

**T=TRACE. A=Accumulated amount since last measure. B=Accumulated amount includes estimated values. S=Included in a subsequent value. E=Estimated amount.

Certified to be a true copy of the original data archived by the HPRCC

[signature]

Station: UNDERV[illegible]D

State: IA County: POTTAWATTAMIE Standard Time: CENTRAL

Observation Time Temperature: Precipitation: 0700

(LST)

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations

Preliminary	Year	Month	Day	Temperature (°F) 24 hrs. ending at observation time Max.	Min.	at Observation	Daily Mean	Daily CDD	Daily HDD	Precipitation (see **) 24 Hour Amounts ending at observation time Rain, melted snow, etc. (Inches & hundredths)	Flag	Snow, ice pellets (Inches & tenths)	Flag	At Observation Time Snow, ice pellets, hail, ice on ground (Inches)
*	2010	06	1							0		0		0
*	2010	06	2							2.33		0		0
*	2010	06	3							0		0		0
*	2010	06	4							0.12		0		0
*	2010	06	5							2.87		0		0
*	2010	06	6							0		0		0
*	2010	06	7							0.10		0		0
*	2010	06	8							1.26		0		0
*	2010	06	9							0		0		0
*	2010	06	10							0		0		0
*	2010	06	11							1.69		0		0
*	2010	06	12							T		0		0
*	2010	06	13							0.14		0		0
*	2010	06	14							0.28		0		0
*	2010	06	15							0		0		0
*	2010	06	16							0		0		0
*	2010	06	17							0		0		0
*	2010	06	18							0.28		0		0
*	2010	06	19							0.22		0		0
*	2010	06	20							0.06		0		0
*	2010	06	21							0.73		0		0
*	2010	06	22							0.42		0		0
*	2010	06	23							1.56		0		0
*	2010	06	24							0.38		0		0
*	2010	06	25							0		0		0
*	2010	06	26							0		0		0
*	2010	06	27							0.10		0		0
*	2010	06	28							0		0		0
*	2010	06	29							0		0		0
*	2010	06	30							0		0		0

Monthly Temperature (°F) Mean Temp	Mean Max	Mean Min	Highest Temp	Lowest Temp	Monthly CDD	Monthly HDD	Monthly Precipitation Precip	Snowfall
							12.54	0

The '*' flags in Preliminary indicate the data has not completed processing and quality control and may contain errors

All 9's (e.g. 999999, 99999.9, etc.) in the data column indicate that the value was not received or is missing

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Natalie Sydlik[illegible]

JONATHAN S. SHEFFTZ

d/b/a JSheffitz Consulting
14 Moody Field Road
Amherst MA 01002
www.JShefftzConsulting.com
413-256-1101 phone
866-252-7130 fax

Mr. Shefftz is an independent consultant who specializes in the application of financial economics to litigation disputes, regulatory enforcement, and public policy decisions. Previously he was a consultant with Industrial Economics, Incorporated ("IEc") from 1992 until 2006 when he moved to western Massachusetts. Mr. Shefftz has extensive experience in settlement and litigation support, and has been qualified as an expert witness in U.S. District Court, a federal agency's Administrative Court, and a state court.

Mr. Shefftz's recent experience includes work in the following areas.

- Calculating the economic damages suffered by companies and individuals from alleged wrongful actions.
- Applying financial economics to civil penalty factors in regulatory enforcement actions.
- Analyzing financial economic issues related to public policy decisions.

Mr. Shefftz has performed this work in a variety of contexts, including expert witness testimony, computer model development, training course delivery, and regulatory review. He has supervised project teams comprising economists, accountants, paralegals, and software developers, as well as worked in parallel with engineers, scientists, lawyers, and lobbyists. His clients have included federal and state governmental agencies, private litigators, and other private-sector entities.

Mr. Shefftz holds a B.A. *magna cum laude* and *Phi Beta Kappa* in Economics and Political Economy from Amherst College, and an M.P.P. degree, with concentrations in Government & Business and Energy & Environmental Policy, from the John F. Kennedy School of Government at Harvard University.

Mr. Shefftz's positions have included Eastern Vice President for the National Association of Forensic Economics (upcoming 2011-14 term), Chair for the Town of Amherst Planning Board, referee for the *Journal of Forensic Economics,* Course Liaison for the "Engineering Economic Decision Making" course at the University of Massachusetts Amherst, and member of the Finance Committee for the Jewish Community of Amherst. He is also a member of the Government Finance Officers Association, Eastern Economics Association, Western Economics Association International, and Amherst Area Chamber of Commerce.

Economic Damages

Mr. Shefftz has experience with the following work on economic damages and has provided expert witness deposition testimony in both U.S. District Court and a state court. He has also applied his expertise in unjust enrichment calculation, financial statement analysis, municipal financial assessment, and corporate control / ownership issues to private-party damages cases – this expertise is described in more detail in the "Financial Factors in Regulatory Enforcement" section.

Business Damages
Mr. Shefftz has modeled companies' cash flows under hypothetical "but-for" states of the world versus actual states of the world to calculate business damages in numerous cases. Sample contexts include an engineering firm that lost business to a spin-off competitor, timber companies that alleged a contract breach from U.S. Forest Service implementation of Congressional legislation, a furniture company whose relationship with a joint venture partner was interfered with by a key customer, a fixed base operator prohibited from selling jet fuel by a municipal airport commission, a brownfields remediation firm with an incapacitated key principal, a state-chartered joint underwriting association whose prior servicing carrier incorrectly determined premiums, a dealer who delivered contaminated diesel fuel, and a sports organization whose apparel licensee breached a contract.

Personal Damages
Mr. Shefftz has assessed lost earnings and household services along with incurred and anticipated medical costs in numerous cases involving wrongful death, personal injury, wrongful termination, estate disputes, and divorce proceedings. Sample contexts for this work include alleged employment discrimination, medical malpractice, workplace injuries, vehicular accidents, retail store accidents, below-market earnings, and an arrest instigated by a former spouse.

Groundwater Contamination
For a private landowner, Mr. Shefftz analyzed the diminution in real estate development value from groundwater contamination, projecting the development schedule with the contamination-induced delay vs. the original schedule. For a U.S. territory, Mr. Shefftz estimated the present value of future expenses for a proposed desalination plant to replace contaminated groundwater sources. On a class action lawsuit by property owners, he evaluated the defense economist's statistical analysis of property values; on another class action lawsuit, he assisted with present value calculations for whole-house drinking water treatment systems to replace contaminated well water.

Intellectual Property
For defense counsel in a copyright infringement lawsuit, Mr. Shefftz assessed declarations from the plaintiff's expert economist who asserted that a "companion" book would damage the author of the original series of novels. He also assisted counsel with preparation for trial cross examination.

Computer Model Development
For the U.S. Department of Justice Commercial Litigation Branch, Mr. Shefftz developed a standalone computer application to calculate statutorily determined interest accruing on damages claims under the Contract Disputes Act.

Financial Factors in Regulatory Enforcement

Mr. Shefftz has experience with the following work on enforcement actions brought under the Asbestos Hazard Emergency Response Act (AHERA), Clean Air Act (CAA), Clean Water Act (CWA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act (EPCRA), Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), Oil Pollution Act (OPA), Resource Conservation and Recovery Act (RCRA), Spill Prevention, Control and Countermeasure (SPCC) rule, Toxic Substances Control Act (TSCA), and others. Mr. Shefftz has been qualified as an expert witness on numerous occasions in Administrative Court, U.S. District Court, and a state court. His clients have included the U.S. Environmental Protection Agency (EPA), U.S. Department of Justice (DOJ), private litigators, state Attorneys General, and a corporate defendant.

Financial Statement Analysis / Ability-to-Pay / Economic Impact / Corporate Control & Ownership
Mr. Shefftz has examined the tax returns, financial statements, and other financial documentation for individuals, businesses, municipalities, territorial governments, and not-for-profits to assess the ability to pay for – and/or economic impact of – sought environmental expenditures, e.g., compliance costs, penalty demands, and cleanup/remediation costs. He has reviewed discovery documents and conducted research in many cases to assess the extent to which subsidiaries can rely on their corporate parents for financial support and the extent to which corporate control of their subsidiaries goes beyond that exercised by mere ownership.

Financial Gain / Economic Benefit / Unjust Enrichment
Mr. Shefftz has modeled companies' and municipalities' cash flows under hypothetical full and timely compliance states of the world versus actual delayed compliance states of the world to calculate the economic benefit (i.e., financial gain or unjust enrichment) on numerous enforcement actions. As part of this work, he has estimated the weighted-average cost of capital for a wide variety of companies and industries.

Other Financial Factors in Regulatory Enforcement Actions
Mr. Shefftz has performed work on other financial factors in regulatory enforcement actions: the "size of violator" penalty element; the relative weight of different financial indicators for establishing deterrence; and, the adequacy of financing plans to ensure environmental compliance.

Computer Model Development, Training, and Support
Mr. Shefftz has managed the development of the current versions of the BEN, PROJECT, ABEL, INDIPAY, and MUNIPAY computer models that U.S. EPA's Office of Enforcement and Compliance Assurance applies to financial economics issues in enforcement actions. He has prepared the models' help systems and training materials, as well as presented training courses and provided related support for federal and state enforcement staff. Mr. Shefftz has also assisted in several U.S. EPA academic peer reviews and public comment processes for the BEN computer model and related economic benefit recapture issues.

Public Policy

Cost of Capital Estimation
Mr. Shefftz assessed peer reviewer comments and then revised a draft report on cost of capital estimation for water systems. His work included applying the capital asset pricing model to the commercial drinking water industry and correcting for the earlier draft's assumptions regarding capital structure and industry-level business risk.

Financial Assurance
For a state agency, Mr. Shefftz proposed appropriate inflation forecasts and discount rates, drafted a guidance document, and then developed a stand-alone computer model to calculate the net present value of future remediation costs. For EPA's Office of Solid Waste, he provided recommendations on discounting future cleanup costs; for the Office of Site Remediation and Enforcement, he created a computer model to assess the combined affordability of financial assurance and cleanup costs; for another EPA office, he created a spreadsheet model to calculate the insurance and/or trust fund amounts necessary to provide for post-closure care. For the U.S. Department of the Interior's Office of Surface Mining Reclamation and Enforcement, he reviewed other agencies' approaches and developed a spreadsheet model to calculate initial trust fund amounts and then recalculate subsequent years' annual rebalancings to reflect actual returns and additional future costs.

Joint Cost Allocation
For a study of Bureau of Reclamation rate setting for California's Central Valley Project, Mr. Shefftz researched economically efficient methods for allocating water project costs to user classes.

Proposed Legislation
For an industry association, Mr. Shefftz designed and implemented a survey and analyzed its results to predict the impacts of a proposed national lead tax upon lead consumption and dependent industrial sectors. For a national waste management firm, he analyzed the financial impacts of a proposed state tax on hazardous waste land disposal.

Superfund Impacts
Mr. Shefftz examined the Department of Energy SURE model's predictions of economic impacts from Superfund liability and cost allocation reform. At a Superfund site, he critiqued a small city's claims that a proposed contaminated soil cleanup would lead to widespread economic disruptions.

Legislative Review
For the 1990 Clean Air Act amendments, Mr. Shefftz investigated the potential of fuel oxygenation requirements to cause petroleum refinery closures. For the Safe Drinking Water Act, he reviewed EPA's national-level drinking water affordability criteria, assessed their implications for small water systems' finances, proposed alternative criteria, created databases to predict how many systems would be judged unable to afford drinking water rules, and evaluated public comments.

Representative Clients

Mr. Shefftz has been retained by the following clients, whether directly as an independent consultant, during his prior employment at Industrial Economics, Incorporated ("IEc"), and/or as an independent consultant via subcontract with IEc.

Private Law Firms
Adler, Cohen, Harvey, Wakeman & Guekguezian LLP
Law Office of Jacqueline L. Allen
Arnold & Porter LLP
Bayh, Connaughton and Malone
The Collins Law Firm, P.C.
D'Ambrosio Law Offices
Law Offices of John K. Dema, P.C.
Doherty, Wallace, Pillsbury & Murphy
The Garcia Law Firm
David S. Hammer, Esq.
Hanson Curran LLP
George E. Hays, Esq.
Henrichsen Siegel Moore, PLLC
Kasowitz, Benson, Torres & Friedman LLP
James E. Kolenich
Lucentini & Lucentini LLP
Marr Law Offices
Meyers Nave
Morrison Mahoney LLP
Law Office of Michael D. Parker
Edward M. Pikula, Esq.
Ryan, Ryan, Johnson & Deluca, LLP
Simonds, Winslow, Willis & Abbott
Smith & Lowney, PLLC
Stoel Rives LLP
Wilson Elser Moskowitz Edelman & Dicker LLP
Joseph J. Zajac III (pro se)
Reed Zars, Esq.

State Agencies
California
Connecticut
Illinois
Indiana
Massachusetts
Michigan
New Hampshire
New Mexico
Ohio
Pennsylvania
Texas
Virginia
Wisconsin

Federal Agencies
U.S. Department of Justice (Civil Division – Commercial Litigation Branch; Environment and Natural Resources Division – Environmental Enforcement Section, Environmental Defense Section)
U.S. Environmental Protection Agency (various Headquarters Offices and Regional Counsels)
U.S. Fish and Wildlife Service (within U.S. Department of Interior)
National Oceanic and Atmospheric Administration (within U.S. Department of Commerce)
Office of Surface Mining Reclamation and Enforcement (within U.S. Department of Interior)

Citizen Groups and Industry
Alabama Environmental Council
Biodiversity Conservation Alliance
CWM Chemical Services, Incorporated
Grand Canyon Trust
Lead Industries Association
National Environmental Law Center
National Parks Conservation Association
Natural Resources Defense Council
Our Children's Earth Foundation
Sierra Club
Tulane Environmental Law Clinic

Publications and Presentations

Present Value and the Resolution of Uncertainty, paper discussant at Allied Social Sciences Associations Conference (Denver CO), 1/8/11 (anticipated).

Alternative Perspectives for Breach-Nonbreach Scenario Specifications in Commercial Litigation, paper presentation at Western Economics Association International Annual Conference (Portland OR), 7/1/10.

Sampling Issues in Commercial Damages Cases, paper discussant at Western Economics Association International Annual Conference (Vancouver BC), 7/1/09.

Net Discount Rates: Does Duration Matter?, paper discussant at Eastern Economics Association Annual Conference (Boston MA), 3/7/08

Enforcement Economics: Deterrence, Economic Benefit, & Ability to Pay, presentation at California Environmental Protection Agency State Water Resources Control Board "Enforcenomics" Workshop (Berkeley CA), 1/11/08.

Alternative Focuses for "But-For" Scenario Specification in Commercial Litigation, paper presentation at Western Economics Association International Annual Conference (Seattle WA), 6/30/07

Expert Witness Role Play, presentation at U.S. EPA 9th Financial Analyst Workshop (Atlanta GA), 5/3/07.

Working with Experts in Environmental Cases: An Expert Economist's Perspective on Expert Testimony, presentation at Public Interest Environmental Law Conference (Eugene OR), 3/2/07.

Alternative Measures and Focuses for Economic Damages Calculations, paper presentation at Eastern Economics Association Annual Conference (New York NY), 2/23/07.

Lost Profit as a Measure of Lost Earning Capacity, panelist at Western Economics Association International Annual Conference (San Francisco CA), 7/7/05

"EPA's Economic Benefit Analysis Policy and Practice," *Natural Resources and Environment*, Fall 2004.

"Taxation Considerations in Economic Damages Calculations," *Litigation Economics Review*, Summer 2004.

Economic Benefit and Wrongful Profits in the Calculation of Penalties for Environmental Violations, presentation to Boston Bar Association Environmental Litigation Committee, 9/23/04.

Business Valuation / Commercial Damages, panelist at Western Economics Association International Annual Conference (Vancouver BC), 7/1/04.

"Wrongful Profits: Setting the Record, and the Concept, Straight," *Environment Reporter*, 1/2/04.

Present Value Sensitivity to Ex Ante vs. Ex Post Perspective, paper presentation at Western Economics Association International Annual Conference (Denver CO), 7/12/03.

Taxation Considerations in Economic Damages Calculations, paper presentation at Eastern Economics Association Annual Conference (New York NY), 2/22/03.

Economic Benefit from Illegal Competitive Advantage and *Complex Economic Benefit Scenarios*, presentation at U.S. EPA 5th Financial Analyst Workshop (Boston MA), 7/26/00.

Economic Benefit in Wetlands Cases: Financial Analysis Issues, presentation at U.S. EPA Wetlands Enforcement Conference (Alexandria VA), 3/22/00.

Economic Benefit, presentation at U.S. EPA 4th Analyst Workshop (Denver CO), 3/10/99.

Testimony History

Elizabeth Russell and Katherine Gates v. Joseph Reilly and James Georges, Executors of the Estate of K. Mildred Dooling, a/k/a Mildred K. Dooling, and Patrick Curtin, Individually and as Trustee of the M.D. Realty Trust (Massachusetts Superior Court), courtroom testimony 7/21/10.

Hildagarde Bartling, et al. v. Country Villa Bay Vista Healthcare Center, et al. (California State Court), deposition 1/29/10.

Joseph J. Zajac III v. Pamela J. Trueblood, et al. (USDC, MD Fla.), affidavit 9/16/09.

In the matter of 99 Cents Only Stores (U.S. EPA Administrative Court), courtroom testimony 6/24/09.

U.S. v. Government of Guam (USDC, Guam), courtroom testimony 12/9/08 and 4/13/09.

U.S. v. James and Nancy Oliver d/b/a Safety Waste Incineration (USDC, Alaska), courtroom testimony 3/25/09 and 3/27/09.

In the matter of Valimet, Inc. (U.S. EPA Administrative Court), courtroom testimony 12/10/08.

Rectrix Aerodome Centers, Inc. v. Barnstable Municipal Airport Commission, et al. (USDC, Mass.), deposition 12/2/08.

State of Ohio v. The Shelly Holding Company et al. (Franklin County Municipal Court), depositions 7/30/08 and 9/19/08, courtroom testimony 10/16/08 and 10/17/08.

In the matter of Lowell Vos Feedlot (U.S. EPA Administrative Court), courtroom testimony 9/17/08.

French Heritage, Inc. v. Ethan Allen, Inc. (Connecticut State Court), deposition 6/28/06 and 6/29/06.

Oregon Public Interest Research Group, Diane Heintz, and Rena Taylor v. Pacific Coast Seafoods Company, Pacific Surimi Joint Venture, LLC, Pacific Surimi Co., Inc., and Dulcich Inc. d/b/a Pacific Seafood Group (USDC, Oregon), deposition 4/18/06.

In the matter of Rizing Sun LLC (U.S. EPA Administrative Court), courtroom testimony 2/7/06.

State of Ohio v. Container Recyclers, Inc. (Franklin County Municipal Court), deposition 4/1/05.

In the matter of Vico Construction Corporation and Smith Farm Enterprises (U.S. EPA Administrative Court), courtroom testimony 6/20/02 and 10/8/03.

U.S. v. The New Portland Meadows, Inc. (USDC, Oregon), courtroom testimony 5/20/03.

In the matter of Vico Construction Corporation and Amelia Venture Properties (U.S. EPA Administrative Court), courtroom testimony 1/14/03.

United States Public Interest Research Group, Stephen E. Crawford, and Charles Fitzgerald v. Heritage Salmon, Inc.; U.S. PIRG et al. v. Stolt Sea Farm, Inc.; U.S. PIRG et al. v. Atlantic Salmon of Maine LLC (USDC, Maine), deposition 6/5/01, courtroom testimony 10/15/02.

U.S. v. Murphy Oil USA, Inc. (USDC, WD Wis.), deposition 4/24/01.

U.S. v. Royal Oak Enterprises, Inc. (USDC, ED Va.), depositions 3/22/00 and 5/19/00.

In the matter of Titan Wheel Corporation of Iowa (U.S. EPA Administrative Court), affidavit 11/24/99.

U.S. v. Gulf States Steel, Inc. (USDC, ND Ala.), affidavit 12/30/98, deposition 10/22/99.

U.S. v. Koch Industries, Inc. (USDC, ND Okla. and SD Tex.), depositions 5/24/99 and 6/1/99.

State of Wisconsin v. I-K-I Manufacturing Company, Inc., deposition 4/13/99.

U.S. v. Borden Chemicals & Plastics (USDC, MD La.), deposition 2/5/98.

State of New Hampshire v. Johnson Products, Incorporated, deposition 2/3/98.

In the matter of EK Associates, L.P., d/b/a EKCO/GLACO, and EK Management Corporation (U.S. EPA Administrative Court), courtroom testimony 8/14/97.

U.S. v. Smithfield Foods, Inc., et al. (USDC, ED Va.), deposition 7/9/97.

U.S. v. Nucor Corporation (USDC, ND Ala.), deposition 6/12/97.

U.S. v. U.S. Metallics, Inc., and Town of Onalaska, Wis. (USDC, WD Wis.), affidavit 10/21/96.

BRYAN T. HAYES

1903 Redwood Drive
Atlantic, IA 50022
Home (712)254-4838
Work (712)769-2587

EDUCATION

Iowa State University, Ames, IA 50010
B.S. Fisheries and Wildlife Biology, 1985.

EXPERIENCE

Natural Resources Biologist II, (January, 2007-Present) 40 hrs/wk.
Iowa Department of Natural Resources, Lewis, IA 51544
Develop and conduct a fisheries management plan for the aquatic resources in a ten county district. Collect fish population, water quality, and aquatic habitat data and manage aquatic ecosystems on both public and private property. Conduct a conservation and natural resources public relations program. Complete natural resources technician development and performance plans. Supervise the work of technician and seasonal employees. Prepare written and oral presentations for technical and public audiences. Manage cost center expenditures according to budget conditions. Investigate fish kills using established guidelines.

Specific accomplishments have include:
•Conducted mark-and-recapture estimate of major fish species in Prairie Rose Lake, 2007.
•Supervise the fish re-stocking effort at Viking Lake, 2007.
•Work with stakeholders to develop lake restoration plans for Lake Manawa and Prairie Rose, 2008.

Natural Resources Biologist II, (May, 1999-January, 2007) 40 hrs/wk.
Iowa Department of Natural Resources, Manchester, IA 52057
Manage the fisheries resources within a seven county area based on data evaluations and assessments. Collect fish population, water quality, and aquatic habitat data and manage aquatic ecosystems on both public and private property. Develop and implement a public relations program through media and urban area entities. Provide informational and educational support to angling public. Complete natural resources technician development and performance plans. Supervise the work of technician and seasonal employees. Prepare written and oral presentations for technical and public audiences. Oversee and coordinate projects and expenditures with state and federal agencies. Investigate fish kills using established guidelines.

Specific accomplishments have included:
•Supervised active habitat improvement program on coldwater trout streams.
•Conducted mark-and-recapture estimate on smallmouth bass in Maquoketa River catch-and-release area 2004.
•Completed mark-and-recapture estimates of the number of brown, brook, and rainbow trout in Spring Branch Creek, 1999.

Natural Resources Technician II, (May 1987-May 1999) 40 hrs/wk
Iowa Department of Natural Resources, Moravia, IA 52571
Assume a leadership role in the fisheries management of Hawthorn Lake. Assist with the management of aquatic ecosystems in an eight county area. Assist in and perform limnological and biological assessments involving electrofishing and netting. Perform compilation, interpretation, and graphic display of data. Supervise the work of seasonal employees. Analyze scale samples to determine age and growth of fish stocks. Provide information on fisheries management activities to the public both directly and through media outlets. Participate in and organize educational activities including environmental field days and fishing clinics. Maintain and fabricate equipment. Purchase materials and equipment for unit projects. Design, fabricate, place, and maintain fish habitat.

Specific accomplishments have included:
•Compiled and analyzed fishing tournament data from all fourteen management stations into one annual report (1997 and 1998).
•Planned and supervised the selective renovation of the fishery at Hawthorn Lake.
•Supervised a creel survey at Hawthorn Lake.

Natural Resources Aide, (April 1986-Dec. 1986) 40 hrs/wk
Iowa Department of Natural Resources, Lake View, IA 51450
Assisted with channel catfish movement study and conducted a creel survey.

HONORS

Iowa Department of Natural Resources, Fisheries Bureau, Certificate of Achievement, 1992.

PUBLICATIONS & PRESENTATIONS

Prairie Rose Lake Fish Creel Survey and Fish Population Assessment, Iowa DNR Fisheries Management Investigations, 2007.
Urban Trout Program in Iowa, The Past, oral presentation to Iowa DNR Fisheries statewide meeting, 2006.
Iowa's Smallmouth Bass Catch-and-Release Fisheries, oral presentation to American Fisheries Society Rivers and Streams Technical Committee, 2006.
Little Turkey River Creel Survey, Iowa DNR Fisheries Management Investigations, 2004.
Evaluation of a Catch-and-Release Regulation For Smallmouth Bass in the Maquoketa River, Iowa DNR Fisheries Management Investigations, 2002.
Spring Branch Creek Trout Population Assessment, Iowa DNR Fisheries Management Investigations, 2000.
Iowa's Fishing Tournament Permit and Report Program, Iowa DNR Fisheries Management Investigations, 1997 and 1998.
Hawthorn Lake Selective Renovation, oral presentation Iowa/Nebraska Chapter American Fisheries Society meeting, February 16, 1994.
Hawthorn Lake Creel Survey, Iowa DNR Fisheries Management Investigations, 1993.

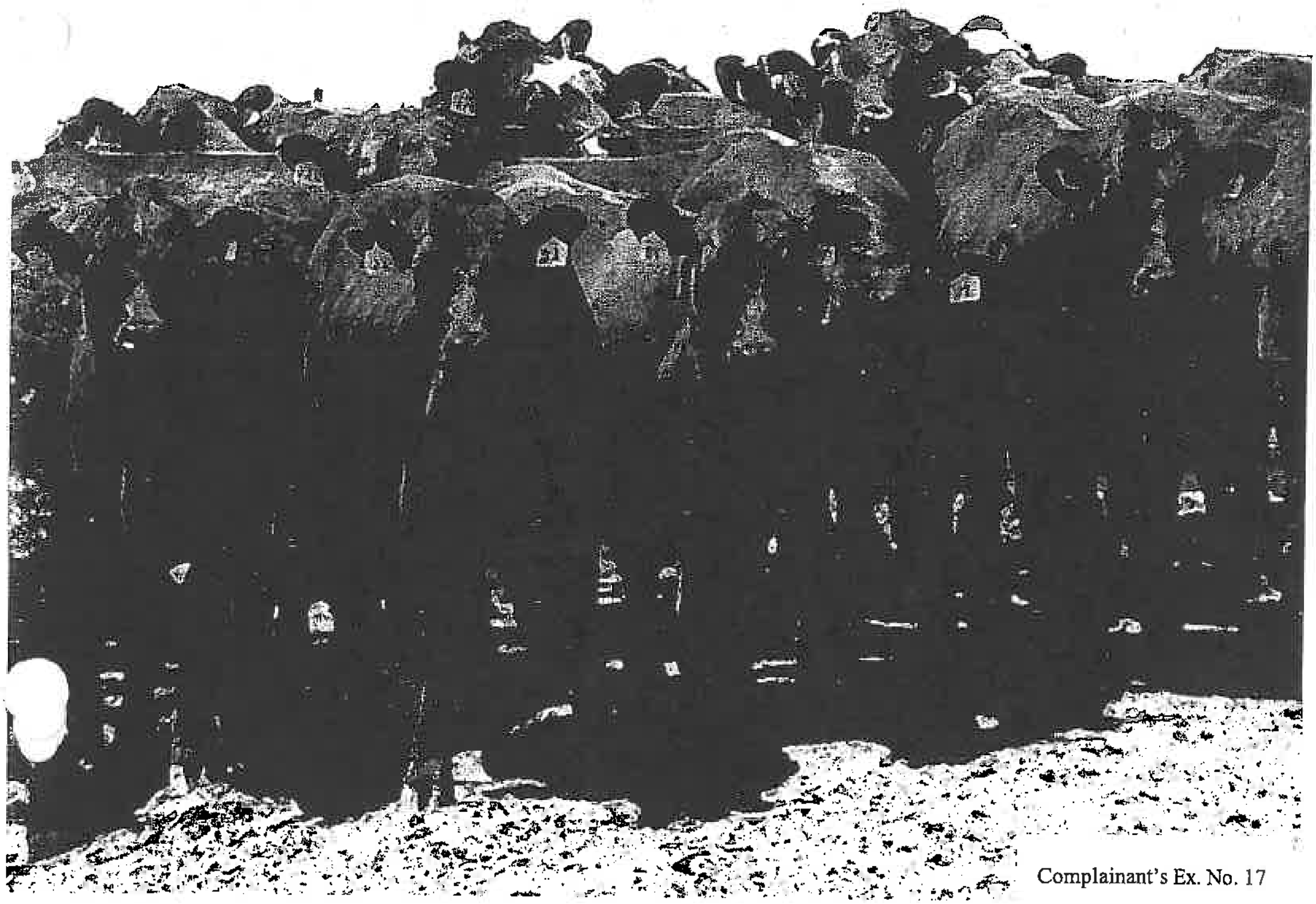
REFERENCES

Available upon request.

Beef Feedlot Systems Manual

IOWA STATE UNIVERSITY
University Extension

IBC Iowa Beef Center
IOWA STATE UNIVERSITY



Complainant's Ex. No. 17

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Prepared by:
John Lawrence, ISU professor of Economics
Shawn Shouse, ISU Extension Ag Engineer
William Edwards, ISU professor of Economics
Dan Loy, ISU professor of Animal Science
Joe Lally, ISU program coordinator
Rachel E. Martin, former Iowa Beef Center communications specialist

IBC Iowa Beef Center
IOWA STATE UNIVERSITY

Beef Feedlot Systems Manual

Iowa's cattle feeding industry is an important part of the state and local economy. More importantly, it is a significant enterprise on several thousand Iowa farms. Cattle feeding adds value to corn and forages; more fully employs farm resources such as labor, facilities, and machinery; and provides profit opportunities for skillful managers. Iowa producers also are reinvesting in feedlots to modernize, improve environmental performance, and expand their businesses to capture emerging opportunities. Growth of ethanol production is creating opportunities for cornbelt cattle feeders and consumer demand for beef has turned the corner after a long downward trend -- moving cattle prices to a new level.

Iowa is the leading state in ethanol production, which has important implications for Iowa's cattle feeding sector. Each bushel of corn converted to ethanol produces approximately 17 pounds (air dry basis) of distillers grains and solubles (DGS), a high quality feedstuff for cattle. DGS works particularly well in feedlot rations and has a higher feed value wet than dry, resulting in a win-win situation for ethanol plants and nearby cattle feeders. Inclusion rates of DGS to 20-40% or more of the dry matter in the ration can significantly reduce cost of gain for feedlots. While early in the transformation, bio-renewable production will have a significant impact on Iowa by increasing the demand for corn. It also creates a significant opportunity for cattle feeders near ethanol plants.

Demand for high quality beef has fueled value-based marketing systems that reward the type of cattle Iowans produce. As a result, innovative marketing programs and alliances have emerged, giving Iowa feeders more choices as to where and how to sell their cattle. Value-based, or grid marketing is rewarding cattle with superior quality grade.

At the same time that the cattle feeding sector is poised for growth, there is increasing environmental scrutiny of agriculture in general and open feedlots in particular. Concerns raised by citizens and organized groups about ground and surface water quality are forcing regulatory agencies such as the Environmental Protection Agency (EPA) to step up enforcement of existing laws and consider new ones. Many of the regulations date back to the Clean Water Act of 1972 or major revisions to Iowa's laws in 1987. The 2003 revisions to the Concentrated Animal Feeding Operations (CAFO) regulations will require nutrient management plans and greater public input to the permit process for CAFOs. While all Iowa producers must work to protect the waters of the state, feedlots with more than 1,000 head of capacity must now adhere to specific regulations regarding runoff control and manure nutrient application. Feedlots considering expansion or new construction must be aware of 1) the environmental regulations and 2) how facility design will impact which regulations apply and their resulting costs.

This publication describes and evaluates five alternative feedlot designs at three different size levels. The designs incorporate necessary environmental control features appropriate for each feedlot size under the regulations at the date of publication. The analysis incorporates differences in animal performance, initial investment costs, annual operating cost, and cost of gain.

As with any modeling analysis, the results depend heavily on the assumptions, and we will explain the assumptions and the reasoning behind them as we proceed. Also note that this analysis is based on new construction, including overhead items such as feed storage, cattle handling facilities, and feeding equipment. Existing feedlots may already have made these investments. The analysis assumes a high enough level of management to meet the performance goals stated.

As producers evaluate the alternative facility designs they must keep in mind the need to:

- create a cattle environment to achieve the target performance,
- protect water quality and be neighbor friendly,
- recognize that soil type, rainfall, slope, drainage, etc., are site specific and affect choices,
- facilitate and encourage proper observation, movement, and management of cattle to assure that they perform well and people stay safe when working cattle.

These objectives can be achieved in a variety of ways in any of the designs considered. Likewise, improper management of even the best designed facilities will produce unsatisfactory results from the cattle and facility.

Iowa Cattle Feeding Economics

Regional Advantage

Iowa has several cattle feeding advantages. The most obvious is the availability and price of corn and corn processing coproducts. During the period 1994-2003, Iowa corn prices averaged from as little as $0.10/bu under southwest Nebraska prices, to as much as $0.35/bu less than in parts of the Texas cattle feeding region. One concern often raised about feeding cattle in Iowa is that of competition for fed cattle from packers, relative to other regions. During the same 1994-2003 period, Iowa fed cattle prices averaged more than other regions on a shrink adjusted live price (Table 1).

It is often thought that much of the corn price advantage is given back in poorer performance related to Iowa's weather. However, feedlot closeout analysis indicates that Midwest feedlots have comparable performance, superior quality grade, and a cost of gain advantage over the Central and High Plains (Table 2). Midwest feedlots tend to use more feed per pound of gain and have more Yield Grade 4 and 5 and Heavy carcasses. To achieve this level of performance, feedlots must be well designed and managed.

Table 1. Average Live Cattle, 1994-2003 for Iowa and Leading Feedlot States

	Texas	Colorado	Kansas	Nebraska	Iowa
Shrink	4%	4%	4%	3%	3%
Average Price	$68.73	$68.71	$68.71	$68.43	$68.52
Shrink adjusted live price	$65.95	$65.96	$65.96	$66.38	$66.45

Table 2. Regional BenchMark Steer Data, 2004-2006

Region	ADG **lbs**	F/G **ratio**	COG **$/lbs**	VM **$/head**	PR+CAB **%**	Choice **%**	Outs **%**
Central Plains	3.26	6.31	0.55	13.85	5.89	41.56	11.32
High Plains	3.02	6.38	0.56	13.27	3.80	42.31	9.43
Midwest	3.18	7.10	0.51	13.28	9.68	56.01	19.52
North Plains	3.28	6.58	0.52	13.82	9.34	49.19	12.31

Source: VetLife, BenchMark, Outs include YG 4 & 5 and Heavy and Light Carcasses

Historical Perspective

Feeding cattle in Iowa generally has been profitable during the most recent 10 years. On average, steer calves made a profit of $31 per head over all costs and yearlings averaged $28 per head over the same period (Figure 1). These averages were influenced by exceptional profits in 2003. More typical profits are closer to $20/head for a 6 month feeding period and require approximately $150-200/head equity investment. There is a strong seasonal pattern to profitability (Figure 2). Calves sold during the first six months of the year produced larger average returns than sales in the second half of the year. Yearlings are generally less profitable when sold in the summer months and more profitable sold in the fall. Naturally, there are exceptions to these seasonal patterns.

Cattle feeding returns are not without their risk and there are tools available to help producers manage this risk. Live cattle futures is one tool to reduce price risk. For the 1990-2005 period, futures could be used to hedge a profit in feeding yearling cattle in 65 percent of the trading days during the feeding period (**www.econ.iastate.edu/outreach/agriculture/periodicals/ifo/IFO_2006/ifo061506.pdf**). In addition to futures and options on futures, Livestock Revenue Protection and Livestock Gross Margin Insurance are two relatively new products to reduce price risk.

Figure 1. Estimated returns per head feeding steer calves and yearlings in Iowa

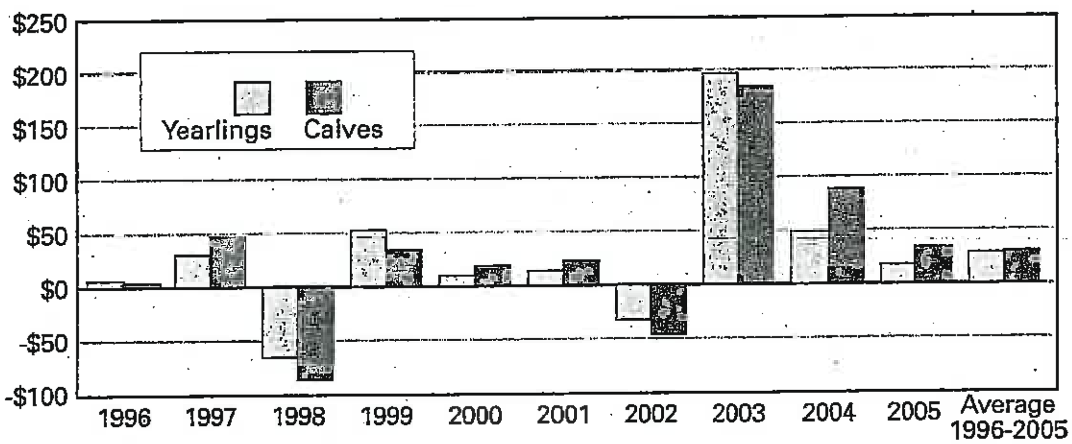
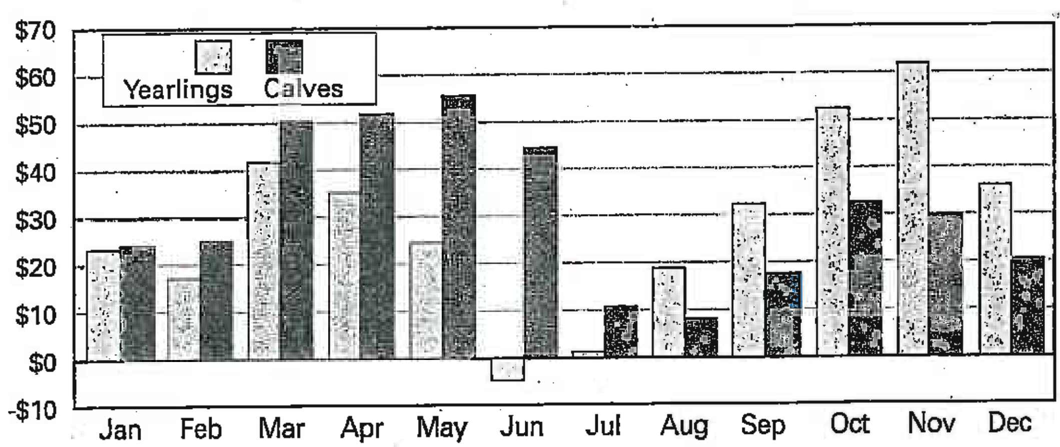


Figure 2. Average estimated return per head by selling month, 1996-2005



A New Strategy for a New Agriculture

Increasing ethanol production is significantly changing Iowa agriculture. Cattle feeders should evaluate their current business in the light of this new environment.

A traditional view of cattle feeding is as a corn marketing strategy. Prorating the profits and losses from the Estimated Returns Series for yearling cattle back on a per-bushel-of-corn-fed basis reveals what many Iowa cattle feeders have known all along. Feeding cattle adds value to the corn they raise.

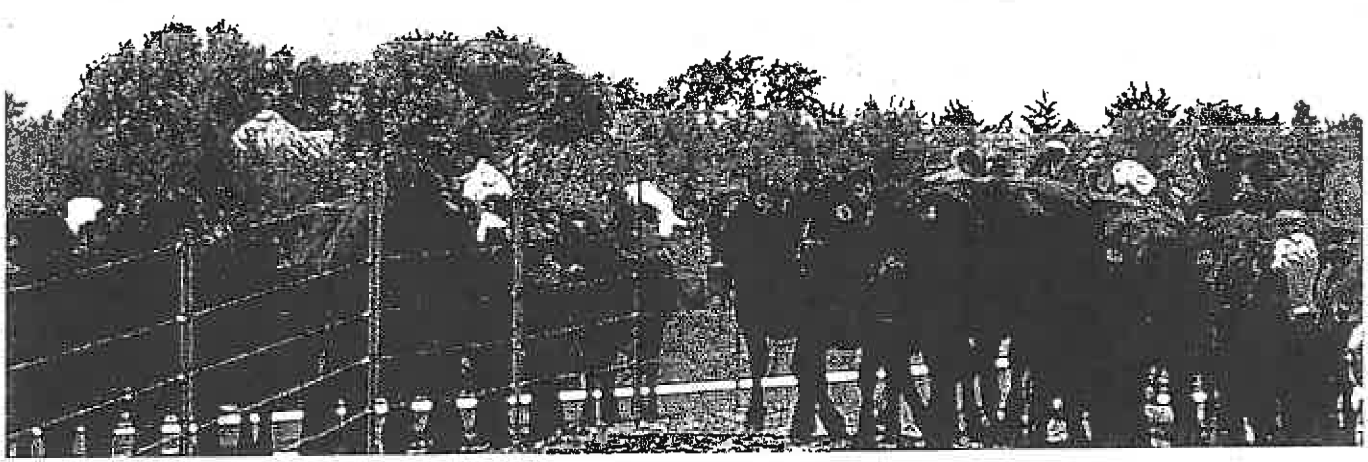
For the 15 years, 1988-2003, the average corn price at north central Iowa elevators in October was $2.17/bu. Selling equal amounts of corn each month averaged $2.26 and selling at the highest monthly average price each year averaged $2.55. If the producer prices the corn into the cattle each month and sells cattle each month the average value of corn through cattle was $2.58/bu. Marketed through cattle corn price was higher than the October price in 11 of 15 years and higher than the highest monthly price in 9 of the 15 years (**www.iowabeefcenter.org/content/MarketingCornThroughCattleStillWorks.pdf**). Cattle feeding has more upside potential for corn prices, but cattle feeders need to manage cattle price risk.

With the rapid increase in ethanol production, corn farmers are less concerned about adding value to corn via cattle feeding and are more interested in the profit advantage of feeding the corn coproducts to cattle. Depending on the distance the feedlot is from the ethanol plant and the relative price of wet distillers grains (WDG) to dry corn in the ration, the profit increase from feeding WDG is significant.

One strategy is for Iowa farmers to benefit from selling higher priced corn to ethanol processors and buying and feeding the increasingly plentiful distillers grains to cattle. Because of the proximity to ethanol production, Iowa feedlots have a competitive advantage over regions with higher cost distillers grains.

A second strategy is for farmers to produce the same amount of corn as before, but increase the number of cattle fed by 20-40 percent by purchasing corn coproducts to add to the ration.

Increasing ethanol production and its demand for corn is changing agriculture. Feedlot cattle can use corn coproducts better than other species and producers located near the plants will have greater access to these products at lower costs than will other cattle feeding regions. Expanding or upgrading feedlot capacity may be a method to effectively capture opportunities that the bioeconomy is creating.



Beef Cattle Feedlot Systems

Feedlots in Iowa are many and varied. Beef feeding in Iowa has not undergone the consolidation that has occurred in other species or other parts of the United States. Many small feedlots still exist. Although there is a wide range of facility types in the state, most feedlots in Iowa can be classified into one of five different feedlot systems: 1) earthen lot with windbreak, 2) earthen lot with shed, 3) concrete lot with shed, 4) complete confinement building with solid floor, and 5) complete confinement building with slatted floor. Facilities may vary greatly from feedlot to feedlot particularly as they relate to shelter and feedlot layout. Each of these systems will have different investment costs and will lead to different levels of animal performance. The facilities examined here are based on a number of general assumptions in order to assign costs.

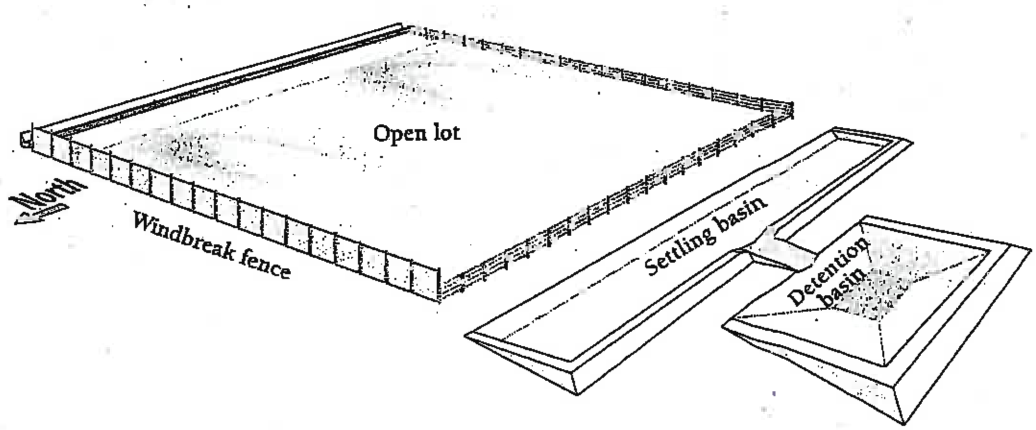
Overall assumptions for all systems include the following:

- Each pen contains 150 head.
- One foot of bunk space per head for all systems.
- Earthen lots have 16-foot wide concrete aprons under the feedbunks.
- Outdoor lots under 1,000 AU have settling basins designed for a 2.5 inch storm.
- Outdoor lots over 1,000 AU have settling and detention basins designed for a 5.2 inch storm.
- No cost estimates were made for water supplies; consult local experts for water supply issues.
- Manure hauling expenses are based on commercial rates.
- All lots assume fence and gates at $10 per foot.

Earthen Lot with Windbreak

In this system, cattle are fed in an open earthen lot with no shelter. An 8-foot high windbreak fence provides some protection against adverse weather. The open lot allows 250 square feet of space per animal. Thirty square feet per head of mound space is provided as a dry resting area. Permanent solid fencing surrounds the lot and a gravel drive lies adjacent to the fence-line feedbunk. Diversions on the upper side of the feedlot direct runoff away from the lot so only what falls on the lot must be handled. A settling basin located on the lower side of the feedlot removes solids from lot runoff and releases the settled liquid to a grassed filter area for lots of less than 1,000 AU or to an engineered detention basin for lots of more than 1,000 AU. The settling and detention basins meet current state and federal pollution control standards. A 16-foot wide concrete apron is used along the feedbunk.

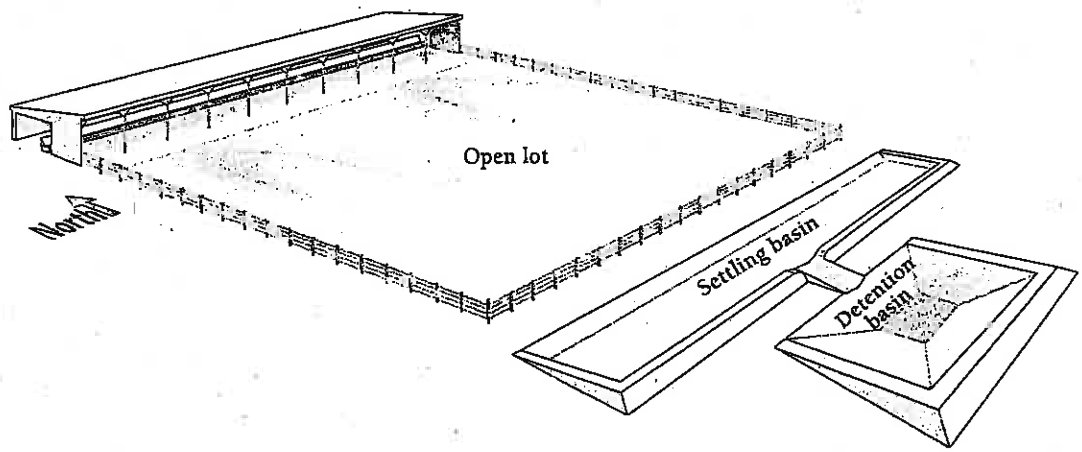
Figure 3. Earthen Lot with Windbreak



Earthen Lot with Shed

This system uses a shed that provides 25 square feet per head inside and an earthen lot that provides an additional 225 square feet per head outside. The shed is a 42-foot wide post frame, uninsulated building with a concrete floor that extends 12 feet outside the building posts. It is open on the feedlot side with a ventilation curtain on the back side. Rain gutters keep roof water out of the feedlot. The feedbunk is located inside the building along with a 14-foot wide feed alley. Mounds are included as a resting area for the cattle and are sized for 30 square feet per head. Water diversion and manure management are similar to the earthen lot with windbreak.

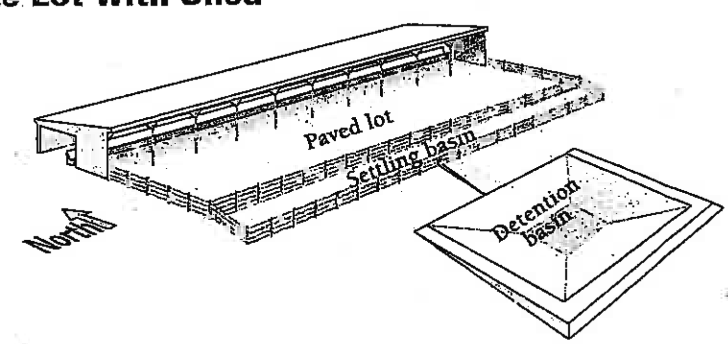
Figure 4. Earthen Lot with Shed



Concrete Lot with Shed

This system uses a shed that provides 20 square feet per head inside and a paved lot that provides an additional 50 square feet per head outside. The shed is a 36-foot wide post frame, uninsulated building with a concrete floor. It is open on the feedlot side with a ventilation curtain on the back side. Rain gutters keep roof water out of the feedlot. The feedbunk is located inside the building along with a 14-foot wide feed alley. Because these pens are relatively small, manure must be scraped often, at least weekly. A concrete settling alley below the pens settles solids from runoff and serves as a sorting and handling alley. Water diversion and manure management are similar to the earthen lots. Bedding is not generally used in this system.

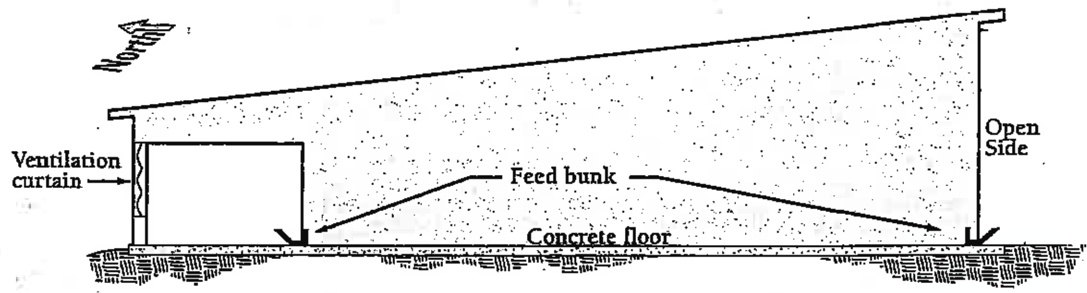
Figure 5. Concrete Lot with Shed



Complete Confinement Building with Solid Floor

This system uses an uninsulated building approximately 100 feet wide, with two sets of fence-line feedbunks. One bunk is filled from a driveway inside the north wall of the building, the other bunk is filled from outside the south wall of the building. The building provides 40 square feet of pen space per animal. The concrete floor is bedded to create a manure-bedding pack in the middle of the pens. Some wet manure may be removed weekly from the areas along the feedbunk. The high open wall on the south and a ventilation curtain along the north provide natural ventilation. All manure is handled as a solid. Space is provided in the building for manure storage between hauling periods. Narrower buildings with a single row of bunk can be built at similar cost.

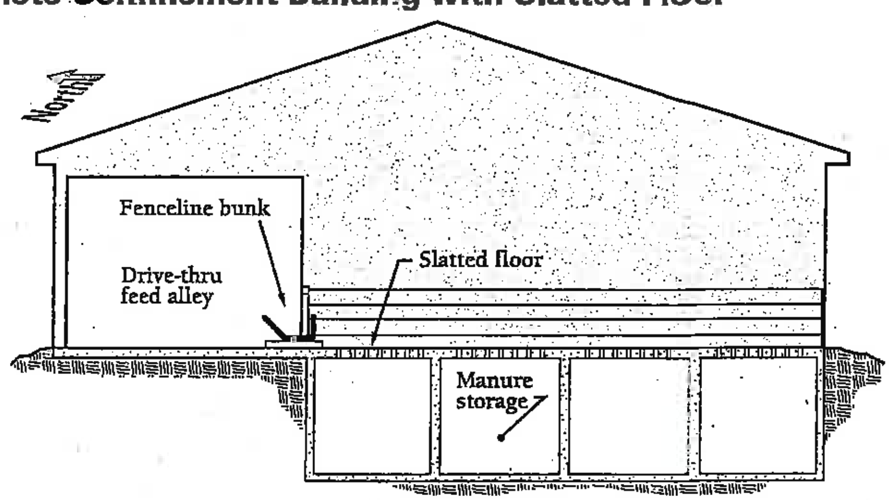
Figure 6. Complete Confinement Building with Solid Floor



Complete Confinement Building with Slatted Floor

Cattle fed in this typical deep-pit facility are confined inside an uninsulated building with a drive-through feeding alley. The building, typically 40 feet wide, is divided into several 150-head pens, each allowing 25 square feet per head. A fenceline bunk runs lengthwise through the building and allows one foot of space per animal. The pen floor is totally slatted with concrete slats over an 8-foot deep pit. The pit is designed to be pumped twice per year. The building has a ventilation curtain on the north, an open south side, and an open ridge to facilitate natural ventilation..

Figure 7. Complete Confinement Building with Slatted Floor



Manure Management

The change in commercial fertilizer costs since 2001, especially nitrogen and phosphorus, has renewed interest in using manure nutrients in crop production. In fact, manure plans now are created to show the supply of manure nutrients and the crop acres that are in greatest demand for those nutrients. Manure plans are an agronomic management tool that protects the environment when implemented correctly.

All cattle feedlots of more than 1,000 head are required to have a National Pollution Discharge Elimination System (NPDES) permit issued by the Department of Natural Resources (DNR) and implement a Nutrient Management Plan (NMP) by the summer of 2007. Smaller cattle feedlot operations will follow state-specific rules and regulations regarding manure control, storage, and nutrient management plans. In Iowa these regulations are minimal. Even if not required by regulations, nutrient planning and land application have important agronomic considerations.

Regulated NMPs must meet specific criteria outlined in state law and rules. This includes incorporating crop needs with application rates, identifying the specific land where manure will be applied, and specifying planned application methods and timing. Nutrient Management Plans (NMPs) must now include the Natural Resources Conservation Service (NRCS) Phosphorus Index (P Index) rating for each field. The P Index estimates the potential for P losses from a field based on landscape features, soil test P, and soil conservation and nutrient management practices. The specific regulations differ by state, but for Iowa when animal manure or other organic byproducts are applied, NMPs must be developed using a crop removal rate based on either nitrogen or phosphorus. Whether the planning process uses nitrogen or phosphorus depends on several conditions including soil test P, crop rotation, crop yields, P Index rating, manure analysis, manure application rates, and the field land treatments and conservation practices.

The P Index identifies the risk of nutrients reaching waters of the state. Depending on the risk category of the field, the farmer may apply manure at a nitrogen rate (lower risk categories), on a phosphorus rate (higher risk categories), or not at all on very high categories. See Table 4 for risk category criteria for phosphorus.

Operations with an NPDES permit must apply manure based on the DNR P Index Risk Categories. Operations that are not permitted by DNR, but follow a Comprehensive Nutrient Management Plan (CNMP) from NRCS must follow the NRCS P Index Risk Categories. The NRCS procedures are good recommendations to follow to protect water quality for operations not required to have an NMP or CNMP.

Most nutrient management plans are Nitrogen utilization plans:

- Manure may be applied to all crops at a rate equal to the nitrogen removal rate (calculated by an approved method) by the harvested crop.
- Applying manure for multiple crop years is acceptable for phosphorous only. This is an accepted practice as long as the nitrogen does not exceed the application year's crop nitrogen demand.

It is important to access correct manure nutrients and characteristics to develop accurate and realistic site-specific nutrient management plans. Understanding the supply of nutrients available for crop demand in manure teamed up with accurate application and incorporation of the manure will ensure full use of the manure's value.

The following (Table 3) are estimates of nutrients excreted in beef feedlot manure on a per head produced basis according to PM 1811, ISU(1999).

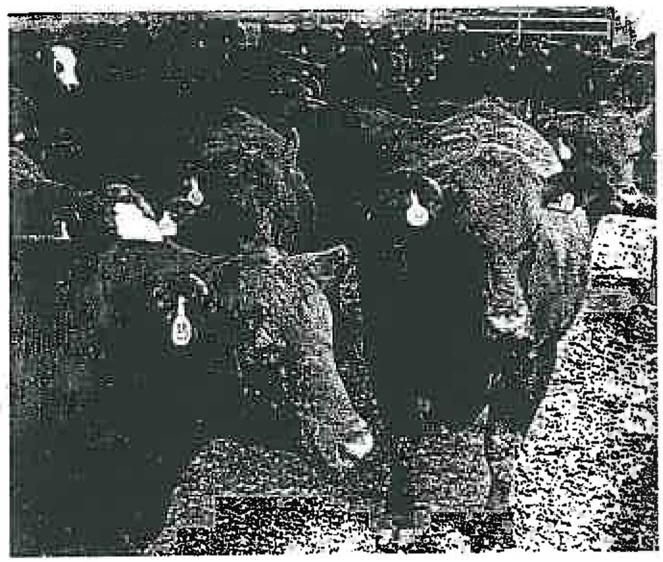


Table 3. Estimated Manure Nutrients

	lbs N	lbs P_2O_5	lbs K_2O
Solid, bedded manure from open lots (scraped)/Ton [1]	**22**	**16**	**14**
Solid manure from Confinement solid floor/space/yr [2]	**84**	**54**	**78**
Liquid manure from deep pit/space/yr [3]	**95**	**59**	**83**
Liquid runoff from open earthen lots/space/yr [3]	**5**	**2**	**11**

[1] based on an estimate of 3 Tons of manure produced per head per year

Due to the extreme variation of manure nutrients from excretion to field application, each feedlot should establish a site specific, 3 year history of manure analysis by sampling fresh feedlot manure scrapings in early winter, early spring, and summer stockpile, plus manure accumulated in sediment control structures (at time of cleanout), and runoff control ponds prior to irrigation. Significant ration changes will create a need to re-sample manures.

A recent 10 year study of open feedlot manure analysis at the University of Nebraska found 0.14 pounds of harvested manure nitrogen per head per day, and 0.07 pounds of phosphorus per head per day (2006 Nebraska Beef Report)

[2] Small sampling of actual manure analysis

[3] PM 1811, ISU

Table 4. Risk Category Criteria for Phosphorus

Department of Natural Resources (DNR) P Index Risk Categories:	Natural Resources Conservation Service (NRCS) P Index Risk Categories:
Very Low, 0-1 Manure shall not be applied in excess of a nitrogen-based rate.	**Very Low, 0-1** A field in which movement of P off-site will be very low. If soil conservation and P management practices are maintained at current levels, impacts on surface waters from P losses from the field will be small.
Low, >1-2 Manure shall not be applied in excess of a nitrogen-based rate.	**Low, >1-2** A field in which movement of P off-site will be low. Although the P delivery to surface water bodies is greater than from a field with a very low rating, current soil conservation and P management practices keep water quality impairment low.
Medium, >2-5 Manure may be applied at a nitrogen-based rate if current or planned soil conservation and phosphorus management practices predict the rating of the field to be not greater than 5 for the next determination of the phosphorus index. Manure shall not be applied in excess of two times the phosphorus removed with crop harvest over the period of the crop rotation.	**Medium, >2-5** A field in which movement of P off-site will be medium. Impacts on surface water resources will be higher than for the field with a low rating, and the P delivery potential may produce some water quality impairment. Careful consideration should be given to further soil conservation and P management practices that do not increase P delivery to surface water.
High, >5-15 Manure shall not be applied on a field with a rating greater than 5 and less than or equal to 15 until practices are adopted that reduce the phosphorus index to at least the medium risk category. However, prior to December 31, 2008, fields with a phosphorus index greater than 5 and less than or equal to 10 may receive manure at a phosphorus-based rate if practices will be adopted to reduce the phosphorus index to the medium risk category.	**High, >5-15** A field in which movement of P off-site will be high. Water quality impairment will be large. Remedial action is required to reduce P movement to surface water bodies. New soil and water conservation and/or P management practices are necessary to reduce off-site P movement and water quality degradation.
Very High, >15 Manure shall not be applied on a field with a rating greater than 15.	**Very High, >15** A field in which movement of P off-site will be very high. Impacts on surface water resources are extreme. Remedial action is required to reduce P delivery to surface water. All necessary soil and water conservation practices plus a P management plan, which may require discontinuing P applications, must be put in place to reduce water quality impairment.
For more information **http://www.iowadnr.com/afo/mmp.html#phosphorus**	**For more information** **http://www.ia.nrcs.usda.gov/technical/Phosphorus/phosphorusstandard.html**

Increased use of ethanol byproduct feed ingredients in livestock rations has changed the traditional assumptions of manure nutrients. A comparison is listed in Table 5 that illustrates a range from a corn and forage base ration to rations that replaced 10 percent, 20 percent, 30 percent, and 40 percent of the corn with byproduct from ethanol production. Analyses also were performed increasing the diet crude protein and phosphorous concurrently as byproduct use increased. Scenarios were developed for 2-year application rates for P with various crude protein and phosphorous levels. All these variables were compared for continuous corn (CC) and corn-soybean (C-SB) crop rotations to analyze the crop rotation effect. Nutrient values were set at $0.19/lb for N; and $0.26/lb P for a 2,500 head lot capacity case study. Assume manure applied to fields that can assimilate all nutrients in the manure.

Table 5. Impact of Corn Coproducts on Manure Application

	Manure applied on 2-year P removal basis									
	Continuous Corn					Corn-Soybean				
P % in diet	base diet	10%	20%	30%	40%	base diet	10%	20%	30%	40%
(DM basis)	0.29	0.34	0.39	0.44	0.49	0.29	0.34	0.39	0.44	0.49
Tons/A	12.0	9.8	8.3	7.2	6.4	9.2	7.5	6.4	5.5	4.9
acres	500	620	730	840	950	660	810	950	1100	1250
Cost of manure/hd	$3.40	$3.60	$3.90	$4.10	$4.40	$3.70	$4.10	$4.40	$4.70	$5.10
Net value manure/hd	$2.90	$3.70	$4.70	$5.70	$6.70	$1.80	$2.50	$3.40	$4.20	$5.00

*excerpts from 2006 Nebraska Beef Report

The 3 factors that influence the actual plant available nutrients following animal excretion are:

- Manure handling/storage/application management
- Time between excretion and field application
- Environmental factors (temperature, moisture, wind speed, etc.)

Hauling manure to the field within 7 days of excretion will provide the highest nitrogen content to the crop. Composting manure within 7 days of excretion will produce the next most valuable manure product in terms of nitrogen content. Handling manure by cleaning the pen once a year contributes to the greatest nitrogen loss from manure.

Site specific manure production, quantities handled/applied coupled with accurate manure analysis, good crop production yield records, and calibrated manure application equipment will help ensure that the Nutrient Management Plan outlined will reward the feedlot with lower cost of production and improved environmental stewardship.

Sample feedlot record keeping forms that will track the National Pollution Discharge Elimination System (NPDES) requirements as well as the operational management needs can be downloaded at: **www.heartlandwq.iastate/manure**

Iowa NRCS P Index can be found at:

www.ia.nrcs.usda.gov/technical/Phosphorus/phosphorusstandard.html

Feedlot Performance and Facility Type

Facility design that improves animal comfort also may improve cattle performance. A considerable amount of research was conducted, primarily in the 1970s, that evaluates cattle performance and facility type. A summary of this research is shown in table 6.

Considerable variation exists in these studies. However, there appear to be certain consistent trends. Those include reduced feed intake in total confinement and improved efficiency in open lots when shelter is provided. The more recent 10-year analysis of 1,836 Iowa closeouts showed similar confinement and shelter effects on feedlot performance. Based on the early studies, it was assumed that cattle fed in open lots with shelter would be 5 percent more efficient than cattle fed in open lots without shelter. It also was assumed that confinement cattle consume 5 percent less feed, but are 2-3 percent more efficient than cattle fed in open lots. Average performance assumptions for calves and yearlings were based on recent closeouts summarized in the State of Iowa Summaries (Wilson and Loy, various issues). The average performance was then adjusted for facility type based on the previously stated assumptions.

Limited experimental data exist on the relative performance of cattle fed in solid-floor total-confinement systems. It was assumed that cattle performance in these systems would be similar to the open lot with shelter system, based on closeouts from systems in South Dakota and early research from Iowa State University and South Dakota State University. The performance assumptions for steer calves and yearlings for each of the facility types is shown in table 7.

Table 6. Feeding Trial Summaries *Confinement and Shelter Effects on Feed Intake and Feed Efficiency*

Feeding Trials	% Change	
Confinement vs. open lots w/o shelter	**Feed Intake**	**Feed Required Per Lb. Gain**
Iowa State (Allee, 1970-75)	-7.90	-6.80
Iowa State (Allee, 1978-83)	-9.10	2.10
Minnesota (Morris, 1970-76)	-0.60	-4.50
Minnesota (Morris, 1977-78)	6.00	-5.10
Nebraska (1974-75)	-3.50	-1.00
Missouri (Commercial feedlot, 1974-82)	-12.00	-1.00
Iowa State (Closeout summaries, 1988-97)	-6.00	-1.00
Shelter vs. no shelter in open lots		**Feed Required Per Lb. Gain**
Iowa State (Allee, 1970-75)		-9.20
Iowa State (1978-83)		-5.50
Minnesota (Morris, 1970-76)		-2.40
Minnesota (Morris, 1977-78)		-6.70
Henderson & Geasler, 13-study summary		-5.00
Iowa State (Closeout summaries, 1988-97)		-3.00

Table 7. Feed Usage Assumptions of Yearling Steers and Steer Calves Fed in Differing Facility Types

	Yearling Steers			Steer Calves		
	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.
Ave. Daily Gain (lbs)	3.14	3.29	3.05	2.95	2.95	2.72
Feed/gain, Dry Matter	7.25	6.90	6.90	6.85	6.50	6.65
Dry Matter intake (lbs)	22.80	22.80	22.80	20.20	20.20	19.20
Days on Feed	159	152	164	203	194	207

Feedstuffs used for feedlot rations are quite variable in Iowa. Many feeders harvest the majority of their feedstuffs from their own grain operations. The required type of storage ranges from dry commodity storage to fermented feeds including silage and high moisture corn. Other feeders rely more heavily on purchased feeds, including byproducts and other commodities. In this analysis the system that allows the most flexibility and incorporates only 2 to 3 weeks storage of processed feeds was chosen. If the producer chooses to incorporate longer-term storage, including silage bunkers, additional costs should be assumed. The rations used in this analysis included dry rolled corn, tub ground hay, modified distillers grains (MDG, 50 percent of dry matter) and supplement (vitamin-mineral premix). Obviously, many other feedstuffs and successful feedlot rations exist. This one is somewhat common statewide and includes flexibility. The total feed requirements for steer calves and yearlings by facility-type assumed in the economic analysis are shown in table 8.

Table 8. Feed Requirements for Yearling Steers and Steer Calves Fed in Differing Facility Types

	Yearling Steers			Steer Calves		
	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.	Open Lots (no shelter)	Sheltered Open Lots Partial Confine. Solid-floor Confine.	Total Confine.
Corn (bu.)	47.70	45.60	46.80	49.30	47.10	47.80
Hay (ton)	0.213	0.204	0.210	0.362	0.346	0.350
Distillers Grain (50% dm-ton)	0.906	0.866	0.890	1.025	0.980	0.994
Supplement (lb.)	97	92	95	128	122	124

Feed Storage

Commodity feed storage is needed for holding corn, ground hay, MDG, and supplement. The following assumptions were made to calculate the price. The shed was a monoslope building with bins that were 12 feet wide, 36 feet deep with a wall height of five feet. Corn and coproducts were stored to a height of five feet. Ground hay was blown in, to a height of 10 feet.

Construction cost was $9 per square foot. Supplement was stored in a steel bulk bin.

The following feed delivery assumptions were used to calculate prices. Corn and coproducts were delivered once per week for the 750 and 1,500 head feedlots, and twice per week for the 5,000 head feedlot. Hay was ground and blown into the shed once every two weeks for all the operations. Supplement would be delivered every two weeks for all operations. The summary of estimated feed storage costs by storage facility is shown in table 9.

Table 9. Estimated Feed Storage Facility Costs

	Operation Size		
	750 Head	1,500 Head	5,000 Head
Corn Bins	1	2	4
Ground Hay Bins	1	2	7
Coproducts Bins	1	2	3
Commodity Shed Bins	$9,750	$19,500	$50,000
Supplement Bulk Bin (tons)	3	6	20
Bulk Bin Cost	$1,260	$1,910	$5,040
Total Cost	$11,010	$21,410	$55,040

Feedlot Systems Cost Analysis

The initial investment required to construct each of the five feedlot systems described earlier is summarized in tables 10-14 (pages 19-23). For each system, the cost of a facility with a one-time capacity of 750 head, 1,500 head, and 5,000 head is shown. All systems are designed to meet EPA guidelines.

It was assumed that the land was already owned; hence, no investment cost is shown for land. However, if a site for the feedlot must be acquired, this investment cost should be added. The estimated number of acres needed for the feedlot and the environmental structures is shown for each system and capacity. Also, well capacity and cost are site specific and are not included here.

All other items reflect a new purchase or construction cost, including design fees. For many feeders, some of the items listed already may be available.

Tables 10-14 also show the annual cost of owning and maintaining each feedlot. In table 15 (page 24) the assumed depreciable life is shown for each component. With proper care, however, most of the components should be functional for a considerably longer period.

A capital recovery charge based on the expected life and an annual interest charge of 6 percent on the value of the investment was included. Annual insurance costs and property taxes were estimated at 1.5 percent of the initial investment. A rental charge or opportunity cost for land of $125 per acre per year also was included.

The assumed repair-cost rates also are shown in table 15. These indicate expected annual repair and maintenance costs as a percent of the initial investment. No maintenance for earthwork mounds in the earthen lots is shown. Rather, it was assumed that they would be rebuilt every five years.

Besides the annual ownership costs, each system has different costs for manure handling, labor, and feed rations. The estimated costs for moving both solid and liquid manure are shown in tables 18-20. These were based on custom handling charges of $1.50 per ton for solid manure and $0.01 per gallon for liquid manure. Labor costs were charged at a rate of $10.00 per hour. An average labor requirement of two hours per head for yearling steers and three hours per head for steer calves was assumed.

The time required to scrape lots or buildings for each 150-head pen was assumed to be 0.50 hours per week for the two earthen lot systems; 0.75 hours per week for the concrete lot with shed; and 0.50 hours per week for the solid floor confinement system plus a bedding cost of 5 pounds per head per day was used at one cent per pound. For the confinement building with slatted floors, no labor for scraping was included. The systems have different manure quantities and handling costs, but when put on a per head per day basis they are identical when rounded to the whole cent.

Feed usage assumptions for each system and for yearling steers and steer calves are summarized in table 7. To estimate the cost of each ration the following feed prices were used:

Corn	**$2.30 per bushel**
Hay	**$60 per ton**
Modified Distillers Grains...	**$39.10 per ton**
Supplement	**$0.16 per pound**

These values reflect average prices over the past decade.

Other non-feed costs are summarized in table 16 (page 24). These were assumed to be the same for each of the five systems analyzed.

Tables 18, 19, and 20 (pages 25-27) summarize the total costs of gain for each of the systems, at three different capacities. For yearling steers, two turns of cattle per year were assumed, while for steer calves only one turn was assumed. Costs for each component of the systems for each type of cattle are calculated per head, per head per day, and per pound of gain.

Feedlot Systems Summary

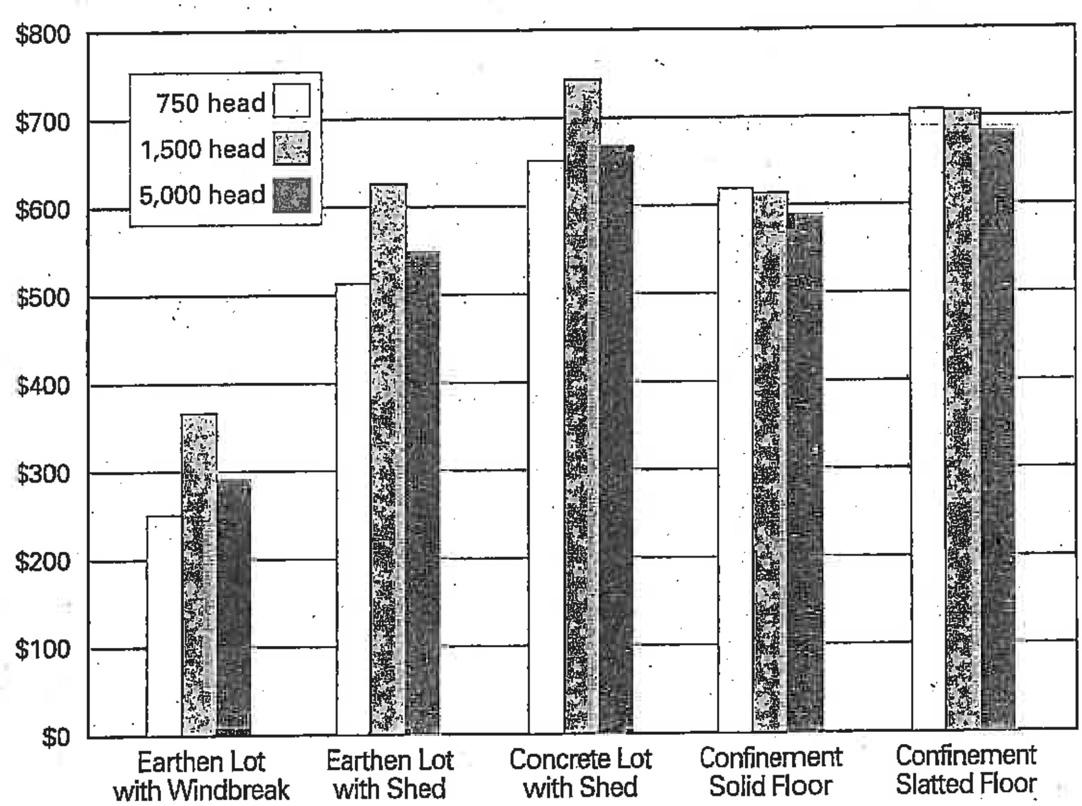
Perhaps the best way to compare the different feedlot designs is at the bottom line. Each design includes the initial investment, operating costs, and animal performance and they all meet current environmental requirements. Where should producers invest their money?

Figure 8 compares the initial investment per head across the systems. Note that there is little difference between the 750 and 5,000 head lots on a per head basis. The 1,500 head investment is higher because of the additional environmental cost that the 750 does not have. The 5,000 head feedlot is able to spread these costs over more cattle, reducing the per head costs. Adding the shed to the earthen lot more than doubles the initial investment for the 750 head lot and increases it 80 to 90 percent in the larger lots.

The earthen lot is approximately one-third the cost of total confinement with slatted floors. The earthen lot with shed and concrete lot with shed have comparable initial investment. The concrete lot has higher animal density and less runoff to control than the earthen lot, and thus has a lower cost of environmental compliance.

Ownership and operating costs including the facility, bedding, manure hauling, fuel and utilities, health, marketing, and labor are summarized in figure 9 (page 17) for yearling steers assuming two turns a year. The costs range from $81.44 for the earthen lot with windbreak to $108.37 for solid floor confinement.

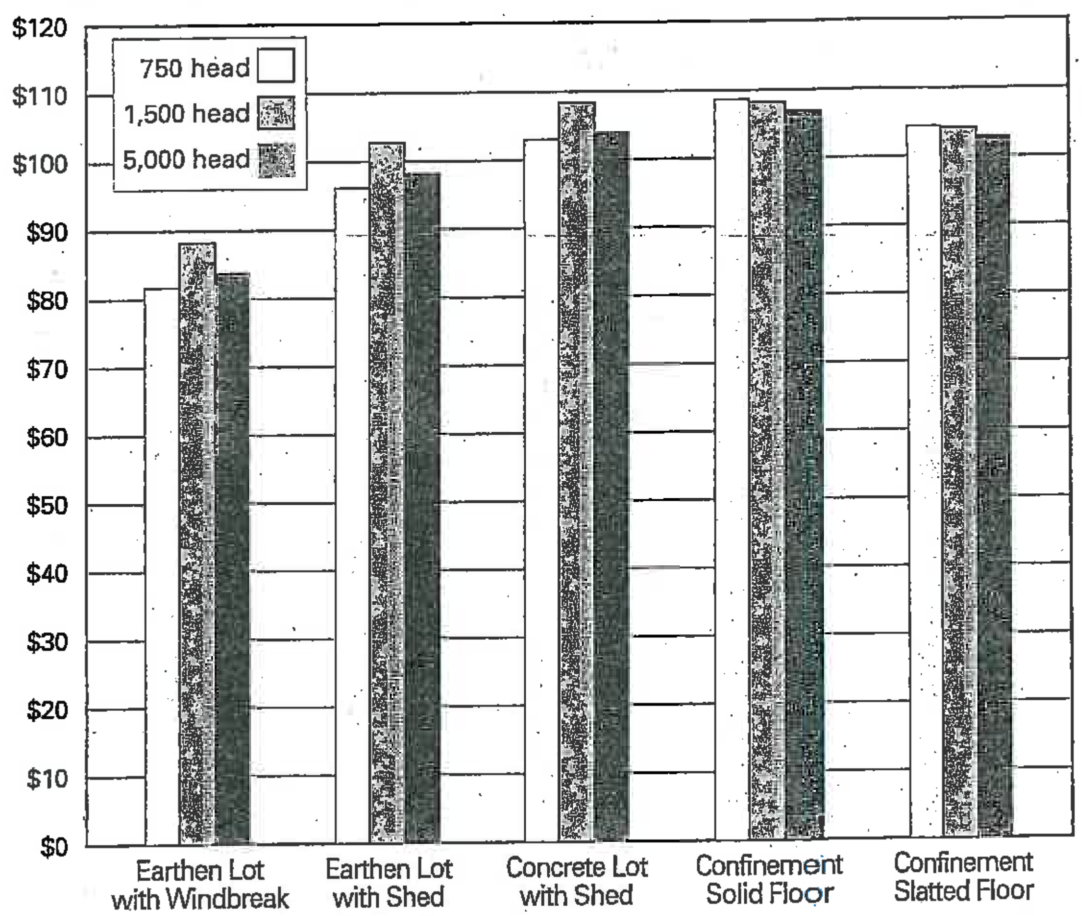
Figure 8. Initial Investment per Head by System and Size



The differences between the systems decline when compared on a cost-of-gain basis. Comparisons of the systems for two turns of yearlings and one turn of calves each year are shown in Tables 18-20. It also incorporates feed costs, and therefore animal performance differences, with the investment and operating costs. The difference between calves and yearlings is relatively small in part because the calves gain more pounds per head than do yearlings and have about 10 percent lower feed cost per pound of gain. The cost-of-gain numbers are similar across the systems ranging $0.04/lb from low to high on the yearlings, and $0.07/lb on calves. For all sizes of feedlots, the earthen feedlots have the lowest cost of gain. The other feedlot types all had very similar costs of gain.

Another analysis of interest to many producers is the daily operating costs that reflect a yardage charge. Table 17 is an estimate of the daily yardage cost based on an 85 percent occupancy.

Figure 9. Ownership and Operating Costs (nonfeed) per Head of Yearling Steers



Appendix

Table 10. Initial Investment for System 1, Earthen Lot with Windbreak

	Investment			Annual Cost		
Facilities and Equipment	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Land (acres)	5.7	13.1	43.6	$717	$1,636	$5,452
Building	0	0	0	0	0	0
Concrete	$69,000	$135,000	$450,000	$6,778	$13,261	$44,202
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$37,500	$67,500	$212,500	$4,582	$8,247	$25,964
Site preparation	$7,500	$15,000	$50,000	$699	$1,398	$4,661
Windbreaks	$9,000	$18,000	$60,000	$1,100	$2,199	$7,331
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Subtotal	**$170,760**	**$332,910**	**$997,040**	**$19,185**	**$37,372**	**$111,843**
Environmental Structures	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Engineering costs	$5,000	$50,000	$50,000	$466	$4,661	$4,661
Construction costs	$11,250	$90,000	$300,000	$1,049	$8,390	$27,968
Irrigation system	0	$75,000	$100,000	0	$10,742	$14,323
Subtotal	**$16,250**	**$215,000**	**$450,000**	**$1,515**	**$23,794**	**$46,952**
Total	**$187,010**	**$547,910**	**$1,447,040**	**$20,699**	**$61,165**	**$158,795**
$ per head of capacity	**$249**	**$365**	**$289**	**$28**	**$41**	**$32**

Table 11. Initial Investment for System 2, Earthen Lot with Shed

	Investment			Annual Cost		
Facilities and Equipment	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Land (acres)	5.7	13.1	43.6	$717	$1,636	$5,452
Building	$187,500	$375,000	$1,250,000	$21,230	$42,460	$141,533
Concrete	$87,000	$168,000	$550,000	$8,546	$16,502	$54,025
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$37,500	$67,500	$212,500	$4,582	$8,247	$25,964
Site preparation	$7,500	$15,000	$50,000	$699	$1,398	$4,661
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Subtotal	**$367,260**	**$722,910**	**$2,287,040**	**$41,083**	**$80,874**	**$255,868**
Environmental Structures	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Engineering costs	$5,000	$50,000	$50,000	$466	$4,661	$4,661
Construction costs	$11,250	$90,000	$300,000	$1,049	$8,390	$27,968
Irrigation system	0	$75,000	$100,000	0	$10,742	$14,323
Subtotal	**$16,250**	**$215,000**	**$450,000**	**$1,515**	**$23,794**	**$46,952**
Total	**$383,510**	**$937,910**	**$2,737, 040**	**$42,598**	**$104,668**	**$302,820**
$ per head of capacity	**$511**	**$625**	**$547**	**$57**	**$70**	**$61**

Table 12. Initial Investment for System 3, Concrete Lot with Shed

Facilities and Equipment	Investment 750 Head	Investment 1,500 Head	Investment 5,000 Head	Annual Cost 750 Head	Annual Cost 1,500 Head	Annual Cost 5,000 Head
Land (acres)	1.9	4.1	13.5	$239	$508	$1,693
Building	$187,500	$375,000	$1,250,000	$21,230	$42,460	$141,533
Concrete	$208,500	$411,000	$1,360,000	$20,480	$40,371	$133,588
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$26,250	$46,500	$150,000	$3,207	$5,682	$18,328
Site preparation	$7,500	$15,000	$50,000	$699	$1,398	$4,661
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Subtotal	**$477,510**	**$944,910**	**$3,034,540**	**$51,165**	**$101,049**	**$324,036**
Environmental Structures	750 Head	1,500 Head	5,000 Head	750 Head	1,500 Head	5,000 Head
Engineering costs	$5,000	$50,000	$50,000	$466	$4,661	$4,661
Construction costs	$5,625	$45,000	$150,000	$524	$4,195	$13,984
Irrigation system	0	$75,000	$100,000	0	$10,742	$14,323
Subtotal	**$10,625**	**$170,000**	**$300,000**	**$991**	**$19,599**	**$32,968**
Total	**$488,135**	**$1,114,910**	**$3,334,540**	**$52,156**	**$120,648**	**$357,004**
$ per head of capacity	**$651**	**$743**	**$667**	**$70**	**$80**	**$71**

Table 13. Initial Investment for System 4, Complete Confinement with Solid Floor

Facilities and Equipment	Investment 750 Head	Investment 1,500 Head	Investment 5,000 Head	Annual Cost 750 Head	Annual Cost 1,500 Head	Annual Cost 5,000 Head
Land (acres)	1.4	2.6	8.0	$172	$323	$1,004
Building	$225,000	$450,000	$1,500,000	$25,476	$50,952	$169,840
Concrete	$178,500	$351,000	$1,160,000	$17,533	$34,478	$113,943
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$10,500	$15,000	$40,000	$1,283	$1,833	$4,887
Site preparation	$1,500	$3,000	$10,000	$140	$280	$932
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Building engineering costs	$0	$3,000	$3,000	$0	$277	$277
Total	**$463,260**	**$919,410**	**$2,937,540**	**$49,742**	**$98,449**	**$314,112**
$ per head of capacity	**$618**	**$613**	**$588**	**$66**	**$66**	**$63**

Table 14. Initial Investment for System 5, Complete Confinement with Slatted Floor

Facilities and Equipment	Investment 750 Head	Investment 1,500 Head	Investment 5,000 Head	Annual Cost 750 Head	Annual Cost 1,500 Head	Annual Cost 5,000 Head
Land (acres)	0.9	1.7	5.2	$172	$323	$1,004
Building	$187,500	$375,000	$1,250,000	$21,230	$42,460	$141,533
Manure containment	$277,500	$555,000	$1,850,000	$27,258	$54,516	$181,719
Feed bunks	$11,250	$22,500	$75,000	$1,262	$2,524	$8,414
Fencing	$15,750	$24,750	$70,000	$1,924	$3,024	$8,553
Site preparation	$1,500	$3,000	$10,000	$140	$280	$932
Windbreaks	$0	$0	$0	$0	$0	$0
Commodity storage sheds	$9,750	$19,500	$50,000	$1,104	$2,208	$5,661
Bulk bin for supplement	$1,260	$1,910	$5,040	$143	$216	$571
Cattle handling equipment	$9,000	$15,000	$17,500	$1,280	$2,133	$2,488
Feed handling equipment	$16,500	$38,500	$77,000	$1,521	$3,549	$7,098
Building engineering costs	$0	$3,000	$3,000	$0	$277	$277
Total	**$530,010**	**$1,058,160**	**$3,407,540**	**$55,862**	**$111,186**	**$357,247**
$ per head of capacity	**$707**	**$705**	**$682**	**$74**	**$74**	**$71**

Table 15. Depreciation Life and Repairs Rate

	Depreciation Life–years	Repairs Rate
Facilities and Equipment		
Building	25	2.0%
Concrete	25	0.5%
Feed bunks	20	1.0%
Fencing	20	2.0%
Site preparation	25	0.0%
Windbreaks	20	2.0%
Commodity storage sheds	25	2.0%
Bulk bin for supplement	25	2.0%
Cattle handling equipment	20	5.0%
Feed handling equipment	20	5.0%
Engineering costs for building	20	0.0%
Environmental Structures		
Engineering costs	25	0.0%
Construction costs	25	0.0%
Irrigation system	25	5.0%

Table 16. Other Nonfeed Costs, per Head

	Yearlings	Calves
Veterinary and health	$8.00	$10.00
Machinery and equipment	$7.00	$11.00
Marketing and miscellaneous	$16.00	$14.00
Total	**$31.00**	**$35.00**

Table 17. Yardage Cost Assuming 85% Occupancy Rate ($/Head/Day)

Capacity	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
750	$0.48	$0.64	$0.69	$0.73	$0.65
1,500	$0.53	$0.66	$0.71	$0.70	$0.62
5,000	$0.49	$0.63	$0.67	$0.69	$0.62

Table 18. Total Costs for Facilities and Rations—750 head capacity

Yearling Steers	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$13.80	$28.40	$34.77	$33.16	$37.24
Manure handling	$/head	$15.89	$15.89	$15.89	$15.89	$15.89
Bedding	$/head	na	na	na	$7.60	na
Ration	$/head	$173.45	$165.72	$165.72	$165.72	$170.19
Labor	$/head	$20.76	$20.72	$21.09	$20.72	$20.00
Other nonfeed costs	$/head	$31.00	$31.00	$31.00	$31.00	$31.00
Total	**$/head**	**$254.90**	**$261.73**	**$268.46**	**$274.09**	**$274.32**
Facilities ownership	$/head/day	$0.09	$0.19	$0.23	$0.22	$0.23
Manure handling	$/head/day	$0.10	$0.10	$0.10	$0.10	$0.10
Bedding	$/head	na	na	na	$0.05	na
Ration	$/head/day	$1.09	$1.09	$1.09	$1.09	$1.04
Labor	$/head/day	$0.13	$0.14	$0.14	$0.14	$0.12
Other nonfeed costs	$/head/day	$0.19	$0.20	$0.20	$0.20	$0.19
Total	**$/head/day**	**$1.60**	**$1.72**	**$1.76**	**$1.80**	**$1.67**
Total	**$/lb. of gain**	**$0.51**	**$0.52**	**$0.54**	**$0.55**	**$0.55**

Steer Calves	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$27.60	$56.80	$69.54	$66.32	$74.48
Manure handling	$/head	$31.77	$31.77	$31.77	$31.77	$31.77
Bedding	$/head	na	na	na	$5.82	na
Ration	$/head	$195.67	$186.91	$186.91	$186.91	$189.66
Labor	$/head	$30.97	$30.92	$31.39	$30.92	$30.00
Other nonfeed costs	$/head	$35.00	$35.00	$35.00	$35.00	$35.00
Total	**$/head**	**$321.00**	**$341.40**	**$354.61**	**$356.74**	**$360.91**
Facilities ownership	$/head/day	$0.14	$0.29	$0.36	$0.34	$0.36
Manure handling	$/head/day	$0.16	$0.16	$0.16	$0.16	$0.16
Bedding	$/head	na	na	na	$0.03	na
Ration	$/head/day	$0.96	$0.96	$0.96	$0.96	$0.92
Labor	$/head/day	$0.15	$0.16	$0.16	$0.16	$0.14
Other nonfeed costs	$/head/day	$0.17	$0.18	$0.18	$0.18	$0.17
Total	**$/head/day**	**$1.58**	**$1.76**	**$1.83**	**$1.84**	**$1.74**
Total	**$/lb. of gain**	**$0.49**	**$0.53**	**$0.55**	**$0.55**	**$0.56**

Table 19. Total Costs for Facilities and Rations–1,500 head capacity

Yearling Steers	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$20.39	$34.89	$40.22	$32.82	$37.06
Manure handling	$/head	$15.89	$15.89	$15.89	$15.89	$15.89
Bedding	$/head	na	na	na	$7.60	na
Ration	$/head	$173.45	$165.72	$165.72	$165.72	$170.19
Labor	$/head	$20.76	$20.72	$21.09	$20.72	$20.00
Other nonfeed costs	$/head	$31.00	$31.00	$31.00	$31.00	$31.00
Total	**$/head**	**$261.48**	**$268.22**	**$273.91**	**$273.75**	**$274.14**
Facilities ownership	$/head/day	$0.13	$0.23	$0.26	$0.22	$0.23
Manure handling	$/head	$0.10	$0.10	$0.10	$0.10	$0.10
Bedding	$/head	na	na	na	$0.05	na
Ration	$/head/day	$1.09	$1.09	$1.09	$1.09	$1.04
Labor	$/head/day	$0.13	$0.14	$0.14	$0.14	$0.12
Other nonfeed costs	$/head/day	$0.19	$0.20	$0.20	$0.20	$0.19
Total	**$/head/day**	**$1.64**	**$1.76**	**$1.80**	**$1.80**	**$1.68**
Total	**$/lb. of gain**	**$0.52**	**$0.54**	**$0.55**	**$0.55**	**$0.55**

Steer Calves	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$40.78	$69.78	$80.43	$65.63	$74.12
Manure handling	$/head	$31.77	$31.77	$31.77	$31.77	$31.77
Bedding	$/head	na	na	na	$5.82	na
Ration	$/head	$195.67	$186.91	$186.91	$186.91	$189.66
Labor	$/head	$30.97	$30.92	$31.39	$30.92	$30.00
Other nonfeed costs	$/head	$35.00	$35.00	$35.00	$35.00	$35.00
Total	**$/head**	**$334.18**	**$354.38**	**$365.50**	**$356.05**	**$360.55**
Facilities ownership	$/head/day	$0.20	$0.36	$0.41	$0.34	$0.36
Manure handling	$/head	$0.16	$0.16	$0.16	$0.16	$0.16
Bedding	$/head	na	na	na	$0.03	na
Ration	$/head/day	$0.96	$0.96	$0.96	$0.96	$0.92
Labor	$/head/day	$0.15	$0.16	$0.16	$0.16	$0.14
Other nonfeed costs	$/head/day	$0.17	$0.18	$0.18	$0.18	$0.17
Total	**$/head/day**	**$1.65**	**$1.83**	**$1.88**	**$1.84**	**$1.75**
Total	**$/lb. of gain**	**$0.51**	**$0.55**	**$0.56**	**$0.55**	**$0.55**

Table 20. Total Costs for Facilities and Rations—5,000 head capacity

Yearling Steers	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$15.88	$30.28	$35.70	$31.41	$35.72
Manure handling	$/head	$15.89	$15.89	$15.89	$15.89	$15.89
Bedding	$/head	na	na	na	$7.60	na
Ration	$/head	$173.45	$165.72	$165.72	$165.72	$170.19
Labor	$/head	$20.76	$20.72	$21.09	$20.72	$20.00
Other nonfeed costs	$/head	$31.00	$31.00	$31.00	$31.00	$31.00
Total	**$/head**	**$256.98**	**$263.61**	**$269.39**	**$272.34**	**$272.80**
Facilities ownership	$/head/day	$0.10	$0.20	$0.23	$0.21	$0.22
Manure handling	$/head	$0.10	$0.10	$0.10	$0.10	$0.10
Bedding	$/head	na	na	na	$0.05	na
Ration	$/head/day	$1.09	$1.09	$1.09	$1.09	$1.04
Labor	$/head/day	$0.13	$0.14	$0.14	$0.14	$0.12
Other nonfeed costs	$/head/day	$0.19	$0.20	$0.20	$0.20	$0.19
Total	**$/head/day**	**$1.62**	**$1.73**	**$1.77**	**$1.79**	**$1.67**
Total	**$/lb. of gain**	**$0.51**	**$0.53**	**$0.54**	**$0.54**	**$0.55**

Steer Calves	Unit	Earthen Lot with Windbreak	Earthen Lot with Shed	Concrete Lot with Shed	Confinement Solid Floor	Confinement Slatted Floor
Facilities ownership	$/head	$31.76	$60.56	$71.40	$62.82	$71.45
Manure handling	$/head	$31.77	$31.77	$31.77	$31.77	$31.77
Bedding	$/head	na	na	na	$5.82	na
Ration	$/head	$195.67	$186.91	$186.91	$186.91	$189.66
Labor	$/head	$30.97	$30.92	$31.39	$30.92	$30.00
Other nonfeed costs	$/head	$35.00	$35.00	$35.00	$35.00	$35.00
Total	**$/head**	**$325.16**	**$345.17**	**$356.46**	**$353.24**	**$357.88**
Facilities ownership	$/head/day	$0.16	$0.31	$0.37	$0.32	$0.35
Manure handling	$/head	$0.16	$0.16	$0.16	$0.16	$0.16
Bedding	$/head	na	na	na	$0.03	na
Ration	$/head/day	$0.96	$0.96	$0.96	$0.96	$0.92
Labor	$/head/day	$0.15	$0.16	$0.16	$0.16	$0.14
Other nonfeed costs	$/head/day	$0.17	$0.18	$0.18	$0.18	$0.17
Total	**$/head/day**	**$1.60**	**$1.78**	**$1.84**	**$1.82**	**$1.74**
Total	**$/lb. of gain**	**$0.50**	**$0.53**	**$0.55**	**$0.54**	**$0.55**

Notes

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Jack M. Payne, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

File: Animal Science 4-2

DONALD G. HUGGINS
Curriculum Vitae

Revised Oct 2009

Director of Central Plains Center for BioAssessment, Univ. of Kansas, Lawrence, KS 66047
Director of Ecotoxicology Program, KS Biological Survey, Univ. of KS
Senior Scientist, KS Biological Survey, Univ. of KS
Courtesy Professor, Dept. of Civil Engineering, Univ. of KS.
Courtesy Professor, Dept. Evolutionary Biology and Ecology, Univ. of KS

PERSONAL:

Born - April 11, 1944, Des Moines, Iowa
President of the board of directors for the Lawrence Community Shelter
(a community program for the homeless and under-privileged)
Vietnam Combat Veteran (US Marine Corps)

EDUCATION:

BA, Westmar College, Lemars, IA. 1966. Double major in Chemistry and Biology
MS, Iowa State University, Ames, IA. 1968. Fisheries Biology (Major), Water Resources (Minor)
PhD, (with Honors), University of Kansas, Lawrence, KS. 1990. Environmental Health Science, School of Engineering

PROFESSIONAL TRAINING PROGRAMS:

1977 - Current Biological Methodology & Quality Assurance Practices. US EPA, Region VII, KS
1977 - Bioassay Procedures Workshop. Columbia National Fisheries Research Laboratory, Columbia, MO
1978 - Basics of Surface-Water Discharge Measurements. US Geological Survey, KS
1986 - Hazard Ranking System of NCP. US EPA, Region VII, KS
1988 - Geographic Information Systems and Digital Data Processing Workshop. CALMIT, Univ. of Nebraska, Lincoln, NE
2000 – Applied Fluvial Geomorphology. Kansas Water Office and Wildland Hydrology, Salina, KS
2003 – National Wadeable Streams Assessment, USEPA sponsored field methodologies and quality assurance training, Lawrence, KS
2007 – National Lakes Assessment Training, USEPA sponsored field methodologies and quality assurance training, Lawrence, KS
2008 – National Rivers and Streams Assessment (NRSA) Training, USEPA sponsored field methodologies and quality assurance training, May 27-30, 2008, Kansas City, KS

COMPLAINANT'S EX. NO. 18

PROFESSIONAL EXPERIENCE:

1965-66 - Student Advisor, Westmar College
1966-68 - Research Assistant, Coop. Fisheries Unit, Iowa State University
1967 - Biological Technician, Wildlife (GS-5), U.S. Fish and Wildlife Service
1969-70 - Agricultural Advisor for MAC-V, U.S. Marine Corps
1973-74 - Limnologist, Center for Northern Studies, Wollcott, VT
1970-77 - Fisheries Biologist, University of Kansas, Lawrence
1977-87 - Tech. Consultant, Kansas Nongame, Threatened and Endangered Species Program, KS. Dept. Wildl. & Parks
1978-87 - "Fish Kill" Investigation Group, Kansas Dept. Health and Environment, KS Wildl. & Parks and Kansas Biological Survey, Lawrence
1979 - Graduate Faculty (Ad hoc), Civil Engineering, University of Kansas
1987-88 - President, Central States Entomological Society
1993 - Development of Coop. Research Agreement with Iowa State Univ., Univ. of Kansas, The Ukrainian Res. Inst. of Agriculture & Luiv Univ. (Luiv, Ukraine)
1994 - Kansas Conservation Partnership Forum, University Panel, Salina, KS
1994 - Sharing Water: Cities, Farms and Ecosystems, National Video Conference, Discussion Panel, University of Kansas, Lawrence

PROFESSIONAL AFFILIATIONS:

North American Benthological Society
Central States Entomological Society
Water Environment Federation
Society of Environmental Toxicology and Chemistry
North American Lake Management Society

COMMITTEE ASSIGNMENTS (since 1975):

1975 - Chairman, Chironomid Studies and Ecology of Stream Invertebrates Session, North American Benthological Society, Annual Mtg.
1975-76 - Committee on Threatened and Endangered Species in Kansas, Invertebrate Work Group, Kansas Dept. Wildl. & Parks
1976-79 - Planning and Policy Advisory Committee - Kansas Water Quality Plan. Kansas Dept. of Health & Environment
1976-79 - Technical Planning Committee (Assessment of streams and lake biosupport capabilities and development of stream and lake fisheries classifications for Water Quality Assessment workplan). Kansas Water Quality Plan. Kansas Dept. of Health & Environment
1977 - Chairman, Search Committee for aquatic invertebrate position, Kansas Biological Survey
1977-78 - Technical Advisor, Development of Invertebrate Strategic Plan for the Kansas Endangered Species Program. Kansas Dept. Wildl. & Parks

1977-82 - Federal-State Coordinating Committee, Kansas River and Tributaries Bank Stabilization Study, Army Corps of Engineers
1978 - Chairman, Search Committee for phycologist position, Kansas Biological Survey
1978 - Review Committee on the Directorship of the Museum of Invertebrate Paleontology, University of Kansas
1978-79 - Chairman, Kansas Academy of Science Natural History Handbooks Committee, Invertebrate Section, Kansas Acad. Sci.
1979 - Chairman, Search Committee for aquatic invertebrate biologist position, Kansas Biological Survey
1978-87 - Planning Committee, Nongame, Endangered or Threatened Wildlife. Kansas Dept. Wildl. & Parks
1983 - Ecological community advisor, Environmental Defense Fund, Washington, D. C.
1984-85 - Surface Water Quality Standards Task Force. Kansas Dept. Health & Environment
1985-to-date - Joint Task Group 10500 (Benthic Macroinvertebrates) for prep of *Standard Methods for the Examination of Water and Wastewater.* American Water Works Assn.
1985-to-date - Joint Task Group 10900 (Identification of Aquatic Organisms) for prep of *Standard Methods for the Examination of Water and Wastewater.* American Water Works Assn.
1986 - Member, Search Committee for Stream Ecologist position with Kansas Biological Survey
1986 - Chairman, Aquatic Toxicity Session, North American Benthological Society, Annual Meeting
1986-92 - Aquatic Insect Common Names Committee, North American Benthological Society
1987 - Planning Committee, Stream Program. Kansas Dept. Wildl. & Parks
1990 - Livestock Pollution Control Task Force (tech. subcommittee.), Bureau of Environ. Quality, Kansas Dept. Health & Environment.
1990-91 - University Committee on Promotion and Tenure (UCPT). University of Kansas
1991-92 - Pesticide/Nitrate Risk Reduction Opportunity Team, U.S. EPA, Region VII
1991-93 - General Research Fund Committee, University of Kansas
1991-93 - Faculty Senate Research Committee, University of Kansas
1992-to-date - Chairman, Joint Task Group 8750 (Toxicity Test Procedures for Aquatic Insect) for prep of *Standard Methods for the Examination of Water and Wastewater.* American Water Works Assn.
1995-99 - Project Advisory Team, Clean Water Farms Project, Kansas Rural Center and Kansas Dept. of Health & Environment

GRANTS AND CONTRACTS (since 1975):

<u>Funded</u>

1979-81 - Soldier Creek Water Quality and Conservation Project. Kansas Dept. Health & Environment. ($15,000)
1977-79 - The determination of water quality criteria for the support of aquatic life in two small Kansas streams (C. Burkhead and D. Huggins). Kansas Water Resources Institute.

($27,607)
1981 - Guide to the Freshwater Invertebrates of the Midwest. Office of Surface Mining, Dept. of Interior. ($1800)
1985 - Biological assessment of selected water quality parameters of Prairie Creek and associated contact springs. Stinson, Mag & Frizzell for Waste Management Inc. ($30,333)
1985-86 - Development and maintenance of the Kansas Biotic Index. Kansas Dept. Health & Environment. ($10,000)
1985-86 - Cheyenne Bottoms: An Environmental Assessment, (Project Manager). Kansas Dept. Wildl. & Parks. ($180,000)
1985 - Effects of atrazine concentrations recorded in a large Kansas reservoir on phytoplankton from atrazine-free water (D. Huggins, G. Howick and F. deNoyelles). US Geological Survey. ($4,993)
1985 - Potential for the development of atrazine-resistant phytoplankton communities in contaminated zones of a large Kansas reservoir (D. Huggins, G. Howick and F. deNoyelles). US Geological Survey. ($4,993)
1985 - A preliminary evaluation of the impact of atrazine on the plant community of a large Kansas reservoir (D. Huggins, G. Howick and F. deNoyelles). Kansas Dept. Health & Environment. ($4,935)
1986-87 - Seasonal Stream Water Quality Inventory (D. Huggins and G. Howick). Kansas Dept. Wildl. & Parks. ($24,212)
1986-87 - Milford Hatchery Site Water Quality and Water Management Assessment. (D. Huggins, G. Howick and F. deNoyelles, Jr.). Kansas Dept. Wildl. & Parks. ($32,743)
1986-87 - The Plecoptera Nymphs of Kansas: Their identification, distribution and use in water quality studies. Kansas Dept. Health & Environment. ($10,000)
1986-87 - Proposed Biotic and Habitat indices for use in Kansas Streams. Kansas Dept. Health &
Environment. ($5,000)
1987-88 - Biological & engineering contributions to RI/FS at the Arkansas City "superfund" site in SE Kansas (D. Huggins, D. Lane and F. deNoyelles). US Geological Survey. ($50,000)
1985 - Development of experiment lake facility (with others) Res. Improvement Award, University of Kansas. ($98,199)
1987-88 - Field evaluations of the assessment value of a Kansas biotic index on nonpoint source agricultural pollution (D. Huggins, F. deNoyelles, D. Kettle and P. Liechti). Kansas Dept. Health & Environment. $10,000)
1989-90 - Relationships between land use/land cover and nonpoint pollution stream effects within an ecosystem (Project Manager). US EPA, Region VII. ($173,000)
1985 - Data validation for EPA modeling (D. Huggins and M. Johnson). US EPA, Duluth-ORD. ($7,500)
1991-92 - A regionalized assessment of the influences of rural nonpoint source pollution on the ecological integrity of stream ecosystems and evaluation of associated pollution control management. (E. Martinko, D. Huggins and M. Johnson). US EPA. ($1,250,000)
1992-93 - A regionalized assessment of the influences of rural nonpoint source pollution on the

ecological integrity of stream ecosystems and evaluation of associated pollution control management (F. deNoyelles, D. Huggins and M. Johnson). US EPA. ($1,450,000)

1993-94 - A regionalized assessment of the influences of rural nonpoint source pollution on the ecological integrity of stream ecosystems and evaluation of associated pollution control management (F. deNoyelles, D. Huggins and M. Johnson). US EPA. ($1,500,000)

1992-95 - An assessment of the effects on nonpoint source pollution on the biotic integrity of Walnut Creek and the role of riparian vegetation in mitigating nonpoint source (D. Huggins, M. Johnson and B. Menzel). US EPA, ERL-Duluth. ($358,720)

1992-93 - Riparian Studies in the Delaware River basin, Kansas. US EPA, ERL-Duluth and US EPA, Region VII co-op grant. ($25,000)

1993-94 - Effects of the structure and function of periodically-flooded wetlands on the degradation of herbicides and their metabolites. Regional Applied Research Effort proposal, US EPA, Region VII and US EPA-ERL, Duluth co-op grant. ($30,000)

1994-95 - Research and Development Fund Grant (F. deNoyelles, D. Huggins, D. Lane and S. Randtke). University of Kansas. ($35,761)

1995-99 - Validation of clean water farms management techniques. Kansas Dept. Health & Environment and US EPA Region VII, 319 grant funding. ($442,642)

1995-96 - Predicting impacts of the conservation reserve program on aquatic ecosystems (D. Huggins and L. Bain). National Biological Service, Ft. Collins, CO. ($28,000)

1995-96 - Macroinvertebrate identifications and verifications for NAWQA Program, US Geological Survey, Arvada, CO. ($69,600+$45,240)

1995 - Water quality impacts of agricultural activities on small watersheds. Kansas Dept. Health & Environment. ($30,000)

1996-97 - Assessment of the ecological integrity of Soldier Creek drainage basin, Prairie Band of Potawatomi Nation, Mayetta, KS. ($10,000+$20,706)

1996 - Development of a watershed analysis and management framework, Prairie Band of Potawatomi Nation, Mayetta, KS. ($16,990)

1997-99 - Assessment of Clinton Reservoir and its watershed, Kansas Dept. Health & Environment, Kansas Water Office and US EPA Region VII. ($220,049)

1997-99 - Development of biocritieria metrics for streams of the Western Corn Belt Plains Ecoregion Kansas and adjacent states, (L. Ferrington and D. Huggins). US EPA. ($30,000)

1998 - Baldwin Creek water quality assessment project. Kansas Water Office. ($15,000)

1998 - Small stream crossing impact study. Subcontract with Univ. of California-Davis. ($6,500)

1998-99 - Small stream crossing impact study. Subcontract with Univ. of California-Davis. ($14,500)

1998-99 – Enhancement of research with experimental aquatic ecosystems at the Kansas Ecological Reserves, (C. Annett, S. Dewey, L. Ferrington, D. Graham, D. Huggins, D. Kettle, V. Smith and F. deNoyelles). National Sci. Foundation. ($13,381)

1999 - Macroinvertebrate identifications. Missouri Dept. of Conservation. ($1,752)

1999 - Big Soldier Creek Watershed Management Plan, Prairie Band of Potawatomi Nation, Mayetta, KS. ($7,805)

1999-00 - TMDL supplement data assessment project, (D. Huggins and F. deNoyelles). Kansas Dept. Health & Environment. ($120,000)

1998-01 - Development of a regional center of bioassessment. US EPA. ($160,000)

1998-01 - Acquisition and assessment of nutrient data: an ecoregion approach with an emphasis on streams. US EPA. ($188,729)

2001 - TMDL supplement data assessment project, (D. Huggins). Kansas Dept. Health & Environment. ($60,000)

2001-03 - Spatial and temporal variability of nutrient limitation on phytoplankton growth in Kansas reservoirs. Kansas Department of Health and Environment. (Co-PI, $108,308)

2001-03 - Water quality and biological criteria and recommended monitoring approaches relevant to Heartland Network Parks. U.S. National Park Service cooperative grant. ($169,000)

2001-04 - An Integrated Modeling Approach to Predict the Effects of Watershed Management on the Eutrophication of Reservoirs in the Central Plains. USEPA Region 7. (Co-PI, $540,000)

2003-05 - Developing Regional Nutrient Benchmark Values for Streams, Rivers, and Wetlands Occurring in USEPA Region 7. USEPA Region 7. (Co-PI, $80,000)

2004-05 - Assessment of floodplain wetlands of the lower Missouri River using an EMAP study approach. USEPA Region 7. (Co-PI, $209,481)

2004-05 - Assessment of wadeable streams within the South Central Semi-arid Prairies Ecoregion using an EMAP randomized study design. USEPA, WOWO. (Co-PI, $401,972)

2004-05 - Defining relationships among indicators of sediment, erosion and ecosystem health in low gradient stream. USEPA Region 7. (Co-PI, $59,000)

2006-07 - Procurement of Field and Analytical Support for the EMAP-Great Rivers Reference Condition Research on the Missouri River in Kansas. USEPA Region 7. (Co-PI, $98,000)

2005-07 - Developing Regional Nutrient Criteria for Wetlands of the Central Plains Region. USEPA Region 7. (Co-PI, $40,000)

2005-07 - Reference Conditions for Wadeable Streams of the Central Plains: Characterizing Minimally Versus Least Disturbed Conditions. USEPA Region 7. (Co-PI, $30,000)

2005-07 - Identification and Characterization of Reference Conditions within USEPA Region 7 using EMAP methodology. USEPA Region 7. (Co-PI, $374,000)

2005-07 - Determination of Regional Reference Conditions, Tiered Aquatic Life Applications and Inter-Regional Calibration of Community Assessment Methods. USEPA Region 7. (Co-PI, $30,000)

2006 - Procurement of Field and Analytical Support for the EMAP-Great Rivers Reference Condition Research on the Missouri River in Kansas, USEPA (Co-PI, $98,000)

2007-09 - Assessing the condition of USEPA Region 7's large tributaries of the Missouri River: A probabilistic design approach, USEPA (Co-PI, $383,000)

2007-09 - National River and Stream Assessment Survey – 2008 and 2009, TetraTech as contractee of USEPA. (Co-PI, $208,418)

2008 - Developing Regional Nutrient Benchmarks for Streams and Wetlands of the Central Plains Region, Great Lakes Environmental Center as a contractee of USEPA. (Co-PI,

$16,000)

2008 - Database development for definition and assessment of nutrient levels and their biological effects in the Missouri River, Great Lakes Environmental Center as a contractee of USEPA. (Co-PI, $15,000)

2008-09 - Assessment of Westar Energy Jeffrey Energy Center discharge on Lost Creek: A long–term monitoring/assessment strategy, Westar Energy. (Co-PI, $153,000)

PROFESSIONAL CONSULTING (Since 1975):

B. A. Vittor & Associates, Envirn. Research & Consulting
Black and Veatch, Consulting Engineers
Chadwick & Associates, Consulting Engineers
Natural Resources Consultants
Illinois Natural History Survey
Midwest Aquatic Enterprises
Waste Management of North America, Inc.
B. F. Goodrich, Chemical Division
Blazer, Zeni and Company (Environ. Management Consultants)
Jacobs Engineering Group, Inc.

RESEARCH INTERESTS:

Population Studies

Ecological and taxonomic studies of Odonata, Plecoptera and aquatic Lepidoptera are primary study groups with emphases on larval taxonomy, systematics of Argyractini, new species descriptions, and rheobiontic macroinvertebrate responses to "hydraulic stress". Population responses to perturbations are also of interest.

Community and Ecosystem Level Research

Major research interests are in ecotoxicology and community and/or ecosystem assessment of anthropogenic perturbations. Current research efforts are being directed toward assessment of the effects of watershed-level influences on stream ecosystems. Research on the joint toxicity of pesticide mixtures is ongoing. Current research efforts include: (1) nonpoint pollution and its relationship with land form and use, (2) development of assessment methods for use in stream pollution studies, and (3) interactions of riparian or near stream land use and stream ecosystems, and effects of landuse in instream habitats and geomorphology of streams, (4) surface and groundwater quality associated with differing farm management practices, (5) development of simple watershed models to rank nonpoint source contaminant risk to stream ecosystems, (6) Development of Use Attainability Assessment procedures, and (7) use of Structural Equation Modeling (SEM) in ecosystem studies.

SEMINARS AND PRESENTATIONS (Since 1975):

1974-84 - Various class presentations on aquatic biology, Lawrence, Topeka, St. Francis, Bonner Springs, Ottawa, Melvern and Shawnee Mission School Districts
1976 - Invertebrate Stream Biology, Kansas Assoc. Biological Teachers
1978 - Surface Mining Stream Investigation Workshop, Office of Surface Mining, US Dept. Interior, Kansas City, KS
1986 - Cheyenne Bottoms - Environmental Assessment Study presentation at public meeting, Great Bend, KS
Cheyenne Bottoms: Environmental Assessment, Kansas Governor Mike Hayden, and Select legislative representatives, Topeka
Cheyenne Bottoms, Kansas Advisory Council Environ. Education, Topeka
Cheyenne Bottoms: An Environmental Assessment, KS Dept. Wildlife & Parks Commission, Topeka
Cheyenne Bottoms, Fish and Wildlife Committee of Kansas Water Office, Topeka
Cheyenne Bottoms, KS Audubon Council, Kansas City
Cheyenne Bottoms, Jayhawk Kiwanis Club, Lawrence
1986 - New insights into the ecology and systematics of aquatic Lepidoptera, KU Entomol. Seminar, Lawrence
1986 - Biological assessment of nonpoint source agricultural pollution, KS Department of Health and Environment, Topeka
1985 - Remote Sensing and GIS-based assessment of agricultural nonpoint source pollution (Huggins, D. and P. Liechti). Geography seminar, University of Kansas, Lawrence, October 26.
1985 - Use of a GIS approach in assessing the ecological effects of nonpoint source pollution on stream ecosystems, Animal Ecology Seminar, ISU, Ames, IA
1990 - Impact of livestock confinements on stream water quality, Livestock Pollution Control Task Force, Kansas Dept. Health & Environment, Topeka
1990 - Ecological disturbance: interactions between aquatic ecosystems and landscapes, Animal Ecology Seminar, ISU, Ames, IA. (April 29)
1990 - The development, utilization and future of biological indicators in ecological risk assessment, Comparative Risk Seminar Series, US EPA, Region VII, Kansas City, KS
1985 - Ecological disturbance: Interaction between aquatic ecosystems and landscapes, Systematics and Ecology Seminar, University of Kansas, Lawrence, KS (September 18)
1985 - Special Aquatic Sites. Wetland Protection Workshop (Enforcement Training program), Corps of Eng./US EPA, Region VII, Kansas City, MO
1985 - Identifying technical criteria for riparian wetland restoration and protection, a 2-day workshop presentation (Huggins, D., D. Bandi and K. Higgins), Kansas Biological Survey, University of Kansas, Lawrence, KS.
1985 - Tri-State nonpoint source pollution assessment project, US EPA - Region VII, 2nd Annual NPS Workshop, US EPA Region VII, Overland Park, KS
1985 - Landscape risk-based assessment of nonpoint source pollution and riparian restoration potential, poster presentation, 3rd Ann. Regional Wetland Mtg., US EPA Region VII, Kansas City, MO (D. Huggins and D. Bandi)
1994 - Delaware Riparian Study, Wetland Riparian Areas Project Mtg., Manhattan, KS

1990 - Identifying riparian buffers to control nonpoint source pollution impacts, managing ecological risks through riparian protection and restoration, a 2-day workshop, U.S.EPA Wetlands Res. Program & US EPA, Region VIII, Denver, CO.

1990 - Nonpoint Source Pollution Effects on Aquatic Ecosystems and Whole System Management (D. Huggins & F. deNoyelles), a workshop for Nebraska extension educators, Coop. Extension, Univ. of Nebraska, July 18, Lawrence, KS.

1994 - Upper Delaware riparian study, Soil Conservation Service, AC - State Staff Conference, Topeka, KS.

1990 - Nonpoint source pollution and riparian buffers, a wetlands workshop, Kansas Biol. Survey, Lawrence, KS. (April 11- 12)

1994 - Identifying riparian buffers that function to control nonpoint source pollution impacts, *In* The geographic prioritization of ecosystem restoration and protection activities, US EPA sponsored workshop, Lincoln, NE. (Aug 22-23)

1990 - Aquatic organisms as indicators of stream quality. Kansas Water Environ. Assn., 50th Ann. Conf., Manhattan, KS. (April)

1998 - Temporal and spatial variations in water quality of Clinton Reservoir: preliminary data. Kansas Academy of Science, 130th Ann. Meeting, Kansas Newmen College, Wichita, KS. (April 19-20)

1998 - Examining the potential enhanced toxicity of atrazine in aquatic ecosystems, Symposium on Kansas Water Resources: Past, Present and Future. Kansas Academy of Science, 130th Ann. Meeting, Kansas Newmen College, Wichita, KS. (April 19-20)

1999 - Biological assessment of Soldier Creek watershed, Soldier Creek Watershed Partnership Meeting, Prairie Band of Potawatomi Nation. (Sept 29)

1999 - Nutrient levels in Midwestern streams and lakes. Breakout session #2, Nutrients, EPA Region 7, 7th Ann. Nonpoint Source Conference and Iowa St. University Conference on global water issues. ISU, Ames, IA. (March 24-26)

2000 - Functions and values of intermittent streams. Regional Wetlands and Water Resources meeting, Kansas City, MO, (Feb 29 – March 2)

2000 - Panelist and presenter, Professional Seminar Series, Environmental Science. Federal Agency Advisory Board and Haskell Indian Nations University, March 30.

TEACHING:

1980, Fall - Aquatic insects, Laboratory and Aquatic Biology (Biol. 418), University of Kansas

1981, Fall - Aquatic biology, Biol. Principles Environ. Eng. Proc. (CE 773), University of Kansas

1981, Spring - Aquatic macroinvertebrate, Stream Ecology (Biol. 661), University of Kansas

1984-92, Spring - Biological monitoring and toxicity testing, Environ. Monitoring (CE 873), University of Kansas

1987, Fall - Biological Assessment of Streams, Stream Ecology (Biol. 661), University of Kansas

1988, 1992, 1994, Spring - Odonata evolution and biology, Aquatic Entomology (Biol. 525), University of Kansas

PRESENTATIONS (since 1975):

1975 - Odonates of Kansas, Part II. Kansas Academy of Science, Ann. Mtg.*

1977 - Stoneflies of Kansas. Kansas Academy of Science, Ann. Mtg.*

1979 - Aquatic Biology Studies in Kansas (invited paper), Kansas Assoc. Biological Teachers, Ann. Mtg.

1980 - Effects of a 24 hour ammonia injection on stream drift and benthic standing crop, Kansas Academy of Science, 112th Ann. Mtg.* (D. Huggins and P. Liechti)

1980 - Odonates of southeastern United States (invited paper), special symposia, North Am. Benthological Soc., Ann. Mtg., Savannah, GA *

1984 - Emergence Biology of *Anax longipes*, North Am. Benthological Soc., Ann. Mtg., Raleigh, NC (D. Huggins and B. Coler) *

1986 - Effects of VOC contamination on the stream fish *Pimephales promelas* (Rafinesque), North Am. Benthological Soc., Ann. Mtg., Lawrence, KS. (D. Huggins and G. Welker)*

1986 - Aquatic toxicity studies on VOC contamination, Soc. Environ. Toxicol. and Chem, Ozark- Prairie Chapter, Ann. Mtg., Columbia, MO

1986 - Reproduction in *Petrophila* (invited paper) (Huggins, D. and A. Brigham). Entomol. Soc. Am., Natl. Conf., Reno, NV *

1986 - The Cheyenne Bottoms feasibility study (Hoffman, W. and D. Huggins). Midwest Fish and Wildlife, Natl. Conf. Omaha, NE *

1987 - Hydrologic assessment of Cheyenne Bottoms(McClain, T. and D. Huggins). American Geophysical Union, Ann. Mgt., Baltimore, MR *

1987 - Evolution of Odonata, Formal Conference on the Aquatic Insects, Entomol. Soc. America, Natl. Conf., Boston, MA*

1988 - Cheyenne Bottoms Study (invited paper), 5th Ann. Water and Future of Kansas Conf., Manhattan, KS

1988 - Aquatic Lepidoptera (Pyralidae: Nymphulinae) in the Neotropics (invited paper (Huggins, D. and A. Brigham)), Special Symposia, North Am. Benthological Soc., Ann. Mtg., Tuscaloosa, AL *

1990 - Application of the Habitat Development Index in evaluating insect composition in small streams (Huggins, D., T. Anderson and P. Liechti), North Am. Benthological Soc., Ann. Mtg., Blacksburg, VA *

1990 - Invertebrate biomonitoring and habitat assessment (invited paper), Nonpoint Source Pollution Workshop, Center for Field Biology and Tennessee Dept. Health and Environ., Austin Peay St. Univ., Clarksville, TN

1990 - Influence of near-stream conditions on NPS pollution (invited paper), Nonpoint Source Pollution Workshop, Center for Field Biology and Tennessee Dept. Health and Environ., Austin Peay St. Univ., Clarksville, TN

1990 - Use of remote sensing and GIS in evaluating NPS pollution (invited paper), Nonpoint Source Pollution Workshop, Center for Field Biology and Tennessee Dept. Health and Environ., Austin Peay St. Univ., Clarksville, TN

1990 - Direct and indirect effects of atrazine on aquatic fauna. Fish and Wildlife Conf.: "Environmental Health of Kansas", Pittsburg St. Univ., Pittsburg, KS

1990 - The effects of atrazine on aquatic ecosystems: an assessment of direct and indirect effects using structural equation modeling (Huggins, D., M. Johnson and F. deNoyelles, Jr.) Soc. Environ. Tox. and Chem. (SETAC), 11th Ann. Mtg. Arlington VA *

1990 - Structural equation modeling and ecosystem analysis. (Johnson, M., D. Huggins and F. deNoyelles, Jr.). Soc. Environ. Tox. and Chem. (SETAC), 11th Ann. Mtg. Arlington VA *

1990 - Freshwater simulated field studies: A review of surrogate ecosystems designed to simulate the natural environment (deNoyelles, F., S. Dewey, D. Huggins and D. Kettle). Soc. Environ. Tox. and Chem. (SETAC), 11th Ann. Mtg. Arlington VA *

1991 - Temporal variation in the response of stream insect composition to extensive basin cultivation in small agricultural streams (D. Huggins and T. Anderson). North Am. Benthological Soc., Ann. Mtg. Santa Fe, NM *

1991 - Ecological impacts of NPS pollution/agrichemicals. KS. Water Pollut. Control Assoc., 46th Ann. Conf., Manhattan, KS *

1991 - Ecological consequences of the control and elimination of macrophytes in small ponds by atrazine and Grass Carp (Huggins, D. and M. Johnson). North Am. Lake Mgmt. Soc., Region Lake Mgmt. Conf., Des Moines, IA *

1991 - Impacts of row crop pollutants on aquatic life (overview paper). Conference on the Status of Row Crop Pollution Control Practices, KSU, Manhattan, KS. (June 20)

1992 - The Kansas River system and its biota in transition, 122nd Ann. Mtg., Am. Fish Soc., Rapid City, SD (R. Sanders, D. Huggins and F. Cross)*

1993 - Monitoring freshwater communities to integrate environmental stresses, Water and Future of Kansas Conf., 10th Ann. Mtg., Manhattan, KS*

1993 - Ecotoxic effects of atrazine and its potential impact on aquatic ecosystem structure, (keynote address). Ozark-Prairie Chapter, SETAC, 8th Ann. Mtg., Ames, IA

1993 - Ecological impacts of herbicides - a review. Symposium on agricultural nonpoint sources of contaminants: a focus on herbicides, U.S. EPA and U.S.G.S., Lawrence, KS

1993 - The impacts of agricultural non-point source pollution on benthic macroinvertebrates in sixteen Western Corn Belt Plains Ecoregion streams (Lary, M. and D. Huggins). North Am. Benthological Soc. 42nd Ann. Mtg., Orlando, FL

1994 - The role of macroinvertebrates data in a watershed approach in evaluating nonpoint-source agricultural pollution (Anderson, T. and D. Huggins). Oregon Chapter, Am. Fish. Soc. Ann. Mtg., Sunriver, OR

1994 - Differentiation of major periphyton taxonomic groups based on spectral reflectance using close-range remote sensing (Clements, A., Dewey, S. Bergin and D. Huggins). Kansas Academy of Science, 126th Ann. Mtg. *

1994 - Differentiation of major periphyton taxonomic groups based on spectral reflectance using close-range remote sensing (Clements, A., S. Dewey, S. Bergin and D. Huggins). North Am. Benthological Soc, Ann. Mgt. *

1993- Evaluating biological integrity in watershed monitoring studies in the Midwest (Invited speaker). Ozark-Prairie Chapter, SETAC, 9th Ann. Mtg. Lawrence, KS

1994 - Riparian forest impacts on aquatic wildlife (Invited speaker), Great Plains Ag. Council, 46th Ann. Mtg., Forestry Com., Manhattan, KS

1995 - Non-point source evaluation of sixteen watersheds. Kansas Water Environ. Assn., 50th Ann. Conf., Manhattan, KS (April)

1995 - Northeast Kansas environmental assessment. 12th Ann. Water and Future of Kansas Conf., Manhattan, KS

1995 - The impacts of agricultural non-point source pollution on benthic macroinvertebrate trophic structure in the western corn belt plains ecoregion (M. Lary and D. Huggins). 43rd Ann. Mtg., North Am. Benthological Soc., Keystone, CO *

1995 - The dragonflies and damselflies (Odonata) and aquatic moths (Lepidoptera: Pyralidae:Nymphilinae) of Colorado (Invited speaker). 43rd Ann. Mtg., North Am. Benthological Soc., Keystone, CO*

1995 - Spatial and land use characteristics of small livestock confinements affecting stream water quality (D. Huggins, D. VanSchmus, S. Meador and D. Bandi). Animal Waste and Land-Water Interface, An Interdisciplinary Conference, Fayetteville, AR *

1995 - Effects of hydrophyte community structure on atrazine and alachlor degradation in Wetlands (Lee, K., D. Huggins and M. Thurman). *In* Versatility of wetlands in the agricultural landscape. Am. Water Res. Assoc. Conference, Orlando, FL

1999 - Nutrient criteria: National and regional perspectives (D. Huggins, B. Hayford and G. Welker, invited speakers). 49th Ann. Environ. Engineering Conference, Lawrence, KS *

1999 - Management and restoration of Midwestern riparian systems*. USDA workshop, 61st Midwest Fish and Wildlife Conference, Chicago, IL

2004 - Nutrient limitation of primary production in eastern and central Kansas reservoirs (Dzialowski, A., S. Wang, W. Spotts, N.C. Lim, and D. Huggins). North American Lake Management Society Annual Meeting, Victoria, British Columbia, November 2004.

2006 - Examining biological integrity and stressor gradients in wadeable streams in the Central Plains (Baker, D., A. Dzialowski, and D. Huggins). Midwest Fish and Wildlife Conference Annual Meeting, Omaha, NE. December 2006.2007 - Predicting taste and odor events in Kansas reservoirs (Dzialowski, A., D. Huggins, F. deNoyelles, Jr., N.C. Lim and J. Beury). Future and Water in the State of Kansas Ann. Mgt., Topeka, KS. March 2007.

2008 - Biological Responses to Nutrient Enrichment in Streams of the Central Plains and Adjacent Regions (Huggins, D. and D. Baker). Iowa Water Conference, 8th Annual "Linking land management and water quality". ISU, Ames, IA. February 2008.

2008 - Predicting Taste and Odor Events: Is it Possible? (Huggins, D. and A. Dzialowski). Kansas Rural Water Assoc., 2008 Conference. Wichita, KS. March 2008.

2008 - Impact of Sedimentation on Biological Resources (Huggins, D., B. Everhart [presenter], A. Dzialowski, J. Kriz and D. Baker). *In* Sedimentation in our Reservoirs: Causes and Solutions, A research strategy workshop. Sponsored by KS Water Resources Inst. and KS Water Office, Topeka, KS. March 2008.*

2009 – Biological Impacts of Sediment and Sedimentation in Aquatic Ecosystems (Huggins, D. [session moderator and speaker], B. Everhart, A. Dzialowski, J. Kriz and D. Baker), in Session 6, Sediment Loading in Streams and Lakes. Assessing Impacts, 26th Annual Water and the Future of Kansas Conference, Capital Plaza Hotel, Topeka, KS. March 26, 2009.

2009 - Using Digital Elevation Data for River Valley Identification and Floodplain Mapping (J. Kastens, K. Dobbs, S. Egbert, D. Huggins, B. Williams, and J. Thorp). A poster presented at the 1st Biennial Symposium of the International Soc. River Science. St. Pete Beach, FL, July 12-17, 2009.

* denotes abstracted papers

TECHNICAL REPORTS:

1976 - Invertebrates of Woodson County State Fishing Lake and Game Management Area (Huggins, D., P. Liechti, T. Oldham and S. Hamilton). *In* Preliminary Inventory of Woodson County State Lake and Game Management Area. Rpt. State Biol. Surv. Kansas 5: 40-61.

1979 - The development of water quality criteria for ammonia and total residual chlorine for the protection of aquatic life in two Johnson County, Kansas streams (Burkhead, C., D. Huggins and R. Hazel). Office of Water Res. and Tech., U. S. Dept. Interior, Dec. 1979. Kansas Water Resources Res. Inst., Cont. No. 209

1986 - Biological assessment of selected water quality parameters of Prairie Creek and associated contact springs (Huggins, D., P. Liechti, G. Welker, and T. Fraizer). Rpt. No. 30. Kansas Biol. Surv., Lawrence, KS. 92 pp. + Append.

1996 - The effects of atrazine on phytoplankton in Tuttle Creek Reservoir (Huggins, D., G. Howick, M. Moffett, F. deNoyelles, Jr.). Rpt. No. 31. Kansas Biol. Surv., Lawrence, KS. 38 pp.

1987 - Assessment of the quality of water sources at the Milford Fish Hatchery (Huggins, D., G. Howick, F. deNoyelles, Jr., and M. Moffett). Rpt. No. 33. Kansas Biol. Surv., Lawrence, KS. 49 pp.

1986 - Cheyenne Bottoms: An Environmental Assessment. (Project Manager & Author). Rpt. No. 32. Kansas Biol. Surv., Lawrence, KS. 719 pp.

1987 - Seasonal stream water quality inventory: Summer 1986 (Huggins, D. and G. Howick). Rpt. No. 34 Kansas Biol. Surv., Lawrence, KS. 30 pp.

1988 - An economic impact study of petition for regulatory relief from phosphorus effluent limits, City of Pana. (State of Illinois). R84-44, Dec. 1987, Blazer, Zeni & Co. 63 pp. + Apex.

1986 - Cheyenne Bottoms: An Environmental Assessment (Executive Summary). (Project Manager & Author). Report of Kansas Biological Survey and Kansas Geological Survey for Kansas Dept. Wildl. & Parks. 20 Jan. 1987. 29 pp.

1987 - Proposed biotic and habitat indices for use in Kansas streams. (Huggins, D. and M. Moffett) Rpt. No. 35. Kansas Biol. Surv., Lawrence, KS. 128 pp.

1988 - An economic analysis of proposed amendments to water pollution regulations, phosphorus discharges (State of Illinois). R87-6, March 1988, Blazer, Zeni & Co. 82 pp + Appex.

1988 - An ecological and air quality assessment of the Arkansas City, Kansas Superfund Site, Center for Research, Inc. Final report for U.S. Geological Survey (Contract #14-08-0001-A-0335). 13 Jun 1988. Part I, 38 pp; Part 2, 11 pp. + Appex.

1989 - Ecological assessment (M. Griffith, D. Huggins and R. Blackburn), pp. 65-101. *In* Remedial Investigation of the Arkansas City Dump Site, Cowley County, South-Central

Kansas, Phase IIB. T. Spruill, et al., eds. U.S. Geological Survey Administrative Report, Lawrence, KS.

1988 - Field evaluations of the assessment value of a Kansas biotic index on nonpoint source agricultural pollution (D. Huggins, P. Liechti and T. Anderson). Rpt. No. 37. Kansas Biological Survey.

1990 - Establishment of empirical relationships between land use/land cover and nonpoint source pollution stream effects within an ecosystem (D. Huggins, M. Johnson, P. Liechti, T. Anderson, S. Meador and J. Whistler). U.S. EPA, Region VII, Office Integrated Environ. Analysis, NPS Analysis Project Rpt. 3. 66 pp.

1994 - Identifying riparian buffers that function to control nonpoint source pollution impacts to instream communities: Feasibility study in the Delaware River Basin, Kansas (D. Huggins, D. Bandi, and K. Higgins). Rpt. No. 60. Kansas Biol. Surv., Lawrence, KS. 118 pp.

2004 - Variability in nutrient limitation of Kansas reservoirs (Wang, S.W., A. Dzialowski, W. Spotts, N.C. Lim, and D. Huggins). Rpt No. 201, Kansas Biol. Surv., Lawrence, KS. 45 pp.

2005 - Identification and quantification of reference conditions associated with lotic ecosystems of the central plains and surrounding regions: A summary of approaches and factors (Huggins, D. and A. Dzialowski). Final report submitted to the United States Environmental Protection Agency, Region 7, Kansas City, KS. 34 pp.

2005 - Predicting the effects of watershed management on the eutrophication of reservoirs in the central plains: an integrated modeling approach (Wang, S., D. Huggins, N.C. Lim, W. Spotts, and A. Dzialowski). Rpt. No. 223. 103 pp.

2006 - Characterization of reference conditions in wadeable streams of the central plains. (Dzialowski, A., D. Baker and D. Huggins). Final report submitted to the United State Environmental Protection Agency, Region 7, Kansas City, KS. 28 pp.

2007 - An integrated assessment of the effects of internal phosphorus cycling on sediment resuspension on the eutrophication of lakes and reservoirs in the Central Plains (Dzialowski, A., S. Wang, N.C. Lim, J. Beury and D. Huggins). Final Report submitted to the United States Environmental Protection Agency, Region 7, Kansas City, KS. 36 pp.

2009 - Solomon River Basin Selenium Assessment Project (Koontz, J., D.G. Huggins, and N.C. Lim). Final Report. Open-file Report No. 155. Kansas Biological Survey, Lawrence, KS. 31 pp.

2009 - Trophic State Analysis of Pottawattamie State Fishing Lake No. 1 (Beury, J.H. and D.G. Huggins). Open-file Report No. 154. Kansas Biological Survey, Lawrence, KS. 8 pp.

PUBLICATIONS:

1969 - Mark-and-recapture methods for studying domestic cockroach populations (Huggins D., and F. Bulow). Proc. Iowa Acad. Sci. 75: 447-456

1971 - Toad or frog? Iowa Conservationist, Jan 1971. p.7

1971 - *Scaphiopus bombifrons* Cope, a species new to Iowa. Jour. Herpetology 5(3-40): 216

1974 - The limnology of the Noatak Drainage Area (J. O'Brien and D. Huggins). *In* the Environment of the Noatak River Basin, Alaska, S. B. Young, ed. Center for Northern Studies, Wolcott, Vermont, 1: 158-223

1975 - Primary productive and nutrient limiting factors in lakes and ponds in the Noatak River Valley, Alaska (J. O'Brien and F. deNoyelles, Jr. and D. Huggins). Arch. Hydrobiol. 75: 263-275

1975 - Skipjack herring, *Alosa chrysochloris*, in the Missouri River Basin (Cross, F. and D. Huggins). Copeia 2:382-385

1975 - Fish population structure in altered and unaltered areas of a small Kansas stream (Huggins, D. and R. Moss). Trans. Kansas Academy Sci. 77: 18-33

1976 - The sympatric occurrence of three species of Eubranchipoda in Douglas County, Kansas. The Southwestern Nat., 20: 577-578

1976 - Biological notes on *Eupera cubensis* (Bivalvia: Sphaeriidae) from Kansas (Mackie, G. and D. Huggins). Jour. Fish. Res. Bd. Canada 33: 1652-1656

1976 - Species accounts of certain aquatic macroinvertebrates from Kansas (Huggins, D., P. Liechti and D. Roubik). *In* New Records of the Fauna and Flora of Kansas for 1975. J. Caldwell, ed. Tech. Publ. State Biol. Surv. Kansas 1:13-77

1977 - Unionacean mussels of Kansas (Liechti, P. and D. Huggins). *In* New Records of the Fauna and Flora of Kansas for 1976. J. Caldwell, ed. Tech. Publ. State Biol. Surv. Kansas 4: 17-30

1977 - Kansas Plecoptera (Stoneflies) (Stewart, K. and D. Huggins). *In* New Records of the Fauna and Flora of Kansas for 1976. J. Caldwell, ed. Tech. Publ. State Biol. Surv. Kansas 4: 31-40

1977 - Additions and corrections to the list of aquatic beetles of the families Dryopidae and Elmidae from Kansas (Brown, H. and D. Huggins). *In* New Records of the Fauna and Flora of Kansas for 1976. J. Caldwell (ed.). Tech. Publ. State Biol. Surv. Kansas 4: 41-44

1977 - Records of Megaloptera in Kansas (P. Liechti and D. Huggins). *In* New Records of the Fauna and Flora of Kansas for 1976. J. Caldwell, ed. Tech. Publ. State Biol. Surv. Kansas 4: 45-50.

1978 - Additional Records of Kansas Odonata. *In* New Records of the Fauna and Flora of Kansas for 1977. R. Brooks & R. McGregor, eds. Tech. Publ. State Biol. Surv. Kansas 6: 1-35

1978 - Description of the nymph of *Enallagma divagans* Selys (Odonata: Coenagrionidae). Jour. Kansas Entomol. Soc. 51(1): 140-143

1979 - Kansas leeches (Annelidae; Hirudinea) with notes on distribution and ecology (Klemm, K., D. Huggins and M. Wetzel). *In* New Records of the Fauna and Flora of Kansas for 1978. R. Brooks, ed. Tech. Publ. State Biol. Surv. Kansas 8: 38-46

1979 - Fleas in Kansas: Their habits and effects on man (Huggins, D. and T. W. Oldham). Bull. State Biol. Surv. Kansas 6: 1-20

1980 - The occurrence of the glass shrimp, *Palaemonetes kadiokensis* Rathbum in Kansas. *In* New Records of the Fauna and Flora of Kansas for 1979. R. Brooks, ed. Tech. Publ. State Biol. Surv. Kansas 9: 12-14

1980 - The Spongillaflies (Neuroptera: Sisyridae) of Kansas. *In* New Records of the Fauna and Flora of Kansas for 1979 R. Brooks, ed. Tech. Publ. State Biol. Surv. Kansas 9: 67-70

1980 - Kansas black flies (Diptera: Simuliidae) with notes on distribution and ecology (Snyder, T. and D. Huggins). *In* New Records of the Fauna and Flora of Kansas for 1979. R. Brooks, ed. Tech. Publ. State Biol. Surv. Kansas 9: 30-34

1981 - New state and distributional records for Kansas Plecoptera. *In* New Records of the Fauna and Flora of Kansas for 1980. R. Brooks, ed. Tech. Publ. State Biol. Surv. Kansas 10:65-70

1981 - Guide to the freshwater invertebrates of the Midwest (Huggins, D., P. Liechti and L. Ferrington). Tech. Publ. State Biol. Surv. Kansas 11:221 pp.

1982 - Odonata (Huggins, D. and W. Brigham), pp. 4.1-4.100. *In* Aquatic Insects and Oligochaetes of North and South Carolina, A. R. Brigham, W. U. Brigham and A. Gnilka, eds. Midwest Aquatic Enterprises, Mahomet, Illinois.

1982 - Factors affecting microdistribution of two species of burrowing dragonfly nymphs (Odonata: Gomphidae) with notes on their biology (Huggins, D. and M. DuBois). Odonatologica 11(1): 1-14.

1982 - Development of water quality criteria for ammonia and total residual chlorine for the protection of aquatic life in two Johnson County, Kansas streams (Hazel, R., C. Burkhead and D. Huggins), pp. 381-388. *In* Aquatic Toxicology and Hazard Assessment,, J. Pearson, R. Foster and W. Bishop, eds. ASTM STP 766, Am. Soc. Test Materials, Philadelphia, PA

1982 - Notes on the Amphipoda of Kansas (Moffett, M. and D. Huggins). Tech. Publ. State Biol. Surv. Kansas 12:9-12

1983 - Sphaeriacean clams of Kansas (Mackie, G. and D. Huggins). Tech. Publ. State Biol. Survey Kansas 14: 92 pp.

1983 - Description of the nymph of *Somatochlora ensigera* (Scudder). Jour. Kansas Entomol. Soc. 56(3):415-419

1983 - New Kansas records of Odonata. Tech. Publ. State Biol. Survey Kansas 13: 24-25

1984 - Description of the nymph of *Enallagma daecki* (Calvert). Jour. Kansas Entomol. Soc. 57(2):190-196

1985 - The nymph of *Gomphus (Gomphurus) ozarkensis* Westfall (Odonata: Gomphlidae). Jour. Kansas Entomol. Soc. 58 (4): 656-661.

1985 - Insects and their relatives, pp. 115-128. *In Natural Kansas*, J. T. Collins, ed. Univ. Press Kansas, Lawrence.

1986 - A recovery and pinning technique for microlepidoptera preserved in alcohol. Jour. Kansas Entomol. Soc. 59(2): 387-388

1991 - Ecosystem modeling with LISREL: an approach for measuring direct and indirect effects in ecosystem level ecotoxicological testing. (Johnson, M., D. Huggins and F. deNoyelles, Jr.) Ecol. Appli.1:383-398.

1991 - Ecological consequences of the control and elimination of macrophytes in small ponds by atrazine and Grass Carp (Huggins, D. and M. Johnson). Proc. Regional Lake Mgnt. Conference, N.A. Lake Mgmt. Soc., Des Moines, IA. (June)

1993 - Kansas River System and its biota (Sanders, R., D. Huggins and F. Cross), pp. 295-326. *In* Restoration planning for the rivers of the Mississippi River ecosystem, L. Hesse, C. Stalnaker, N. Benson and J. Zuboy, eds. U.S. Fish. Wildl. Serv., Biol. Rept. 19.

1984- The ecotoxic effects of atrazine on aquatic ecosystems: an assessment of direct and indirect effects using structural equation modeling (Huggins, D., M. Johnson and F. deNoyelles, Jr.), pp. 653-692. *In* Simulated Field Studies in Aquatic Ecological Risk Assessment, R. Graney, J. Kennedy and J. Rodgers, eds. Lewis Publ., Ann Arbor, MI

1994 - Structural equation modeling and ecosystem analysis. (Johnson, M., D. Huggins and F. deNoyelles, Jr.), pp. 627-652. *In* Simulated Field Studies in Aquatic Ecological Risk Assessment, R. Graney, J. Kennedy and J. Rodgers, eds. Lewis Publ., Ann Arbor, MI

1994 - Aquatic mesocosms in ecological effects testing: Detecting direct and indirect effects on pesticides (deNoyelles, F., Jr., S. Dewey, D. Huggins and W. Kettle), pp.605-626. *In* Simulated Field Studies in Aquatic Ecological Risk Assessment, R. Graney, J. Kennedy and J. Rodgers, eds. Lewis Publ., Ann Arbor, MI

1994 - Converting Public Land Survey information into digital maps of improved accuracy and usefulness (Bandi, D. and D. Huggins). ASPRS Proceedings of "International Symposium on Spatial Accuracy of Natural Resource Data Bases", May 1994, 280 pp.

1995 - Effects of hydrophyte community structure on atrazine and alachlor degradation in wetlands (Lee, K., D. Huggins and E. Thurman), pp. 525-538. *In* Versatility of wetlands in the agricultural landscape. Am. Water Res. Assoc. Conference, Orlando, FL

1997 - Checklist of Kansas dragonflies (Beckemyer, R. and D. Huggins). The Kansas School Naturalist, 43(2): 3-15

1998 - Checklist of Kansas damselflies (Beckemyer, R. and D. Huggins). The Kansas School Naturalist, 44(1): 3-15

1998 - Effects of a large reservoir on downstream groundwater quality (Huggins, D. and G. Howick). J. Lake and Res. Management 14(1): 86-91

1999 - An analysis of the tropic state of Clinton Lake (Wang, S., D. Huggins, F. deNoyelles, Jr. and W. Kolln). Lake and Reserv. Manage. 15(3): 239-250

2001 - Ecoregions of Nebraska and Kansas (Chapman, S., J. Omernik, J. Freeouf, D. Huggins, J. McCauley, C. Freeman, G. Steinauer, R. Angelo and C. Mammoliti). Color poster withmap, descriptive text, summary tables, and photographs. USGS, Reston, VA (paper copy and at ftp://ftp.epa.gov/wed/ecoregions/ks_ne)

2003 - Watershed-lake water quality modeling: Verification and application (Makin, K., S. Wang, J. Koelliker, D. Huggins, and F. deNoyelles, Jr.). J. Soil and Water Conservation 58(4): 188-197

2005 - Nutrient limitation of phytoplankton growth in central plains reservoirs, USA (Dzialowski, A., S. Wang, N.C. Lim, W. Spotts and D. Huggins). J. Plankton Research 27(6): 587-595

2005 - An integrated modeling approach to total watershed management: Water quality and watershed assessment of Cheney Reservoir, Kansas, USA (Wang, S., D. Huggins, L. Frees, C. Volkman, N.C. Lim, D. Baker, V. Smith and F. deNoyelles, Jr.). Water, Air and Soil Pollution 164:1-19

2005 - Relationships between cyanobacteria production and the physical and chemical properties of a Midwestern Reservoir, USA (Wang, S., A. Dzialowski, Meyer, J., F. deNoyelles, Jr., N.C. Lim, W. Spotts, and D. Huggins). Hydrobiologia 541:29-43

2005 - Nutrient limitation of phytoplankton growth in Central Plains reservoirs, USA (Dzialowski, A., S. Wang, W. Spotts, N.C. Lim and D. Huggins). J. Plankton Research

27: 587-595.

2008 – Effects of sedimentation on biological resources (D.G. Huggins, R.C. Everhart, A. Dzialowski, J. Kriz and D.S. Baker), pp35-46. *In* Sediment in Our Reservoirs: Causes and Solutions, Contribution No. 08-250-S, KS Ag. Experiment Station, KSU. 142pp

2008 - Effects of sediment resuspension on algal biomass and nutrient concentrations in reservoirs of the Central Plains (Dzialowski, A.R., S.H. Wang, N.C. Lim, J.H. Beury and D.G. Huggins). Lake and Reserv. Manage. 24:313-320.

2009 - Development of predictive models for geosmin-related taste and odor in Kansas, USA, drinking water reservoirs. (A. Dzialowski, V. Smith, F. deNoyelles, Niang-Choo Lim, D. Baker, J. Buery). Water Research 43: 2829-2840

2009 - Threshold patterns in aquatic biodiversity across water quality gradients in Central Plains streams and rivers. (Evans-White, M.A., W.K. Dodds, D.G. Huggins, and D.S. Baker). J. North Am. Benthol. Soc. 28: 855-868.

(in press) - Patterns in algal biomass across stream size and ecoregions: examining widespread assumptions (D. Huggins, J. Thorp, and D. Baker). Ecosystems.

(submitted) - Evaluating sediment toxicity of residential streams in metropolitan Kansas City area, USA, with the amphipod *Hyalella azteca* (Tao, J., C. Ingersoll, N. Kemble, J. Dias, J. Murowchick1, G. Welker and D.Huggins). Arch. Environ. Contamin.Toxic.

(submitted) - Distribution of polycyclic aromatic hydrocarbon and pesticide contamination of sediment in residential streams in metropolitan Kansas City area, USA (Tao, J., D. Huggins, G. Welker, J. Dias, C. Ingersoll and J. Murowchick). Arch. Environ. Contamin.Toxic.

(submitted) - Congruence between nutrient water quality parameters and Chironomidae (Diptera) scales (Hayford, B. L., D. Huggins, D. B. Baker and M. Johnson). Environ. Management, June 2008

SERVICE:

<u>State and National</u>

Since 1974, I have been directing my service related activities toward providing advisory and support services to the Kansas citizenry; local and regional planners; government officials, judiciary, legislature and regulatory agencies; scientists and engineers and special interest groups who are concerned or interested in our aquatic resources and environment with regards to its biota. Many members and groups in our society are fast recognizing the importance of understanding our aquatic biota and their relationship with water quality. I have listed below a selected group of agencies and organizations that have asked for professional assistance in the area of aquatic biota and water quality related subjects.

Kansas Department of Health and Environment
US Geological Survey
Kansas Geological Survey
Kansas Dept. Wildlife and Parks

Kansas Fish Farmers Association
Dept. Health & Welfare (State of Idaho)
Kansas Department of Transportation
U. S. Department of Army - Ecological Research Unit
Wichita State University
Emporia State University
Kansas State University
Department of Environment Control (State of Nebraska)
Illinois Natural History Survey
University of Missouri
Missouri Conservation Commission
US Army Corps of Engineers (Kansas City District)
Museum of Natural History (KU)
US Fish and Wildlife Service
US EPA, Region VII
US EPA, ERL-Duluth
US EPA, ERL-Corvallis
University of California, Berkley & Davis
Integrated Laboratory systems, Duluth, MN
Nebraska Extension Educators
The Academy of Natural Sciences, Philadelphia
Haskell Indian Nations University
National Biological Service
Dept. of Entomology, Univ. of Wisconsin

International

1993:
Visit of KU and KBS facilities by Iowa State University and Ukraine representatives was conducted to develop a cooperative research and study agreement (KU,ISU and Ukraine). Efforts were made to facilitate discussions and presentations of capabilities of joint environmental interest between KU, ISU and Ukraine. University of Kansas units represented included International Studies, REES, Center of Environmental Education and Training, KBS and university administration officials. In addition, on behalf of the KBS I hosted agricultural and environmental leaders (i.e. government and university official) from Brazil interested in international "partnerships" and studies.

1994-95:
The aquatic ecotoxicology program facilitated collaborative research between Professor Zhaohui Jin, a visiting scholar from Nankai University, Trianjin, China and myself. Professor Jin was provided salary and laboratory facilities during his one and a half year stay at KU and a long-term research effort was established between KBS and Nankai University. This relationship continues with planned visits by other scholars and staff, as well as, collaborative publications of research done at the University of Kansas.

Current:
Since 1994 I have served and continue to serve as an external thesis examiner (i.e. adjudicator) for a number of educational institutes from India including the University of Kalyani, University of Calcutta and the University of Ankhra. I have established and maintained strong and productive relationships with a number of international higher education institutions due to my long history of research and academic mentoring of foreign students.

University

I have provided direct professional assistance and guidance to eight Masters degree candidates and one Ph.D. candidate within the Environmental Health program in Civil Engineering (KU). I have chaired or co-chaired seven MS committees (S. Meador & K. Higgins both CE honors graduates, K. Segelquist, S. Donley, A. Clements, M. Lary, N. Giron, J. Yelton, N. Lim, W. Spotts, W. Bouchard) and four Ph.D. committees (H. Wang, G. Welker, M. Blackwood, B. Chapin). I have sponsored three post-doctoral students (S. Wang, B. Hayford, D. Bandi, A. Dzialowski) and several national and international visiting scholars. Additionally I have set on five Ph.D. and five MS committees at KU and served as an ad hoc member of both a Master (Univ. Humboldt, CA) and PhD (UMKC) committee from other U.S. universities during the last 5 years. In addition, I have served as a mentor and provided research assistance to over 31 graduate students in numerous departments (e.g. Ecology and Evolutional Biology, Geography, Civil Engineering, Entomology, Architecture & Urban Design, Chemistry and Botany) during my tenure with the University. I have also assisted in the development of numerous MS thesis projects for students at Emporia, Pittsburg and Wichita State Universities, Illinois University, Iowa State University, UC-Davis and other universities.

I currently chair or co-chair three MS (Jason Buery, Geoff Warlick, Jason Koontz) and one Ph.D. (Bob Everhart) committee in either EEB or Civil Engineering.

I am the director of the Central Plains Center for BioAssessment that currently employs four scientists on a full-time basis (M. Blackwood, A. Blackwood, L. Bennett, D. Baker). In addition we normally employ about 2-4 graduate students, 4-6 undergraduate students and provide summer salary for 1-3 KU faculty members. During 2006 we have provided full or partial appointments for 5 graduate and 6 undergraduate students and 3 KU faculty members.
Reviewer (1987-to-date)

- Journal Kansas Entomol. Society
- Universities Council on Water Resources
- Nongame, Endangered or Threatened Wildlife Program, KDWP
- *Standard Methods* reviewer, American Water Works Assoc.
- Chapter 9: Lepidoptera *In* Freshwater Macroinvertebrates of Northeastern North America, Cornell Univ. Press.
- Entomological News
- Hydrobiologia

- Special Publication of Soc. Environ. Toxicol. and Chem. (1993)
- KU, New Faculty Proposals (11)
- Journal of North American Benthological Society
- Journal of American Society of Photogrammetry and Remote Sensing (1993)
- University Press of Kansas (book review, 1995)
- Journal of Insect Behavior (1995)
- Environ. Tox. and Chemistry (1994)
- External thesis examiner, University of Kalyani and Ankhra University, India (1994-95)
- Journal of Environ., Toxicol. and Chem. (1994)
- EPA's Eco-related Life Science Peer Review Panel (Apr 21-23, 1997)

IOWA'S WATER

Ambient Monitoring Program

Water Quality Summary 2000-2009*

Water Quality Parameter	Units	Number of Samples	Min Value	Percentiles 10th	25th	50th	75th	90th	Max Value
Acetochlor††	μg/L	7,126	<0.1	<0.1	<0.1	<0.1	<0.1	0.16	21
Alachlor††	μg/L	7,126	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8.6
Ammonia (as N)	mg/L	9,559	<0.1	<0.1	<0.1	<0.1	<0.1	0.20	5.7
Atrazine††	μg/L	7,135	<0.1	<0.1	<0.1	<0.1	0.24	0.75	53
Butylate††	μg/L	7,045	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carbonaceous BOD (5 day)	mg/L	8,806	<2	<2	<2	<2	2	5	35
Chloride	mg/L	8,497	<1	12	16	22	29	39	170
Chlorophyll a†	μg/L	5,056	<1	2	5	13	43	120	640
Chlorophyll b†	μg/L	5,049	<1	<1	<1	<1	<1	2	70
Chlorophyll c†	μg/L	5,049	<1	<1	<1	<1	2	8	66
Chlorophyll free of pheophytin	μg/L	4,042	<1	2	4	10	28	80	670
Corrected Chlorophyll a†	μg/L	5,053	<1	<1	3	10	36	110	620
Cyanazine††	μg/L	7,045	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3
Deethylatrazine††	μg/L	7,045	<0.1	<0.1	<0.1	<0.1	<0.1	0.17	2.6
Deisopropylatrazine††	μg/L	7,045	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.57
Dimethenamid††	μg/L	6,328	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	4.4
Diss. Orthophosphate (as P)	mg/L	9,398	<0.1	<0.1	<0.1	<0.1	0.15	0.27	5.1
Dissolved Oxygen	mg/L	9,634	0.7	7.7	8.7	10.5	12.9	14.4	21
E.coli Bacteria	CFU/100 ml	9,614	<10	<10	30	120	440	2,300	960,000
Field pH	pH units	3,274	5.0	7.8	8.0	8.2	8.4	8.6	10.9
Field Temperature	Celsius	9,681	0.0	0.1	2.3	12.7	20.5	24.3	34.3
Flow**	CFS	7,963	<1	20	90	340	1,280	3,500	78,500
Metolachlor††	μg/L	7,126	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	36
Metribuzin††	μg/L	7,045	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.5
Nitrate+Nitrite (as N)	mg/L	9,561	<0.1	0.9	3	5.8	8.5	12	35
Pheophytin†	μg/L	5,049	<1	<1	1	3	9	19	204
Silica††	mg/L	8,424	<1	5.0	9.0	13	17	21	190
Simazine††	μg/L	6,767	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	20
Specific Conductance	μmhos/cm	8,758	120	420	510	610	720	830	1,700
Sulfate	mg/L	7,998	<1	20	26	36	59	96	400
Total Dissolved Solids	mg/L	9,156	10	250	300	360	430	500	1,640
Total Hardness (as $CaCO_3$)	mg/L	8,769	55	200	240	300	360	410	820
Total Kjeldahl Nitrogen	mg/L	9,197	<0.1	0.3	0.5	0.8	1.3	2.0	28
Total Phosphorus	mg/L	9,558	<0.1	<0.1	0.11	0.20	0.34	0.60	26
Total Suspended Solids	mg/L	9,192	<1	4	10	34	87	220	17,000
Trifluralin††	μg/L	7,045	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.35
Turbidity	NTU	9,450	<1.0	2.8	6.0	18	44	110	8,500

**Due to budget constraints, the network of 75 stream sites were not fully monitored September 2008 – March 2009. Full monitoring resumed in April 2009.*

μg/L – micrograms per liter (parts per billion)
mg/L – milligrams per liter (parts per million)
CFU/100 ml – Colony Forming Units per 100 milliliters of water
CFS – Cubic Feet per Second (ft³/sec)
μmhos/cm – micromhos per centimeter
NTU – Nephelometric Turbidity Units; Diss. – Dissolved
< – less than detection limit shown; BOD – Biological Oxygen Demand

Raw data are available through STORET at www.igsb.uiowa.edu/wqm

Note: This summary only includes stream sites monitored as part of the fixed monthly network. Additional stream sites throughout Iowa are also monitored, but are not included in this summary, since their sampling frequency and parameters vary from the fixed network.

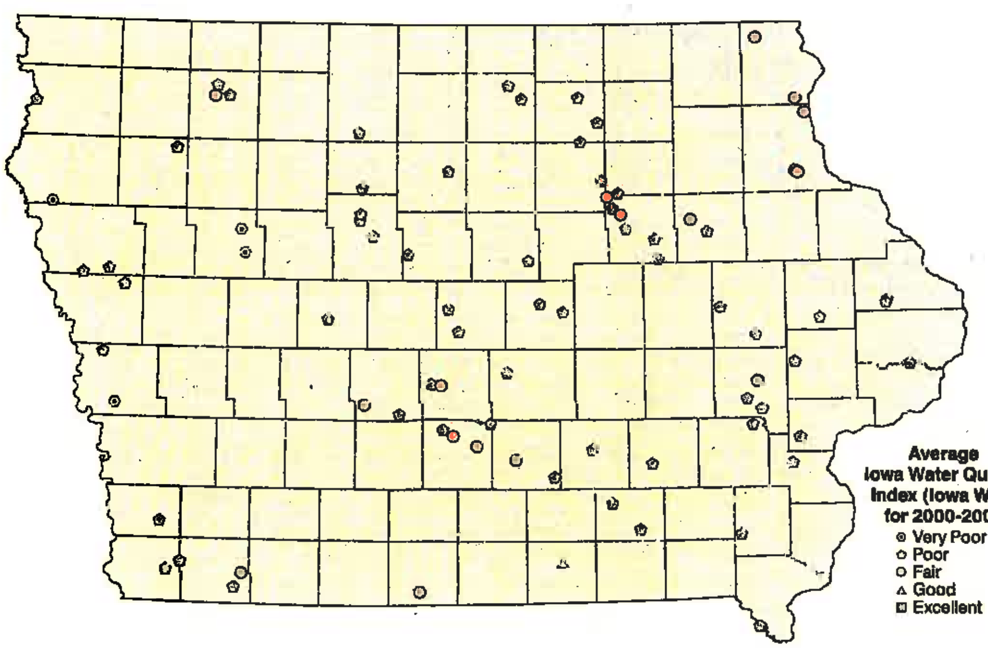
* Includes monthly and event samples for all stream sites
** Provisional data from the U.S. Geological Survey and University of Iowa Hygienic Laboratory
† Sampling discontinued in 2005
†† Sampling discontinued in 2008

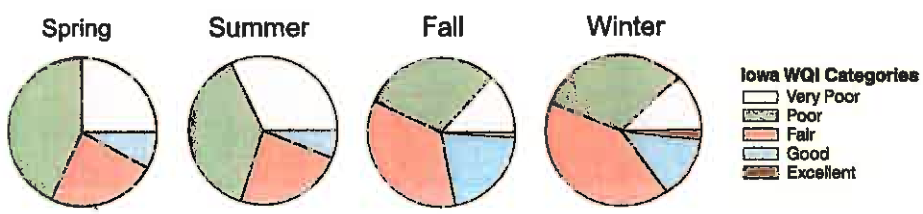
Less than values have been standardized to account for decreases in detection limits through time.

A total of 80 stream sites were sampled monthly from 2000-2002. A total of 84 stream sites were sampled monthly from 2003-2006. Number of sites sampled from Aug-Dec 2006 varied from 75 to 83. A total of 75 stream sites were sampled monthly since Dec 2006.

Iowa Water Quality Index for 2000-2009

In 2005, the Iowa Department of Natural Resources developed the Iowa Water Quality Index (WQI), a standardized method for comparing the water quality of various water bodies across the state. The Iowa WQI rates water quality using the following nine parameters: biological oxygen demand, dissolved oxygen, *E.coli* bacteria, nitrate+nitrite as nitrogen, total detected pesticides, pH, total phosphorus, total dissolved solids, and total suspended solids. If a result is missing for any of these parameters, the Iowa WQI assigns a default value for the missing parameters. Iowa WQI ranks range from 0 – 100 and streams are classified as **very poor** (0 – 25), **poor** (25.1 – 50), **fair** (50.1 – 70), **good** (70.1 – 90), and **excellent** (90.1 – 100). For 2000-2009, 1% of the monthly stream WQI values were in the **excellent** category, 11% were **good**, 31% were **fair**, 36% were **poor**, and 21% were **very poor**. (See map below for average WQI rank for each site.)





Streams in Iowa show seasonal Iowa WQI patterns. For the majority of streams, water quality is **poor** during the spring, followed by a decline in water quality during the summer months when the number of streams in the **very poor** category increases, while the number of streams in the **poor** category remains relatively the same. Water quality is at its best during the fall and winter months, with nearly 57% of the streams classified in the **fair**, **good**, and **excellent** categories during the fall and 56% of the streams classified in the **fair**, **good**, and **excellent** categories during the winter. (See pie charts above.)

Prepared by
Iowa Department of Natural Resources, Geological and Water Survey
109 Trowbridge Hall, Iowa City, IA 52242-1319

Printed on Recycled Paper

SiteID	Stream_L .on	Site No	Ecoregic	County	Strahler Stream Order	.ON_DI	LAT_DD	ammonia mg/L as N	chloride mg/L	chlorophyll A ug/L	D.O. (field) mg/L	(field) Std. Units	temperature (field) C	flow cfs	nitrate mg/L as N
128	West Nishnabotna River - Manning # 12	128	47e	Carroll	3	-95.02	41.973	0.23	20.5	1.5	11.15	8.2	17.85	6	16
8	East Nishnabotna River - Griswold - 8	8	47e	Cass	5	-95.15	41.275	0.025	21	67.667	13.833	8.8667	26.667	69.333	0.8
259	Sevenmile Creek	259	47e	Cass	4	-95.02	41.169	0.025	6.65	9.5	8.25	7.5	23.15	15.1	2.85
227	Sevenmile Creek	227	47e	Cass	4	-94.85	41.315	0.025	12	4.5	8.7	8.1	20.7	4.85	13
190	Troublesome Creek	190	47e	Cass	4	-94.86	41.485	0.025	8.9	11	7.6	8.1	26.55	14.85	6.85
138	Unn.Trib. Buck Creek - Atlantic # 138	138	47e	Cass	2	-95.01	41.481	0.025	20.75	3	9.6	7.8	16.025	3.5	14
30	Boyer River - Deloit - 30	30	47e	Crawford	4	-95.28	42.141	0.025	16.667	7	7.9	8.2667	25.933	79.333	8.3333
43	Nishnabotna River - Hamburg - 43	43	47m	Fremont	6	-95.64	40.607	0.025	13	340	14.8	9	26	326	1.6
182	Plum Creek - Thurman # 182	182	47m	Fremont	3	-95.72	40.833	0.145	12.5	23	7.6	8.1	24.55	3.2	1.85
172	Potato Creek - Persia # 172	172	47e	Harrison	2	-95.7	41.55	0.0313	15.75	2	8.65	7.95	17.85	4.075	14.75
15	Battle Creek - Battle Creek - 15	15	47e	Ida	3	-95.59	42.327	0.025	19	5.6667	10	8.2667	22.567	15.133	7.7667
158	Mud Creek - Hastings # 158	158	47e	Mills	3	-95.51	41.091	0.1125	11.95	4	9.65	8.25	21.3	12.9	8.5
191	Silver Creek	191	47e	Mills	4	-95.59	40.997	0.025	18	8	9.9333	8.5	13.5	79.433	6.4667
217	Jordan Creek	217	47m	Monona	2	-95.82	42.019	0.125	12.5	5.75	7.75	8.05	21.275	0.875	0.7325
226	Little Sioux River	226	47d	Monona	6	-95.95	42.192	0.025	23.5	50.5	8.55	8.35	26.05	538.2	5.05
110	Maple River - Castana # 110	110	47m	Monona	5	-95.92	42.069	0.025	17.5	116	9.7	8.35	22.85	185.25	6.5
21	Maple River - Turin - 21	21	47d	Monona	5	-95.94	42.032	0.025	16	140	9.6	8.3	25.3	161	6
208	Monona-Harrison Ditch	208	47d	Monona	6	-96.01	41.881	0.025	14.5	28	7.9	8.2	25.15	99.25	6.6
119	Soldier River - Moorhead # 119	119	47m	Monona	5	-95.84	41.923	0.025	14	7	8.45	8.4	24.7	45.65	4.5
247	Unn.Trib. Norway Creek - Soldier - REM	247	47m	Monona	2	-95.73	41.954	0.0683	10.767	10	8.5	8.3333	20.133	0.8	2.1
17	Unn.Trib. E. Nishnabotna - Essex - 17	17	47e	Page	2	-95.27	40.868	0.0633	9.9333	4.3333	8.2	8	15.1	2.5	1.7333
123	West Tarkio Creek - Coin # 123	123	47e	Page	3	-95.31	40.673	0.0425	8.65	4	8.5	8.15	22.15	21.35	6.75
106	West Tarkio Creek - Essex # 106	106	47e	Page	3	-95.2	40.829	0.025	10	1.25	9.65	8.05	17.45	21.7	14.5
24	Broken Kettle Creek - Westfield - 24	24	47e	Plymouth	4	-96.47	42.722	0.0567	14	7	10.333	8.0333	16.867	8.1333	6.1
130	Perry Creek - Hinton # 130	130	47e	Plymouth	3	-96.37	42.657	0.025	13.5	1.5	8.95	8.05	17.9	10.7	10.5
74	Boyer River - Missouri Valley - REMAP #	74	47d	Pottawattamie	5	-95.92	41.458	0.025	19.667	46.667	9.1667	8.5667	27.6	180.13	6.2667
52	Keg Creek - McClelland - 52	52	47e	Pottawattamie	3	-95.64	41.311	0.0717	16	13.333	9.4333	8.4333	24.3	6.3667	5.2667
294	Lapworth Creek - Crescent - 294	294	47d	Pottawattamie	2	-95.87	41.361	0.62	46	0.5	3.1	8	18.5	0.05	0.1
105	Mosquito Creek - Underwood # 105	105	47e	Pottawattamie	4	-95.69	41.367	0.025	23	9.3333	9.6667	7.8667	16.767	49.633	6.4333
150	Pony Creek - Council Bluffs # 150	150	47d	Pottawattamie	4	-95.83	41.182	0.295	17.5	12	7.3	7.65	17.35	1.35	1.1
97	West Nishnabotna River - Oakland # 97	97	47e	Pottawattamie	5	-95.4	41.333	0.025	16.5	7	8.6	8.35	22.4	159.1	4.45
251	Odebolt Creek - Odebolt - REMAP # 25'	251	47e	Sac	3	-95.27	42.318	1.5367	293.33	83	10.3	7.9	12.6	0.3333	3.7333
146	East Branch West Nishnabotna River -	146	47e	Shelby	4	-95.23	41.643	0.025	11	2	8.5	8.3	19.6	54.3	7.65
16	Mosquito Creek - Panama - 16	16	47e	Shelby	3	-95.47	41.688	0.16	24.5	6	9.6	8	17.25	5	2.55
230	Unn.Trib. Indian Creek - Elk Horn 230	230	47e	Shelby	2	-95.15	41.582	0.0633	11.9	7.6667	10.1	7.9	13.25	1.8333	8.1667
149	Unn.Trib. West Nishnabotna R.- Irwin #	149	47e	Shelby	2	-95.27	41.777	0.0388	14.75	1.875	9	7.975	19.4	1.9	8.825
60	West Nishnabotna River - Irwin - REMAI	60	47e	Shelby	4	-95.18	41.804	0.0725	22.333	10.667	10.467	8.2667	13.217	22.883	8.5333
173	W.Frk.Little Sioux R. - Bronson # 173	173	47m	Woodbury	5	-96.08	42.371	0.025	18	4.5	7.55	8.3	28.45	84.75	8.4
							Min	0.025	6.650	0.500	3.100	7.500	12.600	0.050	0.100
							10Pct	0.025	9.980	1.763	7.600	7.890	14.620	1.208	1.450
							25Pct	0.025	12.125	4.083	8.300	8.000	17.375	3.644	3.071
							50Pct	0.025	15.875	7.000	8.975	8.175	20.988	14.975	6.450
							75Pct	0.071	19.500	13.000	9.692	8.325	24.663	76.833	8.383
							90Pct	0.181	23.150	72.267	10.373	8.453	26.200	166.740	13.300
							Max	1.537	293.333	340.000	14.800	9.000	28.450	538.200	16.000
							Mean	0.112	23.579	28.071	9.119	8.176	20.743	60.441	6.455
							Std Dev.	0.261	45.432	60.981	1.826	0.290	4.485	106.506	4.145

COMPLAINANT'S EX. NO. 2

SiteID	Stream_L.___.on	Site No	Ecoregic	County	Strahler Stream Order	.ON___DI	LAT_DD	ammonia mg/L as N	chloride mg/L	chlorophyll A ug/L	D.O. (field) mg/L	(field) Std Units	temperature (field) C	flow cfs	nitrate mg/L as N
128	West Nishnabotna River - Manning # 12	128	47e	Carroll	3	-95.02	41.973	0.23	20.5	1.5	11.15	8.2	17.85	6	16
8	East Nishnabotna River - Griswold - 8	8	47e	Cass	5	-95.15	41.275	0.025	21	67.667	13.833	8.8667	26.667	69.333	0.8
259	Sevenmile Creek	259	47e	Cass	4	-95.02	41.169	0.025	6.65	9.5	8.25	7.5	23.15	15.1	2.85
227	Sevenmile Creek	227	47e	Cass	4	-94.85	41.315	0.025	12	4.5	8.7	8.1	20.7	4.85	13
190	Troublesome Creek	190	47e	Cass	4	-94.86	41.485	0.025	8.9	11	7.6	8.1	26.55	14.85	6.85
138	Unn.Trib. Buck Creek - Atlantic # 138	138	47e	Cass	2	-95.01	41.481	0.025	20.75	3	9.6	7.8	16.025	3.5	14
30	Boyer River - Deloit - 30	30	47e	Crawford	4	-95.28	42.141	0.025	16.667	7	7.9	8.2667	25.933	79.333	8.3333
43	Nishnabotna River - Hamburg - 43	43	47m	Fremont	6	-95.64	40.607	0.025	13	340	14.8	9	26	326	1.6
182	Plum Creek - Thurman # 182	182	47m	Fremont	3	-95.72	40.833	0.145	12.5	23	7.6	8.1	24.55	3.2	1.85
172	Potato Creek - Persia # 172	172	47e	Harrison	2	-95.7	41.55	0.0313	15.75	2	8.65	7.95	17.85	4.075	14.75
15	Battle Creek - Battle Creek - 15	15	47e	Ida	3	-95.59	42.327	0.025	19	5.6667	10	8.2667	22.567	15.133	7.7667
158	Mud Creek - Hastings # 158	158	47e	Mills	3	-95.51	41.091	0.1125	11.95	4	9.65	8.25	21.3	12.9	8.5
191	Silver Creek	191	47e	Mills	4	-95.59	40.997	0.025	18	8	9.9333	8.5	13.5	79.433	6.4667
217	Jordan Creek	217	47m	Monona	2	-95.82	42.019	0.125	12.5	5.75	7.75	8.05	21.275	0.875	0.7325
226	Little Sioux River	226	47d	Monona	6	-95.95	42.192	0.025	23.5	50.5	8.55	8.35	26.05	538.2	5.05
110	Maple River - Castana # 110	110	47m	Monona	5	-95.92	42.069	0.025	17.5	116	9.7	8.35	22.85	185.25	6.5
21	Maple River - Turin - 21	21	47d	Monona	5	-95.94	42.032	0.025	16	140	9.6	8.3	25.3	161	6
208	Monona-Harrison Ditch	208	47d	Monona	6	-96.01	41.881	0.025	14.5	28	7.9	8.2	25.15	99.25	6.6
119	Soldier River - Moorhead # 119	119	47m	Monona	5	-95.84	41.923	0.025	14	7	8.45	8.4	24.7	45.65	4.5
247	Unn.Trib. Norway Creek - Soldier - REM	247	47m	Monona	2	-95.73	41.954	0.0683	10.767	10	8.5	8.3333	20.133	0.8	2.1
17	Unn.Trib. E. Nishnabotna - Essex - 17	17	47e	Page	2	-95.27	40.868	0.0633	9.9333	4.3333	8.2	8	15.1	2.5	1.7333
123	West Tarkio Creek - Coin # 123	123	47e	Page	3	-95.31	40.673	0.0425	8.65	4	8.5	8.15	22.15	21.35	6.75
106	West Tarkio Creek - Essex # 106	106	47e	Page	3	-95.2	40.829	0.025	10	1.25	9.65	8.05	17.45	21.7	14.5
24	Broken Kettle Creek - Westfield - 24	24	47e	Plymouth	4	-96.47	42.722	0.0567	14	7	10.333	8.0333	16.867	8.1333	6.1
130	Perry Creek - Hinton # 130	130	47e	Plymouth	3	-96.37	42.657	0.025	13.5	1.5	8.95	8.05	17.9	10.7	10.5
74	Boyer River - Missouri Valley - REMAP #	74	47d	Pottawattamie	5	-95.92	41.458	0.025	19.667	46.667	9.1667	8.5667	27.6	180.13	6.2667
52	Keg Creek - McClelland - 52	52	47e	Pottawattamie	3	-95.64	41.311	0.0717	16	13.333	9.4333	8.4333	24.3	6.3667	5.2667
294	Lapworth Creek - Crescent - 294	294	47d	Pottawattamie	2	-95.87	41.361	0.62	46	0.5	3.1	8	18.5	0.05	0.1
105	Mosquito Creek - Underwood # 105	105	47e	Pottawattamie	4	-95.69	41.367	0.025	23	9.3333	9.6667	7.8667	16.767	49.633	6.4333
150	Pony Creek - Council Bluffs # 150	150	47d	Pottawattamie	4	-95.83	41.182	0.295	17.5	12	7.3	7.65	17.35	1.35	1.1
97	West Nishnabotna River - Oakland # 97	97	47e	Pottawattamie	5	-95.4	41.333	0.025	16.5	7	8.6	8.35	22.4	159.1	4.45
251	Odebolt Creek - Odebolt - REMAP # 25'	251	47e	Sac	3	-95.27	42.318	1.5367	293.33	83	10.3	7.9	12.6	0.3333	3.7333
146	East Branch West Nishnabotna River -	146	47e	Shelby	4	-95.23	41.643	0.025	11	2	8.5	8.3	19.6	54.3	7.65
16	Mosquito Creek - Panama - 16	16	47e	Shelby	3	-95.47	41.688	0.16	24.5	6	9.6	8	17.25	5	2.55
230	Unn.Trib. Indian Creek - Elk Horn 230	230	47e	Shelby	2	-95.15	41.582	0.0633	11.9	7.6667	10.1	7.9	13.25	1.8333	8.1667
149	Unn.Trib. West Nishnabotna R.- Irwin #	149	47e	Shelby	2	-95.27	41.777	0.0388	14.75	1.875	9	7.975	19.4	1.9	8.825
60	West Nishnabotna River - Irwin - REMAI	60	47e	Shelby	4	-95.18	41.804	0.0725	22.333	10.667	10.467	8.2667	13.217	22.883	8.5333
173	W.Frk.Little Sioux R. - Bronson # 173	173	47m	Woodbury	5	-96.08	42.371	0.025	18	4.5	7.55	8.3	28.45	84.75	8.4
							Min	0.025	6.650	0.500	3.100	7.500	12.600	0.050	0.100
							10Pct	0.025	9.980	1.763	7.600	7.890	14.620	1.208	1.450
							25Pct	0.025	12.125	4.083	8.300	8.000	17.375	3.644	3.071
							50Pct	0.025	15.875	7.000	8.975	8.175	20.988	14.975	6.450
							75Pct	0.071	19.500	13.000	9.692	8.325	24.663	76.833	8.383
							90Pct	0.181	23.150	72.267	10.373	8.453	26.200	166.740	13.300
							Max	1.537	293.333	340.000	14.800	9.000	28.450	538.200	16.000
							Mean	0.112	23.579	28.071	9.119	8.176	20.743	60.441	6.455
							Std.Dev.	0.261	45.432	60.981	1.826	0.290	4.485	106.506	4.145

COMPLAINANT'S EX. NO. 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

NOV 8

MEMORANDUM

SUBJECT: Addendum to Inspection Report dated September 23, 2010

FROM: Joe Heafner JAH 11/8/10
EFCB/ENSV

TO: Facility File

This is an addendum to the report of inspection for Moran Beef Feedlot that EPA conducted on September 23, 2010. The addendum presents all sample results including those that were not available at the time that the September 23, 2010 report was completed.

Table 1 represents the analytical data from the samples collected on September 23, 2010 (**see attachments 1 and 2 for complete data transmittal packets**).

Table 1: Analytical Results for Samples Collected During Inspection.

Parameter[1]	Site #1 5120-1	Site #2 5120-2	Site #3 5120-6	Site #4 5120-5
NH_3-N	0.570	3.88	0.1U[2]	0.394
TKN	10.5	17.9	0.841	1.24
Total P	2.54	7.26	0.189	0.327
NFS	87.2	2740	4.0U[2]	67.8
NO_2+NO_3-N	0.251	25.5	13.0	13.8
BOD	18	68	5	2
E. coli	>2500	>2500	>2500	>2500
pH	8.43	7.02	7.4	7.52
Temperature	23.0	18.6	19.5	19.3

[1]Parameters are reported in milligrams per liter (mg/L)
[2]The analyte was not detected at or above the reporting limit.

Attachments
1. Data Transmittal Packet for Activity JAH1012 (11 pages)
2. Transmittal from Midwest Laboratories (3 pages)

United States Environmental Protection Agency
Region 7
901 N. 5th Street
Kansas City, KS 66101

Date: OCT 26 2010

Subject: Transmittal of Sample Analysis Results for ASR #: 5120

Project ID: JHMBFLCAFO

Project Description: Moran Beff - CAFO sampling

From: Michael F. Davis, Chief 10/27/10
Chemical Analysis and Response Branch, Environmental Services Division

To: Joe Heafner
ENSV/EFCB

Enclosed are the analytical data for the above-referenced Analytical Services Request (ASR) and Project. The Regional Laboratory has reviewed and verified the results in accordance with procedures described in our Quality Manual (QM). In addition to all of the analytical results, this transmittal contains pertinent information that may have influenced the reported results and documents any deviations from the established requirements of the QM.

Please contact us within 14 days of receipt of this package if you determine there is a need for any changes. Please complete the enclosed Customer Satisfaction Survey and Data Disposition/Sample Release memo for this ASR as soon as possible. The process of disposing of the samples for this ASR will be initiated 30 days from the date of this transmittal unless an alternate release date is specified on the Data Disposition/Sample Release memo.

If you have any questions or concerns relating to this data package, contact our customer service line at 913-551-5295.

Enclosures

cc: Analytical Data File.

ATTACHMENT 1 Page 1 of 11

Project Manager: Joe Heafner **Org:** ENSV/EFCB **Phone:** 913-551-7091

Project ID: JHMBFLCAFO

Project Desc: Moran Beff - CAFO sampling

Location: Underwood **State:** Iowa **Program:** Water Enforcement

Purpose: Enforcement **GPRA PRC:** 501E49C

Moran Beef Feedlot CAFO sampling in Ireton, Iowa.

Explanation of Codes, Units and Qualifiers used on this report

Sample QC Codes: QC Codes identify the type of sample for quality control purpose.

__ = Field Sample

Units: Specific units in which results are reported.

Deg C = Degrees Celsius
SU = Standard Units (pH)
mg/L = Milligrams per Liter

Data Qualifiers: Specific codes used in conjunction with data values to provide additional informatior on the quality of reported results, or used to explain the absence of a specific value.

(Blank)= Values have been reviewed and found acceptable for use.
U = The analyte was not detected at or above the reporting limit.

ATTACHMENT 1 Page 2 of 11

ASR Number: 5120 **Sample Information Summary** **10/26/2010**

Project ID: JHMBFLCAFO **Project Desc:** Moran Beff - CAFO sampling

Sample No	QC Code	Matrix	Location Description	External Sample No	Start Date	Start Time	End Date	End Time	Receipt Date
1 -	__	Water	Effluent near NE corner of confinement barn		09/23/2010	13:45	09/23/2010	13:45	09/24/2010
2 -	__	Water	Outfall from confinement barn, collection basin		09/23/2010	14:05	09/23/2010	14:05	09/24/2010
5 -	__	Water	Upstream sample of unnamed Trib. to Mosquitto Creek		09/23/2010	14:15	09/23/2010	14:15	09/24/2010
6 -	__	Water	Downstream sample of unnamed Trib. to Mosquitto Creek		09/23/2010	14:10	09/23/2010	14:10	09/24/2010

ATTACHMENT 1 Page 3 of 11

Analysis **Comments About Results For This Analysis**

1 Ammonia in Water by Automated Distillation

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3133.1G

Samples: 1-__ 2-__ 5-__ 6-__

Comments:

1 NFS or Nonfilterable Solids

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3142.3E

Samples: 1-__ 2-__ 5-__ 6-__

Comments:

1 Nitrogen, Nitrate+Nitrite in Water

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3133.2H for acidified samples (for total NO3+NO2 analysis).

Samples: 1-__ 2-__ 5-__ 6-__

Comments:

1 pH of Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter

Samples: 1-__ 2-__ 5-__ 6-__

Comments:
(N/A)

1 Temperature of Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter

ATTACHMENT 1 Page 4 of 11

Samples: 1-__ 2-__ 5-__ 6-__

Comments:
(N/A)

1 Total Kjeldahl Nitrogen in Water Colorimetric

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

ASR Number: 5120 **RLAB Approved Sample Analysis Results** **10/26/2010**

Project ID: JHMBFLCAFO **Project Desc:** Moran Beff - CAFO sampling

Analysis/ Analyte	Units	1-__	2-__	5-__	6-__
1 Ammonia in Water by Automated Distillation					
Ammonia as Nitrogen	mg/L	0.570	3.88	0.1 U	0.394
1 NFS or Nonfilterable Solids					
Solids, nonfilterable	mg/L	87.2	2740	4.00 U	67.8
1 Nitrogen, Nitrate+Nitrite in Water					
Nitrate + Nitrite as Nitrogen	mg/L	0.251	25.5	13.0	13.8
1 pH of Water by Field Measurement					
pH	SU	8.43	7.02	7.52	7.4
1 Temperature of Water by Field Measurement					
Temperature	Deg C	23.0	18.6	19.3	19.5
1 Total Kjeldahl Nitrogen in Water Colorimetric					
Total Kjeldahl Nitrogen	mg/L	10.5	17.9	0.841	1.24
1 Total Phosphorus in Water, Colorimetric					
Phosphorus	mg/L	2.54	7.26	0.189	0.327

ATTACHMENT 1 Page 5 of 11

Analysis **Comments About Results For This Analysis**

Method: EPA Region 7 RLAB Method 3133.3F

Samples: 1-__ 2-__ 5-__ 6-__

Comments:
(N/A)

1 Total Phosphorus in Water, Colorimetric

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3133.4E

Samples: 1-__ 2-__ 5-__ 6-__

Comments:
(N/A)

ATTACHMENT 1 Page 6 of 11

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER (Print): Joe Heafner

NAME OF SURVEY OR ACTIVITY: ASR 5120

DATE OF COLLECTION: DAY 23 MONTH 9 YEAR 10

SHEET 1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER (1L)	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
5120-1	2					X					
5120-2	2					X					
5120-5	2					X					
5120-6	2					X					
Total	8										

Activity Complete

ATTACHMENT 1 Page 7 of 11

ATTACHMENT Page of

Clr. Temp. Rec'd. Out. 3.3-4.7°C ~9/24/10

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
8 PIECE(S) CONSISTING OF X BOX(ES)	___ COMMERCIAL CARRIER: ___
1 ICE CHEST(S); OTHER ___	___ COURIER
	X SAMPLER CONVEYED ___ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD 9/24/10

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Joe Heafner ☒ SEALED ☐ UNSEALED	9/23/10	1930	Nicole Roblez ☒ SEALED ☐ UNSEALED	Analy—
RELINQUISHED BY	DATE	TIME	RECEIVED BY 900Am	REASON FOR CHANGE OF CUSTODY
☐ SEALED ☐ UNSEALED			☐ SEALED ☐ UNSEALED	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
☐ SEALED ☐ UNSEALED			☐ SEALED ☐ UNSEALED	

Sample Collection Field Sheet

US EPA Region 7
Kansas City, KS

ASR Number: 5120 **Sample Number:** 1 **QC Code:** __ **Matrix:** Water **Tag ID:** 5120-1-__

Project ID: ~~JHNWIACAFO~~ SHMBFLCAFO **Project Manager:** Joe Heafner
Project Desc: ~~CAFO sampling in Northwest Iowa~~ Moran Beff
City: ~~Various~~ Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: ~~Discharge of Effluent nee~~ Effluent near NE ~~e~~ corner of Confinement Barn
Storet ID: ______ **External Sample Number:** ______

Expected Conc (or Circle One: Low Medium High) **Date** **Time(24 hr)**
Latitude: __ __ __ **Sample Collection: Start:** 09/23/2010 13:45
Longitude: __ __ __ **End:** 09/23/2010 13:45

Field Measurement

Parameter	Value	Units
Temperature :	23.0	Deg C
pH :	8.43	SU

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	2 mL H2SO4/L	28	Days	1 Nitrogen, Nitrate+Nitrite in Water
1 - 1 Liter Cubitainer	4 Deg C 2	7	Days	1 NFS or Nonfilterable Solids
1 - 1 Liter Cubitainer	5 mL H2SO4/L	28	Days	1 Ammonia in Water by Automated Distillation
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Phosphorus in Water, Colorimetric

1

Sample Comments

(N/A)

BOD and E. coli samples conveyed to MidWest Labs in Omaha NE

ATTACHMENT 1 Page 8 of 11

Sample Collected By: Joe Heafner Joe Heafner

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5120 **Sample Number:** 2 **QC Code:** __ **Matrix:** Water **Tag ID:** 5120-2-__

Project ID: ~~JHNWIACAFO~~ JHMBFLCAFO **Project Manager:** Joe Heafner
Project Desc: ~~CAFO sampling in Northwest Iowa~~ Moran Beff
City: ~~Various~~ Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: Outfall from Confinement Barn Collection Basin

Storet ID: ____________ **External Sample Number:** ____________

Expected Conc (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 09/23/2010 14:05
Longitude: ___ ___ ___ **End:** 09/23/2010 14:05

Field Measurement

Parameter	Value	Units
Temperature :	19.6	Deg C
pH :	7.02	SU

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	2 mL H2SO4/L	28	Days	1 Nitrogen, Nitrate+Nitrite in Water
1 - 1 Liter Cubitainer	4 Deg C (2)	7	Days	1 NFS or Nonfilterable Solids
1 - 1 Liter Cubitainer	5 mL H2SO4/L	28	Days	1 Ammonia in Water by Automated Distillation
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Phosphorus in Water, Colorimetric

D

Sample Comments

(N/A) BOD and E. coli samples conveyed to Midwest Labs in Omaha NE

ATTACHMENT 1 Page 9 of 11

Sample Collected By: Joe Heafner

Sample Collection Field Sheet

US EPA Region 7
Kansas City, KS

ASR Number: 5120 **Sample Number:** 5 **QC Code:** __ **Matrix:** Water **Tag ID:** 5120-5-__

Project ID: ~~JHNWIACAFO~~ JHMBFLCAFO **Project Manager:** Joe Heafner
Project Desc: ~~CAFO sampling in Northwest Iowa~~ Moran Beff
City: ~~Various~~ Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: Upstream sample of Unnamed Trib. to Mosquitto Creek

Storet ID: ____________ **External Sample Number:** ____________

Expected Conc (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 09/23/2010 14:15
Longitude: ___ ___ ___ **End:** 09/23/2010 14:15

Field Measurement

Parameter	Value	Units
Temperature :	17.3	Deg C
pH :	7.52	SU

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 1 Liter Cubitainer	2 mL H2SO4/L	28 Days	1 Nitrogen, Nitrate+Nitrite in Water
1 - 1 Liter Cubitainer	4 Deg C (2)	7 Days	1 NFS or Nonfilterable Solids
1 - 1 Liter Cubitainer	5 mL H2SO4/L	28 Days	1 Ammonia in Water by Automated Distillation
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28 Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28 Days	1 Total Phosphorus in Water, Colorimetric

D

Sample Comments

(N/A)

BOD and E. coli samples conveyed to Midwest Labs in Omaha NE

ATTACHMENT 1 Page 10 of 11

Sample Collected By: Joe Heafner

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 5120 **Sample Number:** 6 **QC Code:** __ **Matrix:** Water **Tag ID:** 5120-6-__

Project ID: ~~JHNWIACAFO~~ JHMBFLCAFO **Project Manager:** Joe Heafner
Project Desc: ~~CAFO sampling in Northwest Iowa~~ Moran Beff
City: ~~Various~~ Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: Downstream Sample of Unnamed Trib to Mosquitto Creek

Storet ID: ____ **External Sample Number:** ____

Expected Conc (or Circle One: Low Medium High)

	Date	Time(24 hr)
Latitude: __ __ __ **Sample Collection: Start:**	09/23/2010	14:10
Longitude: __ __ __ **End:**	09/23/2010	14:10

Field Measurement

Parameter	Value	Units
Temperature :	19.5	Deg C
pH :	7.4	SU

Laboratory Analyses:

	Container	Preservative	Holding Time		Analysis
1)	1 - 1 Liter Cubitainer	2 mL H2SO4/L	28	Days	1 Nitrogen, Nitrate+Nitrite in Water
2)	1 - 1 Liter Cubitainer	4 Deg C	7	Days	1 NFS or Nonfilterable Solids
	1 - 1 Liter Cubitainer	5 mL H2SO4/L	28	Days	1 Ammonia in Water by Automated Distillation
	1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
	1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Phosphorus in Water, Colorimetric

Sample Comments

(N/A) BOD and E. coli samples conveyed to Midwest Labs in Omaha NE

ATTACHMENT 1 Page 11 of 11

Sample Collected By: [signature]

Report Number
10-272-2125

Midwest Laboratories Inc.®
13611 "B" Street • Omaha, Nebraska 68144-3693 • (402) 334-7770 • FAX (402 334-9121
www.midwestlabs.com

REPORT OF ANALYSIS

For: (25910) SAIC
(703)375-2287

Mail to: SAIC
KATIE MERRIMAN/DAVID LARIT
12100 SUNSET HILLS ROAD MS 4-3
RESTON VA 20190

Date Reported: 09/29/10
Date Received: 09/23/10

ASR 5021

ATTACHMENT 2 Page 1 of 3

Lab number: 1762148

Analysis	Level Found	Units	Detection Limit	Method	Analyst-Date	Verified-Date
Sample ID: 5021-1						
E coli	> 2500	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	18	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29
Sample ID: 5021-2						
E coli	> 2500	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	68	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29
Sample ID: 5021-5						
E coli	1,200	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	2	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29
Sample ID: 5021-6						
E coli	> 2500	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	5	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29

Notes:
*Sample was setup with 100 mL used in E coli determination. All the
*wells were positive for 3 of 4 samples. If high amounts were
*expected, we could have done dilutions to determine the exact #

For questions contact

Prem W. Arora

Prem Arora
Environmental Project Manager
prem@midwestlabs.com (402)829-9878

25910

09-23-10P04:02 RCVD

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Joe Heafner	ASR 5021	23 / 9 / 10	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER (1L)	BOTTLE (1 Bact)	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
5021-1	1	1	1762148 2			X					BOD E.Coli
5021-2	1	1	1762149 2			X					
5021-5	1	1	1762150 2			X					
5021-6	1	1	1762151 2			X					
Total	4	4									

8

U.S. Environmental Protection Agency
Region 7. Kansas, Missouri, Iowa, Nebraska

Joe Heafner
Life Scientist
Environmental Services Division

ENSV/EFCB
901 North 5th Street
Kansas City, Kansas 66101

Phone: 913-551-7091
Fax: 913-551-8699
E-mail: heafner.joseph@epa.gov

HAND DELIVERED ON ICE

4

1762148 - 1762151

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
8 PIECE(S) CONSISTING OF 1 BOX(ES)	COMMERCIAL CARRIER:
X ICE CHEST(S): OTHER	COURIER
	X SAMPLER CONVEYED
	Conveyed to Midwest Labs (SHIPPING DOCUMENT NUMBER) Omaha, NE

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] SEALED ☐ UNSEALED ☐	9/23/10	1527	Heather Ramig SEALED ☐ UNSEALED ☐	
RELINQUISHED BY SEALED ☐ UNSEALED ☐	DATE	TIME	RECEIVED BY SEALED ☐ UNSEALED ☐	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY SEALED ☐ UNSEALED ☐	DATE	TIME	RECEIVED BY SEALED ☐ UNSEALED ☐	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Joe Heatner	ASR ~~5021~~ 5120 (7-23/10)	23 / 7 / 10	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	1L CUBITAINER	1L BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers etc.)
5120 04H ~~5121~~-1	1	1				X					BOD e coli
5120 04H ~~5121~~ 2	1	1				X					
5120 GH ~~5121~~-5	1	1				X					
5120 GH ~~5121~~ 11	1	1				X					
Total	4	4									

(NUMBERS OF CONTAINERS PER SAMPLE NUMBER)

Project Manager Transposed #s on samples JAH 7/23/10

ATTACHMENT 2 Page 3 of 3

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
X PIECE(S) CONSISTING OF 1 BOX(ES)	COMMERCIAL CARRIER:
X ICE CHEST(S); OTHER	COURIER
	X SAMPLER CONVEYED — Conveyed to Midwest Labs Omaha (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] ☑ SEALED ☐ UNSEALED	7/23/10	1527	Heather Koenig ☐ SEALED ☐ UNSEALED	
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME —	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

eco News wire

IOWA DEPARTMENT OF NATURAL RESOURCES

December 4, 2008
For immediate release

1. **Livestock producers who house animals both inside and out may need to apply for a permit**

LIVESTOCK PRODUCERS WHO HOUSE ANIMALS BOTH INSIDE AND OUT MAY NEED TO APPLY FOR A PERMIT

MEDIA CONTACT: Gene Tinker at (563) 927-2640 or gene.tinker@dnr.iowa.gov or Ken Hessenius at (712) 262-4177 or kenneth.hessenius@dnr.iowa.gov

DES MOINES – Animal producers, primarily beef and dairy producers, may need to act soon if they raise large numbers of the same kind of animals in both indoor and outdoor housing.

Based on industry input, the DNR estimates that there are less than 200 or 250 livestock operations that will need the permit. But, those who do, must act quickly. Producers who are affected must apply for a permit by Dec. 31, 2008.

The permit is called a national pollutant discharge elimination system permit (NPDES). Affected producers must apply for an NPDES permit to the DNR, develop and submit a nutrient management plan and determine how they will comply with any needed construction requirements – all by the end of the year.

Three tests can help producers decide if they need a permit:

1. Does their operation have any of the following:
    a. 700 or more mature dairy cows, milked or dry?
    b. 1,000 or more veal calves?

COMPLAINANT'S EX. NO. 22

c. 1,000 or more of all other cattle types? (For example, dairy producers raising replacement heifers and feeding out dairy steers would add both of these together to determine if they have 1,000 head.)

2. Does their operation discharge? Most Iowa producers who house animals outside have periodic runoff allowing manure components or process wastewater to reach a stream. In contrast, since Iowa confinement operations are not allowed to discharge, any discharges that occur are likely due to an accident or pipe failure and are in violation of state law.
3. How close are the different parts of their operation? Animals housed within 1,250 feet of each other would be added together.

Producers can call their DNR field office for more information and technical assistance More information is available on the DNR Web site at www.iowadnr.com/afo/index.html under Current News.

The requirement comes about because of a state law that was passed to help Iowa producers comply with federal regulations.

The requirement to obtain an NPDES permit for combined open feedlot and confinement facilities is the result of State law passed in 2008 to help producers comply with federal regulations.

Writer: Karen Grimes

NPDES Permits

Determining if a Combination Open Feedlot and Animal Confinement Must Apply for an NPDES Permit in 2008

Act Now! — What to Do If You Need a Permit

Producers who need an NPDES permit must apply by Dec. 31, 2008 Producers who are affected must

- submit a complete NPDES permit application,
- develop a nutrient management plan that involves soil sampling and public notice,
- decide on any needed construction and find an engineer

— all before the end of 2008.

A new Iowa law requires a national permit for producers who house animals of the same type in both an open feedlot[1] (unroofed or partially roofed) and a confinement[2] (totally roofed). The permits are called national pollutant discharge elimination system or NPDES permits. Producers may also need a construction permit to make changes to their operation.

Open Feedlot, including cow yards: Unroofed or partially roofed area where livestock or poultry are confined for more than 45 days out of any 12-month period

Confinement: Totally roofed area where livestock or poultry are confined for more than 45 days out of any 12-month period.

Animal Feeding Operation: A lot or facility where (1) animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and (2) crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility 40 Code of Federal Regulations (CFR) 122 23 (b)(1)

In the past, Iowa law required producers to count animals that were housed in the same type of housing to determine if a permit was needed. Now producers must count animals together if the same types of animals are in different housing types. The change occurred when the state legislature passed a law in the spring of 2008 to bring state law into agreement with existing federal law. If affected, producers must develop and submit the permit applications to the Department of Natural Resources by Dec. 31, 2008. Producers who need a permit will also need to modify their operations in most cases.

Who is Affected

The new law applies to animal feeding operations[2] and large livestock markets, not to cow-calf operations on pasture. It applies to producers who own or manage the animals, not to two entirely separate owners with facilities located close to each other.

Answering three questions should tell you if you need a permit. Those questions are: 1) How far apart are the different components of my operation? 2) How many animals do I have of the same type? 3) Does my operation allow manure, manure-laden runoff or process wastewater (such as bedding or feedstuffs runoff) to reach Iowa waters?

1) The Department of Natural Resources is proposing that producers who own or manage two or more facilities with the same animal type within 1,250 feet of each other would combine the number of animals in each facility to determine if they need a permit.[1]

2) Until that distance is finalized, check the table below to determine if you have enough animals of one type (regardless of housing) to require a permit. For example, if you have mature dairy cows with 400 cows housed in a barn and 350 that are in an open lot (cow yard), you would add the animals together in both housing types to get a total of 750 mature dairy cows. Because 750 mature dairy cows are equal to or more than the 700 listed in the table,

Minimum Number and Type of Animals that Require a Permit

Type of Animal	Number of Head
Mature Dairy Cows, milked or dry	700
Veal Calves	1,000
All Other Cattle (beef or dairy steers, heifers or bulls; cow/calf pairs)	1,000
Swine (55 lbs or more)	2,500
Swine (less than 55 lbs.)	10,000
Horses	500
Sheep or Lambs	10,000
Turkeys	55,000
Laying hens or broilers (liquid manure handling system)	30,000
Laying hens (other manure handling system)	82,000
Chickens (other than laying hens) (other manure handling system)	125,000

1. *It's important to note that the distance between facilities has not been finalized until the DNR passes rules. Consequently, the distance between two facilities that would need to be counted as one could change before the rules are finalized.*
2. *Definitions givern here are paraphrased. For complete definitions, see Chapter 65 in the Iowa Administrative Code. Also see the state and federal definitions for "animal feeding operations." Federal definitions can be found in EPA's Producer's Guide to Compliance (website listed on back).*

COMPLAINANT'S EX. NO. 23

you could potentially be affected, depending upon how far apart the barn and the partially roofed area are from each other. Generally a mature dairy cow is any cow that has been milked or had her first calf.

For producers with other cattle types, virtually any combination of 1,000 cattle (other than mature dairy cows or veal calves which are separate types) would require a permit. For example, 750 beef steers outside plus 300 dairy heifers inside, would equal 1,050 cattle and need a permit. For producers with swine, 2,500 finishers weighing 55 pounds or more split between outside and inside housing would require an NPDES permit.

Producers who have less animals, but whose operations meet one of the following may also be required to apply for an NPDES permit:

1. A man-made ditch, pipe or similar device carries manure or process wastewater from the operation to surface water, or
2. The animals come into contact with surface water that runs through the area where they're confined.

3) Finally, if your operation discharges manure or runoff, including process wastewater, from the open feedlot area that reaches Iowa waters, you will need to apply for an NPDES permit. Process wastewater includes bedding, feedstuff runoff and silage piles. Almost all feedlots in Iowa discharge, but if you're not certain about yours, ask yourself if it discharged or had runoff that reached a creek this year, especially during the spring thaw. Or, next time it rains, check below the open lot or cow yard area to see if the runoff will potentially reach a stream.

Timeline for NPDES Permits

1. Decide if it applies to your operation.
2. Evaluate your operation and make needed management decisions. For example, if you have 650 mature dairy cows inside and 50 dry cows outside, you may want to consider bringing the 50 dry cows into a hoop building or other confinement. Since confinements are not allowed to discharge, an NPDES permit would not be needed unless a discharge occurred. However, you still need to submit a preliminary plan (Step 5) and a construction permit for the confinement would be needed.)
3. Collect soil samples this fall on fields that will receive manure applications, and have soils tested for use in a Nutrient Management Plan.
4. Develop and submit a Nutrient Management Plan to the Iowa Deparrtment of Natural Resources or combine an existing Manure Management Plan with a new Nutrient Management Plan. Plans can be developed by producers or hired consultants.
5. Provide an engineer's name and develop a preliminary plan indicating how you will comply with state and federal requirements. The plan should include a proposed schedule for completing the project.
6. Provide proof of public notice for the Nutrient Management Plan.
7. Submit a complete NPDES application by Dec. 31, 2008, including the application fee and items 4, 5 and 6 listed above, to the DNR at 502 East Ninth St., Des Moines, IA 50319.

More information:

If you decide that your operation will need an NPDES permit, more information is available on the DNR Web site at www.iowadnr.gov under Animal Feeding Operations.

Most Iowa open feedlots will need some construction to bring them into compliance with federal laws. Producers can find forms, too, at www.iowadnr.gov/afo/. Choose the following forms to apply for an NPDES permit (form number 542-4001), to write a Nutrient Management Plan (542-2021) or to apply for a construction permit (542-1427).

A list of engineers and nutrient planners can be found on the Iowa Manure Management Action Group's website at http://www.agronext.iastate.edu/immag/sp.html.

See the National Cattlemen's Beef Association or the EPA's Web sites for more information about discharges and the federal rules: http://www.beefusa.org/goveCAFORule.aspx or http://cfpub.epa.gov/npdes/home.cfm?program_id=7.

More information about federal regulations can be found in Chapter 3 of the U.S. Environmental Protection Agency's Producer Compliance Guide for CAFOs at http://cfpub.epa.gov/npdes/afo/compliance.cfm.

Recent state law requirements can be found in House File 2700, Division 8, Animal Feeding, Section 143 to 148; or on p. 19, line 6, etc., of the Senate Amendment 5464; or at http://coolice.legis.state.ia.us/Cool-ICE/default.asp?Category=BillInfo&Service=Billbook&hbill=S5464&ga=82. Existing rules and definitions can be found in Chapter 65 of the Iowa Administrative Code http://search.legis.state.ia.us/NXT/gateway.dll/IowaState/iac_5/a567/iac_a567_c65v20.pdf.

Additional Help

Help is available at regional DNR Environmental Services field offices, located in the following areas:

- **Northeast Iowa, Manchester** **(563) 927-2640**
- **North Central Iowa, Mason City** **(641) 424-4073**
- **Northwest Iowa, Spencer** **(712) 262-4177**
- **Southwest Iowa, Atlantic** **(712) 243-1934**
- **South Central Iowa, Des Moines** **(515) 725-0268**
- **Southeast Iowa, Washington** **(319) 653-2135**
- **Ken Hessenius, DNR field office supervisor, Spencer** **(712) 262-4177**

REPORT OF CONCENTRATED ANIMAL FEEDING OPERATION INSPECTION

At

Moran Beef, Incorporated
25794 Magnolia Road
Underwood, Iowa 51576
(712) 545-3512
Facility ID# 64583, 64122

ON
June 4, 2009

BY

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region VII
Environmental Services Division

1.0 INTRODUCTION

At the request of the Water, Wetlands and Pesticides Division, Water Enforcement Branch, a Concentrated Animal Feeding Operation (CAFO) inspection was performed at Moran Beef, Incorporated on June 4, 2009. This inspection was performed pursuant to Section 308(a) of the Federal Water Pollution Control Act, as amended. The CAFO inspection was conducted as a Level B Multimedia Inspection, and the Region 7 Multimedia Screening Checklist (MMSC) is included as Attachment 1. This narrative report and attachments present the findings and observations made during the inspection.

2.0 PARTICIPANTS

Moran Beef, Incorporated (Moran Beef):
Frank Moran, Assistant Vice President (402)-681-3871 - cell
Kevin Moran, Facility Manager (712) 545-3512
Doug Moran, Ranch Hand & Son of Kevin Moran (exit briefing only)
Leona Moran, Wife of Joe Moran & Mother of Frank & Kevin Moran (via phone only)

Turner's Ag Consulting Company: (TAC):
Joe Turner, Consultant/Owner (712) 310-0633

U.S. Environmental Protection Agency (EPA):
Trevor Urban, Environmental Scientist (913) 551-7133

3.0 INSPECTION PROCEDURES

I contacted Ms. Leona Moran at the facility on the afternoon of June 3, 2009, and asked to speak with Mr. Joe Moran. Ms. Moran stated that she was the wife of Joe Moran and that he was not available to come to the phone. I informed Ms. Moran that I would be performing a CAFO inspection at the Underwood, Iowa, facility the following morning. Ms. Moran stated she would inform her husband of the inspection. I then asked Ms. Moran if the facility had a bio-security protocol and she said "no." I informed Ms. Moran that I would be inspecting the entire facility and that I would be following the EPA Region VII bio-security protocol. Ms. Moran stated that someone would be available at the facility at 9:30 am and I agreed to meet them on the morning of Thursday, June 4, 2009. Mr. Frank Moran contacted me later that afternoon after his mother had informed him of the inspection and reconfirmed that I was going to be at the Underwood, IA., location. I explained to Mr. Frank Moran that I would be performing a complete CAFO inspection, which would consist of a visual inspection of the facility and review of records being maintained at the facility. Mr. Frank Moran stated that he was the son of Joe Moran and the assistant vice president of the company. Mr. Frank Moran stated that his brother, Kevin Moran, was the facility manager for the Underwood, IA., location, and they would both meet me at the facility at 9:30 am on Thursday, June 4, 2009

Prior to entering the Moran Beef facility, I conducted a visual reconnaissance of the facility, searching for areas of concern observable from the county roads such as discharges, drainage patterns, flow directions, distance and direction of nearest perennial waters, visual condition of perennial waters, facility location and layout. **The facility is located approximately one mile southwest of Underwood, IA., on Magnolia Road. An unnamed tributary is located directly southwest of the facility (within 50 yards of the total confinement building) and flows southeast for approximately one mile before reaching Mosquito Creek. Mosquito Creek is located approximately ¾ of a mile east of the facility and flows southwest (parallel to I-80) for approximately twenty miles before reaching the Missouri River, south of Council Bluffs, IA. Both the unnamed tributary and Mosquito Creek were flowing at the time of the inspection and Mosquito Creek is identified as perennial water per the USGS topographic maps.**

I arrived at the facility at approximately 9:30 am and met with Messrs. Frank and Kevin Moran and Mr. Joe Turner. I presented my credentials and explained both the purpose of the inspection and the procedures I would follow during the inspection to the Messrs. Frank and Kevin Moran and Mr. Turner. Mr. Frank Moran stated that he and his brother, Kevin, were the sons of Joe Moran and that he was the assistant vice president of the company and managed the Honey Creek, IA., open cattle feedlot facility located west of the Underwood, IA., location. Mr. Frank Moran stated that his brother, Kevin Moran, was the facility manager for the Underwood, IA., location. Kevin Moran stated that he had been the facility manager since 1986 and that his son, Doug Moran, also worked at the facility as a ranch hand. Mr. Frank Moran stated that the open feedlot has been at this location since 1977, and his father, Joe Moran, purchased the facility in 1986. Mr. Frank Moran stated that construction of the total confinement building began in 2006 and was completed in 2007. Mr. Turner stated that he is an agriculture consultant for the facility and has been working for the facility since 2002. I then asked Mr. Frank Moran if the facility had a bio-security protocol and he said "no." I informed Messrs. Frank and Kevin Moran and Mr. Joe Turner I would be following the EPA Region VII bio-security protocol. I then made Messrs. Frank and Kevin Moran and Mr. Joe Turner aware of their confidentiality rights and informed them that a Confidentiality Notice, which they reviewed, would be provided at the end of the inspection to make any claims. I also provided them with a copy of U.S. Federal Code 1001 and 1002 pertaining to false statements and documents, which they reviewed and returned. Mr. Frank Moran acted as the official facility representative during the inspection.

Messrs. Frank and Kevin Moran and Mr. Joe Turner provided information pertaining to the facility operation and Messrs. Frank Moran and Joe Turner accompanied me during the entire inspection.

I explained to Messrs. Frank and Kevin Moran and Mr. Joe Turner that I would be conducting the CAFO inspection under the authority of Section 308(a) of the Federal Water Pollution Control Act to evaluate the facility's compliance status with the requirements of the CWA and determine if the facility is discharging or has discharged to a water of the United States. I also informed Messrs. Frank and Kevin Moran and Mr. Joe Turner that I would be evaluating compliance with several other regulatory requirements through the completion of a MMSC. I explained that the inspection would consist of a review of facility operations, required records, waste generation and management practices, and a visual inspection of the facility. I stated that I would document my findings and observations by making photocopies, taking photographs and/or videos, and obtaining statements from facility staff.

I conducted this inspection in accordance with the procedures described herein and the following EPA Region VII Standard Operating Procedures (SOPs), unless otherwise noted:

SOP No.	
2332.9A	Bio-Security Procedures for Conducting NDPES Compliance Evaluations at Animal Feeding Operations
2332.8B	Clean Water Act Concentrated Animal Feeding Operation Inspection Program (Draft)

I completed my inspection and I summarized the findings and recommendations with Messrs. Frank, Kevin and Doug Moran and Mr. Joe Turner. During the exit briefing, Mr. Frank Moran acknowledged receipt of the Confidentiality Notice, which he signed indicating no confidential business information had been provided during the inspection and a Receipt for Documents and Samples (see attachments 2 & 3). Mr. Frank Moran also signed the Notice of Potential Violation (NOPV) issued at the end of the inspection (see attachment 4). No samples were taken during the inspection. Twenty-one photographs were taken during the inspection.. See attachment 5 for the facility layout, photo locations and direction taken. See attachment 6 for the digital photograph chain of custody/photo log and photos #1 - #21. The Global Positioning System (GPS) was not functioning correctly and therefore no reading was taken prior to leaving the facility.

4.0 FACILITY DESCRIPTION

4.1 Facility Operations

The Moran Beef facility is located approximately one mile southwest of Underwood, IA., on Magnolia Road. The facility's physical address is 25794 Magnolia Road, Underwood, IA. 51594. The legal description for the facility is the SE¼ of Section 17, in Township 76N, Range 42W, in Pottawattamie County, Iowa, within the Mosquito Creek and Missouri River Basins.

As stated above, the open feedlot has been at this location since 1977, and Joe Moran purchased the facility in 1986. Mr. Frank Moran stated that construction of the total confinement building began in 2006, and was completed in 2007. Mr. Frank Moran stated that his brother, Kevin

Moran, was the facility manager for the Underwood, IA., location. Kevin Moran stated that he had been the facility manager since 1986 and that his son, Doug Moran, also worked at the facility as a ranch hand. Mr. Frank Moran stated that the cattle feeding and finishing operation receives feeder cattle at a weight between 400 – 450 pounds and they feed them out to a finish weight of approximately 1,300 pounds. The cattle are then sent to the beef processing facilities. Mr. Turner stated that he is an agriculture consultant for the facility and has been working for the facility since 2002. Mr. Kevin Moran stated that he has four employees including himself to operate the facility and their hours of operation are 7:00 am – 5:00 pm, Monday through Friday. Mr. Turner provided me with the current inventory at the facility that day (see attachment 7). The inventory indicated there were 1,485 cattle at the facility at the time of the inspection. The open lots consist of pens 1-10 and had 623 head in them. The open lots are located on the crest of a hill with pens 7-10 sloping east and pens 1-6 sloping west. Process waste water from the east and west pens are collected in one of three solids settling basins (SSBs), and then discharged into grassy waterways and/or into fields (see photos #1 - #7 and attachment 5). Pens 1 & 2 are utilized as working and sick pens. The total confinement building is divided into four pens (1-4) and had 862 cattle in it. The total confinement building is located at the bottom of the hill, west of the open confinement lots. The total confinement building utilizes corn stocks for bedding pack which are stored south of the building along Magnolia Road (see photos #3, #6 - #10, #16 & #17 and attachment 5). The total confinement building has a berm built around it to prevent storm water run on. The manure storage and composting areas are located directly northeast of pen 7 and are in the east SSB control area. The feed stock storage area is located on the top of the hill, south of pen 10, and is in a controlled area. A cattle alleyway which connects the open confinement lots and the total confinement building, runs down the hill between pens 1 & 2 parallel to Magnolia Road and is not included in a controlled area.

As stated above, the open lots are located on the crest of a hill with pens 7-10 sloping east and pens 1-6 sloping west. Process waste water from the east and west pens are collected in one of three solids settling basins (SSBs), and then discharged into grassy waterways and/or into fields (see photos #1 - #7, #14 & #15 and attachment 5). Pens 1 & 2 are utilized as working and sick pens and process waste water from the pens is collected into the southwest SSB located directly below pens 2 & 3. The process waste water is then connected to an underground tile drain that discharges approximately 100 yards south of the southwest SSB tile inlet, near the cattle alleyway, at the bottom of the hill. The process waste water from the tile drain discharge point flows northwest and then west around the north side of the total confinement building to a culvert and into the unnamed tributary. Process waste water from pens 3 – 6 is collected into the northwest SSB located directly below pens 4 – 6. The tile drain inlet is located at the northwest end of the SSB. The tile drain inlet is connected to an underground tile drain that discharges approximately 375 yards northwest from the tile drain inlet north of the total confinement building (see photos #4 and #11 - #13). The process waste water from the northwest SSB discharge point flows south through a grassy waterway for approximately 400 yards to the culvert located northwest of the total confinement building and into the unnamed tributary (see photos #14 & #15 and attachment 5). The unnamed tributary flows southeast for approximately one mile before reaching Mosquito Creek. Process waste water from pens 7 - 10 is collected into the east SSB located directly below pens 7 – 10. The tile drain inlet is located in the center of the east SSB below pen 9. The process waste water discharges east, out of the back of the SSB berm into a grassy terrace. The grassy terrace wraps around to the northeast for approximately 600 yards before discharging into a field. The process waste water then flows southeast for approximately 400 yards and crosses under 260th Street into a grassy waterway (see photos #1,

#18 & #19). The process waste will flow east southeast for approximately 800 additional yards before reaching Mosquito Creek at a location directly north of the bridge on Magnolia Road (see photos #20 and #21 and attachment 5).

Moran Beef has a manure management plan (MMP) for the application of the total confinement building manure solids and bedding pack waste. Mr. Turner stated that the bedding has been tested for nutrient contents and Mr. Turner stated that he uses the manure sample results from the west (Honey Creek) facility and book values for the open lot manure. Mr. Turner stated that Moran Beef has approximately 686 acres available for manure application. The manure solids are land applied by Moran Beef utilizing pull type 16 ton spreaders. Mr. Turner stated that he works with Moran Beef and is responsible for insuring the manure is applied at agronomic rates as identified in the MMP and keeps track of the number of loads applied to the fields.

Mr. Frank Moran stated that cattle pen scraping is performed as needed and stored in the pens or at the manure storage area located northeast of pen 7. Mr. Frank Moran stated that the facility uses a private well for the cattle water supply and is on a rural water supply for the house. Mr. Moran stated that Moran Beef utilizes composting for mortalities and the composting area is also located northeast of pen 7.

4.2 CAFO Status

Moran Beef is not permitted and had approximately 862 head of feeder cattle in the total confinement building and 623 head of cattle in the open lot pens for a total 1,485 head of cattle on site at the time of the inspection. Moran Beef has two Iowa Department of Natural Resources (IDNR) facility ID numbers. According to the IDNR file, facility ID #64583 is for the total confinement building operation and facility ID #64122 is for the open lot feeding operation.

A review of facility records and statements made by Messrs. Frank and Kevin Moran and Mr. Turner revealed that Moran Beef has confined at least 1,000 (total) head of cattle for more than 45 days during the last 12-month period. The visual inspection of the cattle pens also revealed no vegetative cover in any of the pens that confined cattle (see photos #1- #3and #5 - #7). As a result of my observations, I determined that Moran Beef meets the definition of a large CAFO as it is defined in Title 40 of the Code of Federal Regulations, Part 122.23. Therefore, Moran Beef must control all process waste water generated from both the open confinement feeder cattle operation and the total confinement building.

4.3 Regulatory History

Moran Beef was inspected by the IDNR on December 23, 2004, and was determined to be a medium CAFO. Moran Beef signed a statement of intent (SOI) to stay below the 1,000 head limit in the open confinement lot at the time of the IDNR inspection (see attachment 8). Moran Beef began construction of the total confinement building in 2006, with a maximum capacity of 1,000 head of beef cattle. The IDNR reviewed the construction site for a flood plain development permit which it did not need, but issued the facility a construction storm water discharge permit for the construction of the total confinement building (see attachments 8 & 9). The total confinement building was completed in May of 2007 and Moran Beef submitted a fall 2006 manure management plan for the total confinement building manure solids and bedding pack only (see attachment 11). Moran Beef was visited by the IDNR on March 5, 2009, by the

IDNR and the recent changes in the IDNR's rules regarding combined animal feeding operations were discussed (see attachment 12). Moran Beef was advised that they must either apply for a NPDES permit or maintain less than 1,000 animal units total capacity at the facility. Moran Beef was informed that an NPDES permit is required for both the open lots and the total confinement building and that a nutrient management plan (NMP) was required for the entire facility.

5.0 FINDINGS AND OBSERVATIONS

The Water Enforcement Branch (WENF) of the Water, Wetlands & Pesticides Division (WWPD) requested a CAFO inspection to determine if Moran Beef is in compliance with the CWA and if the LWCF were capturing all process waste water and not discharging to a water of the United States.

On the morning of June 4, 2009, I inspected Moran Beef. The facility received approximately 0.30 of an inch of rain on June 2, 2009. The weather conditions at the time of the inspection were mild and sunny (68°F). I met with Messrs. Frank and Kevin Moran and Mr. Turner, performed a visual inspection of the facility and reviewed on site records being maintained by the facility. I determined that Moran Beef is not permitted and had approximately 862 head of feeder cattle in the total confinement building and 623 head of cattle in the open lot pens for a total 1,485 head of cattle on site at the time of the inspection. Moran Beef has been operating as a large CAFO since June 2007, and therefore, must control all process waste water discharges including the open confinement pens, cattle alleyway and bedding materials for the total confinement building.

As stated above, the total confinement building is divided into four pens (1-4) and had 862 cattle in it at the time of the inspection. The total confinement building utilizes corn stocks for bedding pack which are stored south of the building along Magnolia Road (see photos #3, #6 - #10, #16 & #17 and attachment 5). The total confinement building has a berm built around it to prevent storm water run on. A stand pipe was located inside the berm which drains west approximately twenty yards into the unnamed tributary. Mr. Frank Moran stated that the drain pipe is usually capped and is allowed to drain to the unnamed tributary only after the solids in the storm water captured inside the berm have settled out. During the inspection I observed the total confinement building and the cattle alleyway leading down the hill to the building. There was visible spilled bedding and manure around the perimeter of the building in uncontrolled areas. The cattle alleyway did not have process waste water controls and there was no vegetative cover in the cattle alleyway. Also, the corn stock bedding storage area had no process waste water controls and was being stored directly east of the unnamed tributary. ***I informed Messrs. Frank Moran and Joe Turner that the spilled bedding and manure around the perimeter of the total confinement building and cattle alleyway must be controlled and that manure solids and process waste water discharges generated from these areas as well as the corn stock bedding storage area would be considered to be an illegal discharge.*** I also provided Messrs. Frank Moran and Turner with information pertaining to best management practices (BMPs) to help minimize the chance of a discharge from the building perimeter and corn stock bedding storage area. No process waste water discharge was observed at the time of the inspection.

As stated above, the open lots are located on the crest of a hill with pens 7-10 sloping east and pens 1-6 sloping west. Process waste water from pens 1 & 2 is collected in the southwest SSB located directly below pens 2 & 3. The process waste water in the southwest SSB drains through a drain tile inlet that is connected to an underground tile drain that discharges approximately 100 yards south of the SSB tile inlet, near the cattle alleyway, at the bottom of the hill. The process waste water from the tile drain discharge point flows northwest and west around the north side of the total confinement building to a culvert and into the unnamed tributary (see photos #6, #7, #14 & #15). Process waste water from pens 3 – 6 is collected into the northwest SSB located directly below pens 4 – 6. The tile drain inlet is located at the northwest end of the SSB. The tile drain inlet is connected to an underground tile drain that discharges approximately 375 yards northwest from the tile drain inlet north of the total confinement building (see photos #4 and #11 - #13). The process waste water from the northwest SSB discharge point flows south through a grassy waterway for approximately 400 yards to the culvert located northwest of the total confinement building and into the unnamed tributary (see photos #14 & #15 and attachment 5). During the inspection I observed process waste water at the tile drain discharge point. I also observed a process waste water flow pathway and dead vegetation for approximately 10-15 yards south of the discharge point (see photos #4, & #11 - #15 and attachment 5). The unnamed tributary flows southeast for approximately one mile before reaching Mosquito Creek. Process waste water from pens 7 - 10 is collected into the east SSB located directly below pens 7 – 10. The tile drain inlet is located in the center of the east SSB below pen 9. The process waste water discharges east, out of the back of the SSB berm into a grassy terrace. The grassy terrace wraps around to the northeast for approximately 600 yards before discharging into a field. The process waste water then flows southeast for approximately 400 yards and crosses under 260th Street into a grassy waterway (see photos #1, #18 & #19). The process waste will flow east southeast for approximately 800 additional yards before reaching Mosquito Creek directly north of the bridge on Magnolia Road (see photos #20 and #21 and attachment 5). ***I informed Messrs. Frank Moran and Turner that the process waste water and manure from the pens must be controlled and that the facility is not allowed to discharge any process waste water and manure solids. I also informed them that discharges generated from the open confinement lots would be considered to be an illegal discharge.***

NOPV #2 – Illegal discharge to the waters of the United States.

I asked Mr. Frank Moran how many months of the year the unnamed tributary has flowing water in it during a normal precipitation year. Mr. Frank Moran stated that the unnamed tributary flows twelve months out of the year and that the flow begins in the fields located to the northwest of the facility from field drain tiles. I asked Mr. Frank Moran if the facility had applied for a permit and he said "no." ***I informed Messrs. Frank Moran and Turner that since the facility exceeds the 1,000 total head of cattle at the facility, they are considered to be a large CAFO, the CWA requires the facility to have LWCF for the entire facility including the perimeter of the total confinement building, cattle alleyway and corn stock bedding materials.***

NOPV #1 – Failure to apply for a permit per the CWA.

The feed stock storage area is located directly northeast of pen 7. The process waste waster is controlled by the east SSB and flows south through a grassy terrace discharging in the field (see photo #1. Mr. Frank Moran stated that storm water run off from the feed stock storage area also flows into the east SSB.

Moran Beef has a manure management plan (MMP) for the application of the total confinement building manure solids and bedding pack waste. Mr. Turner stated that the bedding has been tested for nutrient contents and Mr. Turner stated that he uses the manure sample results from the west (Honey Creek) facility and book values for the open lot manure. Mr. Turner stated that the Moran Beef has approximately 686 acres available for manure application. The manure solids are land applied by Moran Beef utilizing pull type 16 ton spreaders. Mr. Turner stated that he works with Moran Beef and is responsible for insuring the manure is applied at agronomic rates as identified in the MMP and keeps track of the number of loads applied to the fields. ***I informed Messrs. Frank Moran and Turner that as a large CAFO, a NMP would be required for the process wastes generated at the entire facility.*** No NOPV was issued to the facility for failing to have an NMP at the time of the inspection.

As stated above, the facility is located approximately one mile southwest of Underwood, IA., on Magnolia Road. An unnamed tributary is located directly southwest of the facility (within 50 yards of the total confinement building) and flows southeast for approximately one mile before reaching Mosquito Creek. Mosquito Creek in located approximately ¾ of a mile east of the facility and flows southwest (parallel to I-80) for approximately twenty miles before reaching the Missouri River, south of Council Bluffs, IA. Both the unnamed tributary and Mosquito Creek were flowing at the time of the inspection and Mosquito Creek is identified as a perennial water per the USGS topographic maps. I asked Mr. Frank Moran how many months of the year the unnamed tributary has flowing water in it during a normal precipitation year. Mr. Frank Moran stated that the unnamed tributary flows twelve months out of the year and that the flow begins in the fields located to the northwest of the facility from field drain tiles. I completed an EPA Stream Characteristics and Water Nexus Form for the unnamed tributary and Mosquito Creek, after the completion of the facility inspection (see attachment 13 and photos #20 - #21).

6.0 Other Regulatory Concerns

No additional specific information was requested during the exit briefing. See attachment 14 for the completed entry/exit briefing checklist.

I reviewed all other applicable CWA and IDNR requirements and no other apparent potential violations were noted. See attachment 15 for the General CAFO Inspection Form.

7.0 SUMMARY

Moran Beef was determined to be a large CAFO at the time of the inspection and therefore must control all process waste water generated from the entire facility including the east and west open confinement feedlot operation, cattle alleyway and corn stock bedding materials. An NOPV was issued to Moran Beef for an illegal discharge to the waters of the United States from the east and west open confinement feedlot operation, the cattle alleyway and corn stock bedding storage area. A second NOPV was issued to Moran Beef for failure to apply for a permit per the CWA. Additional LWCF will need to be constructed in order to control the process waste water and a NMP is required. No NOPV was issued to the facility for failing to have an NMP at the time of the inspection. I provided Messrs. Frank and Kevin Moran and Mr. Joe Turner with information pertaining to BMPs to help minimize the chance of a discharge from the building perimeter and corn stock bedding storage area. No process waste water discharge was observed at the time of the inspection. However, I observed process waste water at the tile drain discharge point for the northwest SSB and I observed the process waste water flow pathway and dead vegetation for approximately 10-15 yards south of the discharge point.

Trevor L. Urban
Environmental Scientist
Date: 8/14/2009

ATTACHMENTS:

1. Multimedia Screening Checklist (2 pages)
2. Confidentiality Notice (1 page)
3. Receipt for Documents and Samples (1 page)
4. Notice of Potential Violation (1 page)
5. Facility Satellite Photo/Maps (2 pages)
6. Digital Photograph Image Chain of Custody/Photo Log and Photos #1 - #21 (25 pages)
7. Facility Cattle Inventory for June 4, 2009 (1 page)
8. IDNR Open Cattle Feedlot Inspection and Facility SOI Dated 12/23/2004 (3 pages)
9. IDNR Flood Plain Development Permit Correspondence (1 page)
10. IDNR 07/02/08 Construction Storm Water NPDES for Confinement Building (2 pages)
11. Fall 2006 Manure Management Plan for Bedded Confinement Beef Facility (26 pages)
12. IDNR Open Cattle Feedlot Inspection Dated 03/05/2009 (3 pages)
13. EPA Stream Characteristics and Water Nexus Form (2 pages)
14. Entry/Exit-Briefing Checklist (1 page)
15. General CAFO Inspection Form (6 pages)

Forward To: *EJ* ☐ *EPCRA / RMP / TSCA* ☐ *CWA* ☒ *Wetlands* ☐ *UIC* ☐ *PWS* ☐ *CAA / CFC* ☐ *RCRA* ☐ *UST* ☐ *SPCC* ☐

REGION VII MULTIMEDIA SCREENING CHECKLIST

Facility Name: Moran Beef, Inc.
Facility Ownership: Joe Moran
Street: 25794 Magnolia Road
City: Underwood, State: IA Zip: 51576
Phone: 712-545-3512 Facility Contact: Joe Moran
Number of Employees: 4 Work Hours/Shifts 7-5 pm M-F Facility Subject to OSHA regulations Yes ☐ No ☒

Inspector Trevor Urban
Primary Media: CWA-CAFO
Inspector Phone Ext.: 7153
Date: 6/4/09
SIC/NAICS Code 0211

Main facility activity, major process chemical(s) & description: Cattle Feeding operation

(**Check all that apply**): painting/coating (water-based ☐, solvent-based ☐), printing ☐, reacting ☐, formulating ☐, distilling ☐, water treatment ☐, refrigeration ☐, manufacturing ☐, parts washers/degreasing (water-based ☐, halogenated-based ☐, non-halogenated-based ☐), combustion (boiler, furnaces, oxidizers) ☐ plating (chrome ☐, other________________).

ENVIRONMENTAL JUSTICE (Note: Forward to EJ if a concern is identified during your inspection)

1. Is the facility located in an <u>apparent</u> low income area (e.g., with many abandoned and dilapidated properties)? No ☒ (stop) Yes ☐
   If yes, is facility less then 1000 feet from nearest routinely occupied property (house, school, etc.)? No ☐ (stop) Yes ☐ *Forward to EJ*

EMERGENCY PLANNING & COMMUNITY RIGHT TO KNOW ACT (EPCRA) & TOXIC SUBSTANCE CONTROL ACT (TSCA)

1. Did facility file a Tier II report with fire department, Local & State Emergency Planning Committee? Yes ☐ No ☒ *Forward to EPCRA*
2. Did facility manufacture, import, or process (formulate, blend, package) >25,000 lbs of a chemical or >100 lbs of a Persistent Bioaccumulative Toxin (lead, mercury, or polycyclic aromatic compounds) at any time over the last 5 years? No ☒ (stop) Yes ☐ *Forward to EPCRA*
3. Has the facility: ***If any box in question 3 is marked - Forward to EPCRA***
   a. Stored ≥500 lbs of ammonia ☐, ≥100 lbs of chlorine ☐, or ≥10,000 lbs of an industrial chemical ☐, at any time over the last 2 years? ☐
   b. Stored ≥10,000 lbs of pressurized flammable material (propane, methane, butane, pentane, etc.) at any time over the last 2 years? ☐
   c. Used ≥10,000 lbs of ammonia ☐, chlorine ☐, halogenated solvents ☐, solvent-based paints ☐, or solvents ☐, or nitrated compound, over the last calendar year? ☐
   d. Generated ≥ one half pound of metal dusts, fumes, or metal turnings, over the last calendar year? ☐
4. Does the facility have any oil filled electrical equipment No ☒ (stop) Yes ☐ *Forward to TSCA and ask* Has facility tested oil filled equipment to determine PCB content; No ☐ Yes ☐ number containing PCBs greater than 50 ppm ____________ and percent of all equipment tested ____________. Is equipment leaking (including wet or weeping equipment)? No ☐ Yes ☐ – *<u>Get Photo</u>*

CLEAN WATER ACT (CWA) - National Pollution Discharge Elimination System (NPDES), Industrial Pretreatment, Storm Water, & Wetlands

1. Does the facility discharge any wastewater to storm sewers, surface water, or the land? No ☐ (stop) Yes ☒
   If yes, are <u>all</u> wastewater discharges permitted? Yes ☐ No ☒ *Forward to CWA*
2. Does the facility have <u>process wastewaters</u> that are discharged to a city POTW (Publicly Owned Treatment Works)? No ☒ (stop) Yes ☐
   If yes, are the discharges permitted by: State? ☐, City? ☐ – If yes, Stop here. No ☐ *Forward to CWA*
   If yes, does the city have a state or EPA approved pretreatment program? Yes ☐ No or Don't Know ☐ *Forward to CWA*
3. During rainfall events, can storm water carry pollutants from manufacturing, processing, storage, disposal, shipping and receiving areas, or from construction sites >1 acre, to storm sewers or surface water? No ☒ (stop) Yes ☐
   If yes, does the facility have an NPDES permit for these storm water discharges? Yes ☐ No ☐ *Forward to CWA*
4. Did you see any wastewater discharges not identified by the facility? No ☒ (stop) Yes ☐ - Identify location, time, appearance of discharge: ______________________________ (*<u>Get Photo</u>*) *Forward to CWA*
5. Does the facility have any wetland areas (e.g. streams, ponds, or temporarily wet areas)? No ☒ (stop) Yes ☐
   If yes, have any wetland areas been dredged, filled, channelized, dammed, or had gravel removed from them within the last 5 years?
   No ☐ (stop) Yes ☐ - Identify location and timeframe______________________ (*<u>Get Photo</u>*) *FWD to Wetlands*

SAFE DRINKING WATER ACT (SDWA) - Underground Injection Control (UIC) & Public Water System (PWS)

1. Does facility discharge any <u>liquids</u> to the subsurface (septic systems, disposal wells, cesspools, etc.)? No ☒ (stop) Yes ☐ *Forward to UIC*
   If yes, do these liquid wastes consist of <u>sanitary wastewater only</u>? Yes ☐ No ☐
2. Does facility provide drinking water to 25 people or more from <u>its own source</u> (private well, pond, etc)? No ☒ (stop) Yes ☐ *Forward to PWS*
   If yes, does the facility test or monitor its drinking water in order to comply with state regulations? Yes ☐ No ☐

CLEAN AIR ACT (CAA) and CFCs

1. Do you see any dense, non-steam, smoke or dust emissions leaving the facility property? No ☒ Yes ☐ *Forward to CAA*
   Source________________________ *(<u>Get Photo</u>)*
2. Does the facility have any new air pollution emitting equipment that was constructed or installed in the past 5 years? No ☒ (stop) Yes ☐
   If yes, is equipment permitted? Yes ☐ No ☐ *Forward to CAA Describe:*________________________
3. Does the facility have any cooling units that contain >50 lbs of refrigerant? No ☒ (stop) Yes ☐ *Forward to CFC*
   If yes, are these units: Self-serviced? ☐ Contract Serviced? ☐ - Service Company:____________________
4. Does the facility have a refrigeration process that contains more than 10,000 lbs of ammonia ? No ☒ (stop) Yes ☐ *Forward to EPCRA/RMP*
5. Does the facility service motor vehicle air conditioning systems? No ☒ (stop) Yes ☐ *Forward to CFC*

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) and UNDERGROUND STORAGE TANKS (UST)

1. Does the facility generate more than 30-gallons (220 lbs./100kg) of hazardous waste per month or at any one time? No ☒ (stop) Yes ☐
   If yes, does facility have an EPA Hazardous Waste Identification Number? Yes ☐ (stop) No ☐ *Forward to RCRA*
2. Is hazardous waste treated ☐ , stored >90-days ☐, burned ☐ , land filled ☐ , put in surface impoundments ☐ or waste piles ☐ ?
   No ☒ (stop) Yes ☐ If yes, is the facility permitted for above described activity? Yes ☐ No ☐ *Forward to RCRA*
3. Did you see or does the facility have any large quantities of materials **that the facility claims to be non-hazardous waste material** (>10 drums, roll-offs, waste piles, etc. – exclude clean office trash, cardboard, & packaging type wastes)? No ☒ (stop) Yes ☐

<u>Material Claimed To Be Non-Hazardous</u>	<u>How does the facility know these wastes are non-hazardous?</u>
____________	Testing, industry or manuf. info.., MSDS, etc. ☐ ; None available ☐ *Forward to RCRA*
____________	Testing, industry or manuf. info.., MSDS, etc. ☐ ; None available ☐ *Forward to RCRA*
____________	Testing, industry or manuf. info.., MSDS, etc. ☐ ; None available ☐ *Forward to RCRA*
____________	Testing, industry or manuf. info.., MSDS, etc. ☐ ; None available ☐ *Forward to RCRA*
____________	Testing, industry or manuf. info.., MSDS, etc. ☐ ; None available ☐ *Forward to RCRA*

4. Did you see any leaking hazardous waste containers, drums, or tanks? No ☒ Yes ☐ *Forward to RCRA*
   Describe:________________________ *(<u>Get Photo</u>)*
5. Did you see any signs of <u>spills or releases</u> (e.g., dead or stressed vegetation, stains, discoloration)? No ☒ Yes ☐ *Forward to RCRA*
   Describe:________________________ *(<u>Get Photo</u>)*
6. Did you see any chemical or waste handling practices that concern you (access to children/public)? No ☒ Yes ☐ *Forward to RCRA &*
   EPCRA Describe:________________________ *(<u>Get Photo</u>)*
7. Does the facility have any <u>past</u> or <u>present</u> underground petroleum product or hazardous material tanks? No ☒ Yes ☐ *Forward to UST*
8. Does the facility have any underground fuel tanks for emergency generators? No ☒ Yes ☐ *Forward to UST*

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN (SPCC)

1. Does the facility have any aboveground <u>oil</u> tanks (petroleum, synthetic, animal, fish, vegetable), with an aggregate volume >1,320 gallons?
   No ☒ (stop) Yes ☐ - Does the facility have a certified SPCC Plan? Yes ☐ No ☐ *Forward to SPCC*
   If yes, are there secondary containment systems for the tanks? Yes ☐ No ☐ *Forward to SPCC*
   If yes, are any tanks <u>leaking</u> where oil could reach waters of the State or U.S.? No ☐ Yes ☐ *(<u>Get Photo</u>) Forward to SPCC*

ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS)

1. Does your facility have an EMS? No ☒ Yes ☐
2. Is the facility's EMS ISO 14001 certified? No ☒ Yes ☐

PLEASE TAKE <u>PHOTOS</u> TO DOCUMENT POTENTIAL PROBLEMS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CONFIDENTIALITY NOTICE

Facility Name Moran Beef, Inc.	
Facility Address 25794 Magnolia Road, Underwood, Iowa 51576	
Inspector (print) Trevor Urban	
U.S. EPA, Region VII, 901 N. 5th St., Kansas City, KS 66101	Date 6/4/09

The United States Environmental Protection Agency (EPA) is obligated, under the Freedom of Information Act, to release information collected during inspections to persons who submit requests for that information. The Freedom of Information Act does, however, have provisions that allow EPA to withhold certain confidential business information from public disclosure. To claim protection for information gathered during this inspection you must request that the information be held CONFIDENTIAL and substantiate your claim in writing by demonstrating that the information meets the requirements in 40 CFR 2, Subpart B. The following criteria in Subpart B must be met:

1. Your company has taken measures to protect the confidentiality of the information, and it intends to continue to take such measures.

2. No statute specifically requires disclosure of the information.

3. Disclosure of the information would cause substantial harm to your company's competitive position.

Information that you claim confidential will be held as such pending a determination of applicability by EPA.

I have received this Notice and DO NOT want to make a claim of confidentiality at this time.	
Facility Representative Provided Notice (print) Frank Moran	Signature/Date Frank Moran 6-4-09

I have received this Notice and DO want to make a claim of confidentiality.	
Facility Representative Provided Notice (print)	Signature/Date

Information for which confidential treatment is requested;

(Rev: 1/19/00) ATTACHMENT 2 Page 1 of 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RECEIPT FOR DOCUMENTS AND SAMPLES

Facility Name
Moran Beef, Inc.
Facility Address
25794 Magnolia Road Underwood, Iowa 51576

Documents Collected? YES X (list below) NO___

Samples Collected? YES___ (list below) NO X Split Samples: YES___ NO X

Documents/Samples were: 1)Received no charge X 2)Borrowed___ 3)Purchased___

Amount Paid: $ —0— Method: Cash___ Voucher___ To Be Billed___

The documents and samples described below were collected in connection with the administration and enforcement of the applicable statute under which the information is obtained.

Receipt for the document(s) and/or sample(s) described below is hereby acknowledged:

1) Inventory Records for June 4, 2009 — (1 Page)

Facility Representative (print)	Signature/Date
Frank Moran	Frank Moran 6-4-09
Inspector (print)	**Signature/Date**
Trevor Urban	[signature] 6/4/09

U.S. EPA, Region VII, 901 N. 5th Street, Kansas City, KS 66101

(rev:1/20/93)

Notice of Potential
National Pollution Discharge Elimination System (NPDES)
PERMIT VIOLATIONS

ermittee (facility) Name and Address: Moran Beef, Inc.
25794 Magnolia Road
Underwood, Iowa 51576

~~NPDES Permit~~ Number: 64583 + 64122
Facility ID

During the Clean Water Act § 308 compliance inspection conducted on June 4 / 2009 **the potential NPDES permit violations noted below were found. Additional violations may be brought to your attention following a complete review of the inspection report and other available information.**

POTENTIAL NPDES PERMIT VIOLATIONS

NOPV #1 → Failure to Apply for an NPDES Permit.

NOPV #2 → Illegal Discharge to the waters of the U.S.

REQUESTED ACTION: Within ten (10) days, please describe in writing any actions taken, or planned, to correct the potential violations identified above. Your response will be considered in the determination of the need for further administrative or legal action. Mail your description of corrective actions to your inspector at:

U.S. Environmental Protection Agency
ENSV/EMWC
901 North 5th Street
Kansas City, Kansas 66101-2907

Inspector's printed name: Trevor Urban

pector's signature: [signature]

otice received by:
(name & title) Frank Moran   Frank Moran

Date: 6-4-09

REPORT ATTACHMENT 4 Page 1 of 1

Moran Brothers Norwalk Feedlot

Underwood, Iowa

--→--→ = Buried Tile Line for process waste water + Flow Direction

→ → → = Process waste water + Flow Direction

o–o→ = Slope + Process waste water Flow Direction

♂ = Photo # + Direction Taken

\# = Cattle Pen number

→ → → = Clean Storm water + Flow Direction

0 100 200 400 Yards

N

ATTACHMENT 5 Page 1 of 2

Moran Brothers Norwalk Feedlot
Underwood, Iowa

→ → → = Clean water Flow Pathway + Direction
→ → → = Process waste water Flow Pathway + Direction
♂ = Photo # + Direction Taken

0 200 400 800 Yards

N

PHOTO LOG

Facility Name / City: Moran Beef, Inc.
Underwood, Iowa 51576
Facility ID#: 64583, 64122
EPA ID#: N/A
Date : June 4, 2009
Photographer: Trevor Urban
Type of Camera: Canon Power Shot G5, Serial #: 6924106032
Digital Recording Media: Flashcard
All digital photos were copied by: Trevor Urban on June 18, 2009
All digital photos were copied to: CD-R
Original copy is stored in: CD-R. Digital photos were downloaded to CD-R all by Trevor Urban. No changes were made in the original image files prior to storage on the CD-R.

Report Photo #	Photographer	Date	Approx. Time	Flashcard Name (IMG_xxxx.jpg) CD-ROM Name (xxx.jpg)	Description
1	Trevor Urban	06/04/09	10:16 AM	6340 001	Photo of pen 7 and the solids settling basin (SSB) for the east side of the open lot pens. The manure storage area is located at the northeast corner of pen 7 within the SSB. Process waste water from the SSB flows east and north through the grassed terrace. Photo taken from the northwest corner of pen 7 facing east. .
	Trevor Urban	06/04/09	10:16 AM	6341 002	Photo of the facility pens, feed mill and feed truck drive way. Photo taken from the northwest corner of pen 7 facing south.
3	Trevor Urban	06/04/09	10:16 AM	6342 003	Photo of pen 6 and the solids settling basin (SSB) for the west side of the open lot pens 3-6. There is no vegetative cover in the open lot pens. The confinement building feeding operation is shown at the bottom of the hill. Photo taken from the northeast corner of pen 6 facing southwest.
4	Trevor Urban	06/04/09	10:27 AM	6343 004	Photo of the north end of the west SSB and drain pipe that discharges into a grassed water way located east of the large tree shown in the upper right of the photo. Photo taken standing on the north side of pen 6 facing northwest.
5	Trevor Urban	06/04/09	10:33 AM	6344 005	Photo of pen 1 and the cattle shipping and receiving area located at the south end of the facility. Photo taken standing in the cattle alley facing east.
6	Trevor Urban	06/04/09	10:33 AM	6345 006	Reverse view of photo #5. Photo of pen 2 and the southwest SSB for pens 1 and 2. The confinement building feeding operation is shown at the bottom of the hill. Photo taken standing in the cattle alley facing northwest.
7	Trevor Urban	06/04/09	10:33 AM	6346 007	Same as photo #6. Photo of pen 2 and cattle alley facing west. The confinement building feeding operation is shown at the bottom of the hill. The southwest SSB discharges into the corn field at the bottom of the hill. The unnamed tributary is located at the bottom of the hill at the tree line.
	Trevor Urban	06/04/09	10:41 AM	6347 008	Photo of the confinement building and bedding stock pile. Spilled bedding and manure can be seen around the perimeter of the confinement building. Photo taken from the southwest corner of the facility facing east.

Report Photo #	Photographer	Date	Approx. Time	Flashcard Name (IMG_xxxx.jpg) CD-ROM Name (xxx.jpg)	Description
9	Trevor Urban	06/04/09	10:41 AM	6348 009	Close up of photo #8. Photo of the confinement building bedding stock pile with no process waste water controls which is located directly northeast of an unnamed tributary. Photo taken from the southwest corner of the facility facing east.
10	Trevor Urban	06/04/09	10:42 AM	6349 010	Photo of the west side of the confinement building facing northeast. Also shown is a white vertical drain pipe for storm water drainage within the berm that surrounds the confinement building. The white drain pipe drains into the unnamed tributary which is located approximately 20 yards west.
11	Trevor Urban	06/04/09	10:48 AM	6350 011	Photo of the drain pipe discharge point from the SSB for the west side of the open lot pens (3-6) that discharges into a grassed water way. The drain pipe discharges at the feet of Mr. Moran and flows south for approximately 400 yards before entering the unnamed tributary. Photo taken facing northwest.
12	Trevor Urban	06/04/09	10:48 AM	6351 012	Close up photo of the discharge point from the SSB for the west side of the open lot pens (3-6) that discharges into a grassed water way. A manure flow path way is visible. Photo taken facing southwest.
13	Trevor Urban	06/04/09	10:48 AM	6352 013	Reverse view of photo #11. Photo of the drain pipe discharge point from the SSB for the west side of the open lot pens that discharges into a grassed water way. A Manure flow path way is visible as well as dead vegetation. The manure discharge flows south for approximately 400 yards before entering the unnamed tributary directly northwest of the confinement building. Photo taken facing south.
14	Trevor Urban	06/04/09	10:54 AM	6353 014	Photo of a white storm water inlet located directly northwest of the confinement building facing north. The pipe discharges into the unnamed tributary which is located approximately 20 yards west. Manure and process waste water from the west and southwest SSBs (pens 1 - 6) flow to this location and into the unnamed tributary. The west SSB manure discharge point is located approximately 400 yards north of this location.
15	Trevor Urban	06/04/09	10:56 AM	6354 015	Photo of the discharge point for the white storm water pipe shown in photo #14 into the unnamed tributary facing southwest. There is visible flow in the unnamed tributary and process waste water from the west and southwest SSBs (pens 1 - 6) flow to this location and into the unnamed tributary.
16	Trevor Urban	06/04/09	11:00 AM	6355 016	Close up photo of the confinement building bedding stock pile shown in photos #7 - #9. The bedding stock pile has no process waste water controls and has spilled into the ditch. Photo taken facing east northeast.
17	Trevor Urban	06/04/09	11:00 AM	6356 017	Reverse view of photo #16. The confinement building bedding stock pile has no process waste water controls and has spilled into the ditch. The unnamed tributary is located directly southwest from the bedding stock pile at the electric pole. Photo taken facing west southwest.

Report Photo #	Photographer	Date	Approx. Time	Flashcard Name (IMG_xxxx.jpg) CD-ROM Name (xxx.jpg)	Description
18	Trevor Urban	06/04/09	11:05AM	6357 018	Photo of the storm water drainage flow pathway from the east side of the facility. Process waste water will flow north along the nearest grassed terrace and discharge into the corn field below the trees shown in the back ground. Storm water and process waste water will then flow southeast to this location and into the ditch culvert. Photo taken from 260th Street north of Magnolia Road.
19	Trevor Urban	06/04/09	11:06 AM	6358 019	Close up of photo #19. Photo of the storm water drainage flow pathway from the east side of the facility. Process waste water will flow north along the nearest grassed terrace and discharge into the corn field below the trees shown on the left. Storm water and process waste water will then flow southeast to this location and east to Mosquito Creek. Photo taken from 260th Street north of Magnolia Road.
20	Trevor Urban	06/04/09	1:30 PM	6359 020	Photo of Mosquito Creek facing north. Process waste water from the east side of the facility will flow into Mosquito Creek less than 100 yards north of this location. Photo taken from the bridge on Magnolia Road approximately 3/4 of a mile east of the facility.
21	Trevor Urban	06/04/09	1:30 PM	6360 021	Photo of Mosquito Creek facing south. Process waste water from the west side of the facility will flow into Mosquito Creek approximately one mile southwest of this location. Photo taken from the bridge on Magnolia Road approximately 3/4 of a mile east of the facility.

Moran Beef, Inc.
Photos
Located in Underwood, IA

Photos taken by Trevor Urban
on June 4, 2009

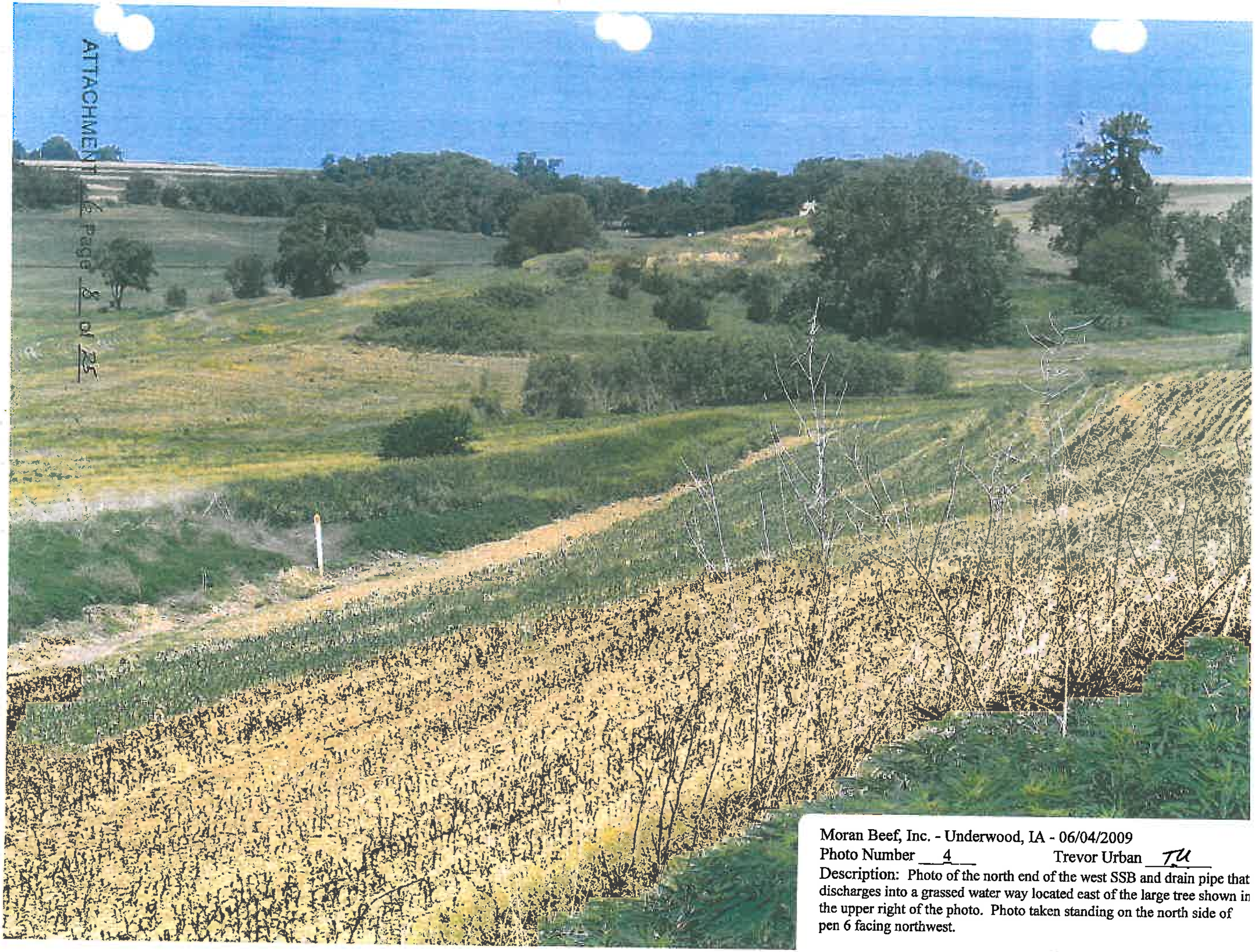
ATTACHMENT 6 Page ___ of ___

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 1 Trevor Urban T.U.
Description: Photo of pen 7 and the solids settling basin (SSB) for the east side of the open lot pens. The manure storage area is located at the northeast corner of pen 7 within the SSB. Process waste water from the SSB flows east and north through the grassed terrace. Photo taken from the northwest corner of pen 7 facing east.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 2 Trevor Urban TU
Description: Photo of the facility pens, feed mill and feed truck drive way. Photo taken from the northwest corner of pen 7 facing south.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 3 Trevor Urban TU
Description: Photo of pen 6 and the solids settling basin (SSB) for the west side of the open lot pens 3-6. There is no vegetative cover in the open lot pens. The confinement building feeding operation is shown at the bottom of the hill. Photo taken from the northeast corner of pen 6 facing southwest

ATTACHMENT 6 Page [illegible] of [illegible]

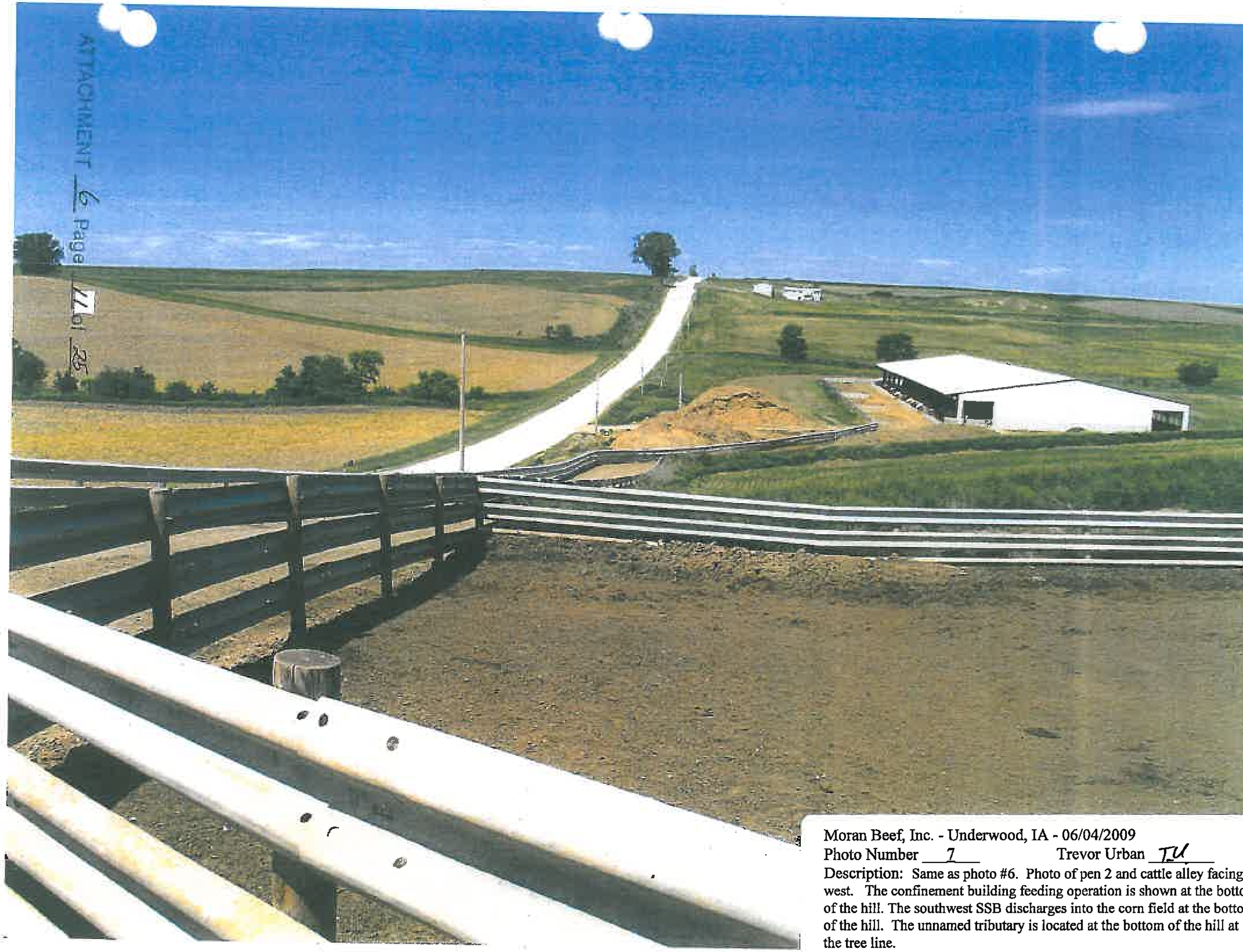


Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number __4__ Trevor Urban _TU_
Description: Photo of the north end of the west SSB and drain pipe that discharges into a grassed water way located east of the large tree shown in the upper right of the photo. Photo taken standing on the north side of pen 6 facing northwest.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 5 Trevor Urban TU.
Description: Photo of pen 1 and the cattle shipping and receiving area located at the south end of the facility. Photo taken standing in the cattle alley facing east.

ATTACHMENT 6 Page 10 of 25

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 6 Trevor Urban TU
Description: Reverse view of photo #5. Photo of pen 2 and the southwest SSB for pens 1 and 2. The confinement building feeding operation is shown at the bottom of the hill. Photo taken standing in the cattle alley facing northwest.



ATTACHMENT 6 Page 11 of 25

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 7 Trevor Urban TU
Description: Same as photo #6. Photo of pen 2 and cattle alley facing west. The confinement building feeding operation is shown at the botto of the hill. The southwest SSB discharges into the corn field at the botto of the hill. The unnamed tributary is located at the bottom of the hill at the tree line.

ATTACHMENT 6 Page 12 of

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 8 Trevor Urban T.U.
Description: Photo of the confinement building and bedding stock pile. Spilled bedding and manure can be seen around the perimeter of the confinement building. Photo taken from the southwest corner of the facility facing east.

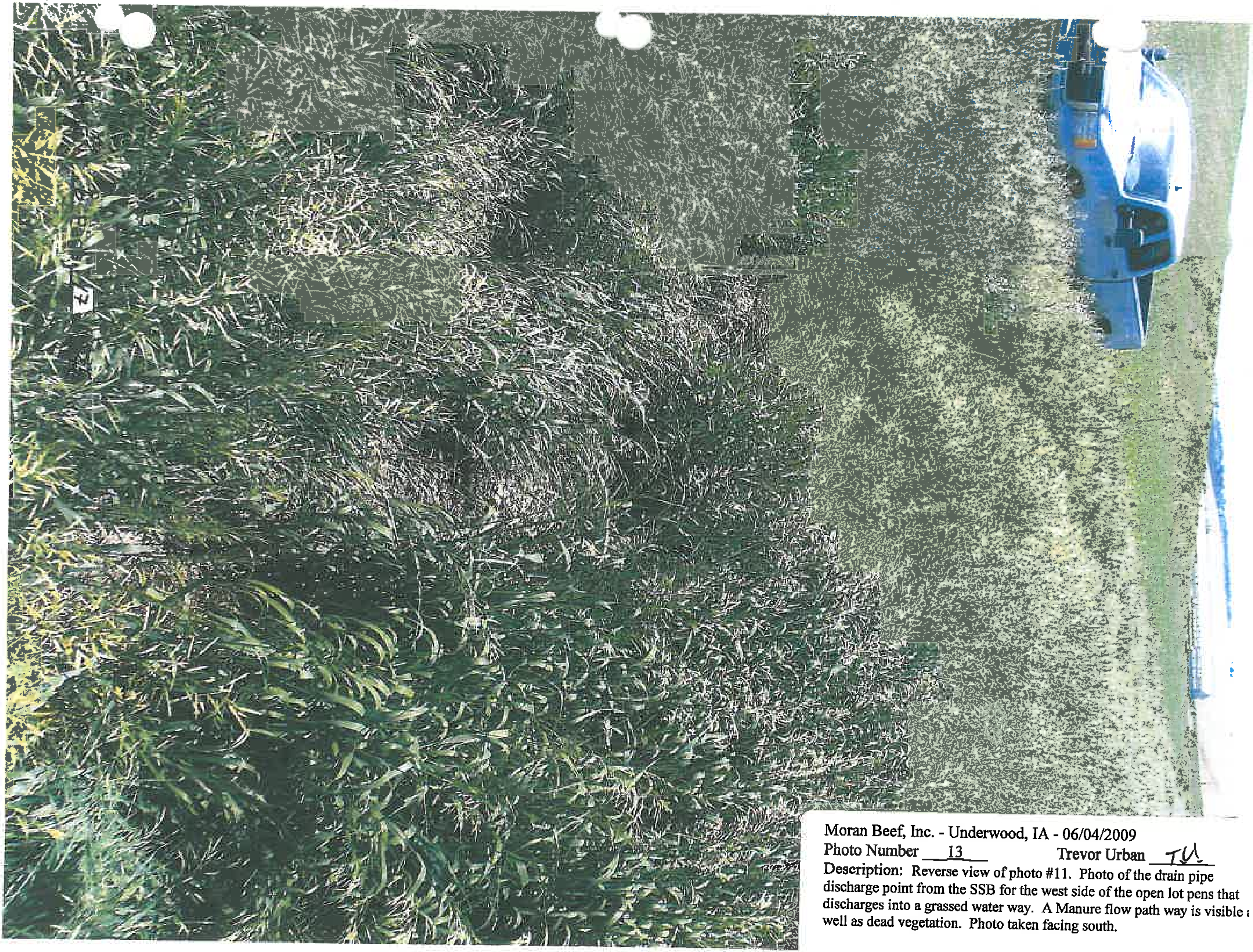
ATTACHMENT 6 Page 12

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 9 Trevor Urban TU
Description: Close up of photo #8. Photo of the confinement building bedding stock pile with no process waste water controls which is located directly northeast of an unnamed tributary. Photo taken from the southwest corner of the facility facing east.

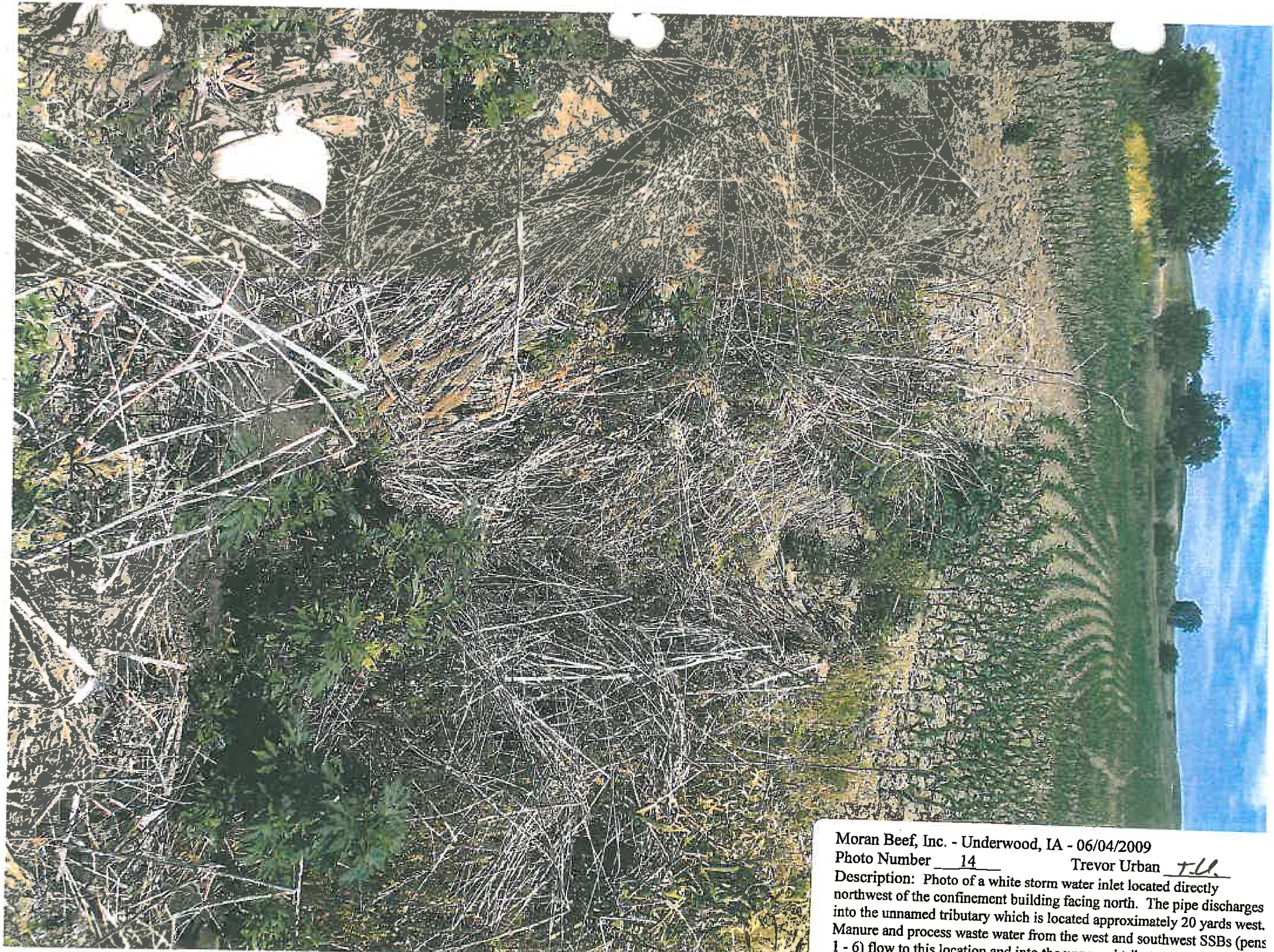
Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 10 · Trevor Urban T.U.
Description: Photo of the west side of the confinement building facing northeast. Also shown is a white vertical drain pipe for storm water drainage within the berm that surrounds the confinement building. The white drain pipe drains into the unnamed tributary which is located approximately 20 yards west.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number __11__ Trevor Urban _TU_
Description: Photo of the drain pipe discharge point from the SSB for the west side of the open lot pens (3-6) that discharges into a grassed water way. The drain pipe discharges at the feet of Mr. Moran and flows south for approximately 400 yards before entering the unnamed tributary. Photo taken facing northwest.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 12 Trevor Urban TU
Description: Close up photo of the discharge point from the SSB for the west side of the open lot pens (3-6) that discharges into a grassed water way. A manure flow path way is visible. Photo taken facing southwest.



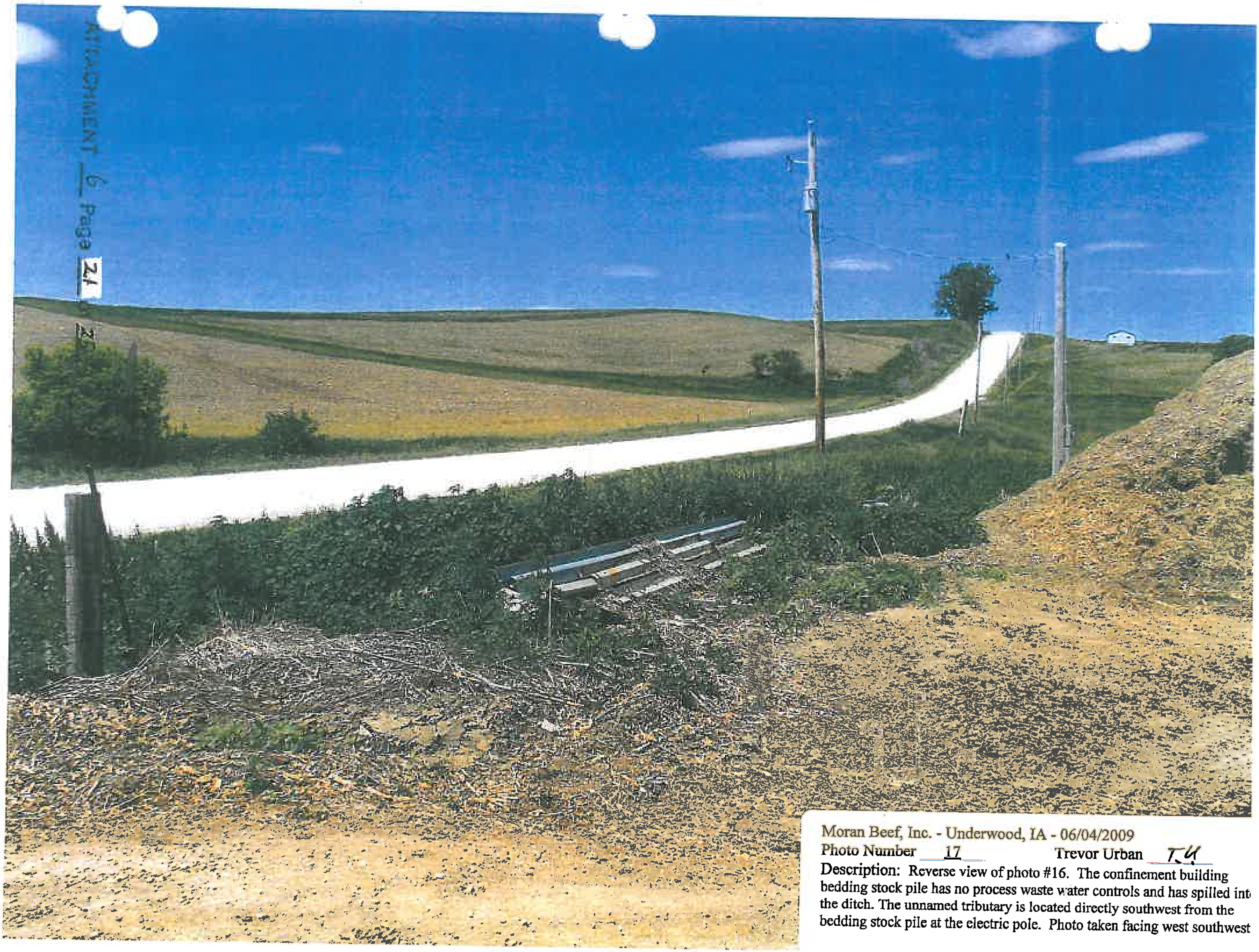
Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number __13__ Trevor Urban _TU_
Description: Reverse view of photo #11. Photo of the drain pipe discharge point from the SSB for the west side of the open lot pens that discharges into a grassed water way. A Manure flow path way is visible a well as dead vegetation. Photo taken facing south.



Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 14 Trevor Urban TU
Description: Photo of a white storm water inlet located directly northwest of the confinement building facing north. The pipe discharges into the unnamed tributary which is located approximately 20 yards west. Manure and process waste water from the west and southwest SSBs (pens 1 - 6) flow to this location and into the unnamed tributary.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 15 Trevor Urban TU
Description: Photo of the discharge point for the white storm water pip shown in photo #14 into the unnamed tributary facing southwest. There visible flow in the unnamed tributary and process waste water from the west and southwest SSBs (pens 1 - 6) flow to this location and into the unnamed tributary.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 16 Trevor Urban TU
Description: Close up photo of the confinement building bedding stock pile shown in photos #7 - #9. The bedding stock pile has no process waste water controls and has spilled into the ditch. Photo taken facing east northeast.



ATTACHMENT 6 Page 21 of 25

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 17 Trevor Urban TU
Description: Reverse view of photo #16. The confinement building bedding stock pile has no process waste water controls and has spilled int the ditch. The unnamed tributary is located directly southwest from the bedding stock pile at the electric pole. Photo taken facing west southwest

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 18 Trevor Urban TU
Description: Photo of the storm water drainage flow pathway from the east side of the facility. Process waste water will flow north along the nearest grassed terrace and discharge into the corn field below the trees shown in the back ground. Storm water and process waste water will then flow southeast to this location and into the ditch culvert.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 19 Trevor Urban TU
Description: Close up of photo #19. Photo of the storm water drainage flow pathway from the east side of the facility. Process waste water will flow north along the nearest grassed terrace and discharge into the corn field below the trees shown on the left. Storm water and process waste water will then flow southeast to this location and east to Mosquito Creek.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 20 Trevor Urban TU
Description: Photo of Mosquito Creek facing north. Process waste water from the east side of the facility will flow into Mosquito Creek less than 100 yards north of this location. Photo taken from the bridge on Magnolia Road approximately 3/4 of a mile east of the facility.

Moran Beef, Inc. - Underwood, IA - 06/04/2009
Photo Number 21 Trevor Urban TU
Description: Photo of Mosquito Creek facing south. Process waste water from the west side of the facility will flow into Mosquito Creek approximately one mile southwest of this location. Photo taken from the bridge on Magnolia Road approximately 3/4 of a mile east of the facility.

Inventory June 4

1 - x
2 - 70
3 - 72
4 - x
5 - 86
6 - 108
7 - 102
8 - 52
9 - 80
10 - 47

623

Shed 1 - 77
Shed 2 - 333
Shed 3 - 310
Shed 4 - 142

862

Fields of Opportunities

STATE OF IOWA

HOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

January 7, 2005

Moran Beef Inc.
Attn: Frank Moran
25843 Hwy 183
Honey Creek, IA 51542

SUBJECT: Open Cattle Feedlot Inspection
Pottawattamie County

Dear Mr. Moran:

At the request of the DNR Des Moines office, I inspected your open cattle feedlot on December 23, 2004. The feedlot I inspected is located in the SE ¼, Section 17, Norwalk Township, T76N, R42W, Pottawattamie County, Iowa. I visited with you during the inspection.

As we discussed, you did not register this feedlot with the Iowa Open Feedlot Plan because it has a capacity of less than 1,000 head of cattle. You signed a Statement of Intent (SOI), a copy of which is enclosed for your records, stating that you would not exceed 1,000 head at this feedlot. You stated that your capacity at this site is 975 head. Please remember that if you should go over 1,000 head of cattle at any time that you must first obtain operation and construction permits and have total containment of all manure.

During this inspection we drove around your open feedlot. I did not observe any evidence of contamination to a waterway. In accordance with Rule 567 IAC 65.2(455B) you are reminded that all manure solids must be settled before runoff enters a waterway, a direct discharge of manure from your open feedlot into a waterway is prohibited, and manure from your open feedlot must not cause a water quality violation.

It appears as if you have adequate controls in place to settle manure solids. On the north side of your lot you have a terrace that serves as a solids settling basin. All manure flows through a tile inlet and eventually through a grass filter strip that is more than ¼ of a mile long. I recommend that you continue to maintain the grass filter strip, and if needed, either add gravel spreaders or reseed areas that are in need.

The south part of the lot flows through a terrace and a grass filterstrip in the middle of a field. The nearest waterway is more than ½ of a mile away.

There are two pens associated with your feedlot located on the northwest side. Although I did not observe runoff entering a waterway, I highly recommend that you contact Iowa State Extension or Natural Resource Conservation Service for ideas on methods you can use to settle solids in this area.

I appreciate your time during the busy holidays to conduct this investigation. If you have any questions concerning this letter please call me at (712) 243-1034.

Sincerely,

Alison Manz

Alison Manz
Environmental Specialist
Field Services and Compliance

ARM:fl/underwood122304.fl.moran letter.manz.doc

cc: Gene Tinker, AFO Coordinator, DNR, Des Moines
Barb Lynch, Bureau Chief, Spencer
Moran Brothers Norwalk Feedlot, Pottawattamie County (new)

Statement of Intent Regarding Open Feedlot Operation

/ith a capacity of over 1000 animal units in open lots, a feedlot is required to apply for, and obtain, an operation permit from the Department of Natural Resources (DNR) according to rule 567 IAC 65.4(455B). In addition, the minimum manure control requirements for open feedlots covered by the operation permit requirements of 567 IAC 65.4(1) is the retention of all manure flows from the feedlot areas resulting from the 25-year, 24 hour precipitation event (in the state of Iowa the 25-year, 24-hour precipitation event ranges from approximately 5.5 inches in the northwest to approximately 6.5 inches of rainfall in the southeast).

Because feedlots of 1000 animal units or less are not required to obtain a permit or construct runoff control structures, you indicated that you may reduce the capacity (or maintain the capacity) of your feedlot to 1000 animal units or less to achieve compliance. The minimum manure control requirement for feedlots not required to obtain an operation permit is removal of settleable solids prior to discharge to state waters.

I, FRANK MORAN, agree to maintain my open facility at 1000 animal units or less to achieve compliance with the open feedlot regulations. I understand that the **minimum** manure control requirements for lots of 1000 animal units or less is the removal of settleable solids prior to discharge to state waters. Other manure control measures may be necessary if the discharge of liquids cause water quality violations in the receiving stream.

lso understand that an operation permit (NPDES) from the Department of Natural Resources is required **rior** to increasing the size of my feedlot to over 1000 animal units. To receive an operation permit I would need to meet the minimum manure requirements of 567 IAC 65.4(1), stated above.

Note: The proposed DNR rule is that two open feedlots under common ownership or management are considered adjacent (one lot) if they are separated at their closest points (including solids-settling basins) by less than 1250 feet.

By signing this document I certify that I am aware of, and understand, the aforementioned regulations regarding open feedlots, as they now exist, under the jurisdiction of the Department of Natural Resources.

Signed: Frank Moran

Signed: ______________________

Signed: ______________________

:: 12/23/04

Idnr\fo3\shared\khessen\intent.doc

Moran Beef Open Lot

Fields of Opportunities

STATE OF IOWA

THOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

March 13, 2006

RECEIVED
MAR 16 2006
IOWA DNR
FIELD OFFICE #4

Moran Beef Inc.
c/o Turner's Ag Consulting
P.O. Box 301
Neola, IA 51542

RE: Proposed Channel Change (Unnamed Tributary to Mosquito Creek)
SE1/4 Section 17, T76N, R42W; Pottawattamie County, Iowa

Dear Mr. Turner:

This letter is in response to your recent Flood Plain Development Permit application for the above project. Based on the information submitted, the drainage area to the point of your project is below the regulatory threshold of 10 square miles for a channel change and thus, according to 567 IAC 71.2(1),"a", a Flood Plain Development Permit is not required from this agency for the proposed work.

The department encourages you to establish vegetative buffer strips along the waterway and other appropriate construction techniques to minimize soil loss and other potential impacts. Please contact your local NRCS office for information on financially attractive incentive programs that are available for buffer strip development through the Continuous-Conservation Reserve Program (CRP).

The owner is responsible for complying with all other statutes applicable to the construction, operation and maintenance of the proposed project. The project may require a Section 404 Permit from the Corps of Engineers. Please note that the project does not require a Sovereign Land Construction Permit from the Department.

Thank you for your patience and cooperation. If you have any questions, please call me at 515- 281-4310.

Sincerely,

Wayne S. Wiksell

Wayne S. Wiksell, P.E.
Environmental Engineer
Water Resources Section
Flood Plain Management Program

Copies: -IDNR FO # 4
-Dan Johnson, Rock Island District, U.S. Army Corps of Engineers, P.O. Box 2004, Rock Island, Illinois 61204-2004

Pott Co. SaTW & open lot file

STATE OF IOWA

DEPARTMENT OF NATURAL RESOURCES

CHESTER J. CULVER, GOVERNOR
PATTY JUDGE, LT. GOVERNOR

RICHARD A. LEOPOLD, DIRECTOR

July 2, 2008

RECEIVED
JUL 07 2008
IOWA DNR
FIELD OFFICE #4

FRANK MORAN
25843 OLD LINCOLN HWY
HONEY CREEK, IA 51542

Re: Acknowledgement of Receipt of Permit Renewal Fee Payment
DNR Authorization Number: IA - 11532 - 11504
Facility Name and Location: MORAN BEEF, INC. UNDERWOOD, IA

Dear FRANK MORAN:

Enclosed you will find a revised discharge authorization sheet for your storm water NPDES General Permit. You will notice that your storm water discharge to be covered under the general permit has been authorized for additional year(s). The revised date is shown on the lower portion of the cover sheet following the phrase "Coverage Provided Through." If any of the information on this cover sheet is incorrect or if you have any questions, please contact Ruth Rosdail at (515) 281-6782.

A[illegible] enclosed is a separate sheet regarding the contact person for storm water correspondence for your project or facility. Please [illegible] our contact person sheet if any information on that sheet is incorrect. Send any revisions to:

Storm Water Coordinator
Iowa Department of Natural Resources
502 E. 9th Street
Des Moines, IA 50319-0034

Sincerely,

Joseph D. Griffin

Joseph D. Griffin
Environmental Protection Division
Wastewater Section

Enclosure(s): Contact Information Sheet; Permit Authorization Sheet

File No. CON 11 - 34 – 11532
IDNR Field Office #4

ATTACHMENT 10 Page 1 of 2

DEPARTMENT OF NATURAL RESOURCES
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
NOTICE OF GENERAL PERMIT COVERAGE UNDER
GENERAL PERMIT NO. 2

STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITY

This notice of general permit coverage for a storm water discharge associated with construction activity is issued pursuant to the authority of section 402 (b) of the Clean Water Act (U.S.C. 1342(b)), Iowa Code 455B.174, and subrule 567--64.4(2), Iowa Administrative Code. A Notice of Intent has been filed with the Iowa Department of Natural Resources that this storm water discharge complies with the terms and conditions of NPDES General Permit No. 2. Authorization is hereby issued to discharge storm water associated with industrial activity as defined in Part VIII of the Iowa Department of Natural Resources NPDES General Permit No. 2 in accordance with the terms and conditions set forth in the permit.

Owner: FRANK MORAN
25843 OLD LINCOLN HWY
HONEY CREEK IA 51542
(712)545-3512

Permit Coverage Issued To:
MORAN BEEF, INC.
25794 MAGNOLIA RD.
in UNDERWOOD, POTTAWATTAMIE COUNTY
located at

1/4 Section	Section	Township	Range	Latitude			Longitude		
				Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
SW	17	76N	42W						

Coverage Provided Through: **6/8/2011**

NPDES Permit Discharge Authorization Number: **11532 - 11504**

Discharge Authorization Date: **6/8/2006**

Project Description: CONSTRUCTION OF A BEDDED CATTLE CONFINEMENT BUILDING. 1.5 ACRES

ATTACHMENT 10 Page 2 of 2

Attn.: Iowa DNR

Alsion Manz
Iowa DNR
Animal Feeding Operations
Atlantic Iowa 50022

From:

Moran Beef Inc.
Frank Moran
25843 Old Lincoln Hwy
Honey Creek, Iowa. 515542

Turner's Ag Consulting Co
Joe Turner
PO box 301
Neola Iowa 51559

Subject Proposed Manure plan for a Bedded Confinement Beef Facility

Included in this Report is a Manure Management Plan for Moran Beef Inc. The MMP is for a proposed confinement operation at the location 25794 Magnolia Rd, Underwood Iowa. (1/4 mile east of the address). The Manure Plan is the first step that we have taken in order to show that there is adequate space for disposal of the manure products. Upon approval of the manure plan other stages of the DNR process will be followed in accordance with regulations. At this point we are using proven yield, 50/50 rotation of corn and soybeans, and ISU PM 1811 for are data. At a future time we will be sampling the manure on a regular basis to figure out the exact analysis, and correct the plan accordingly. The corn crop will have the stalks removed for bedding for the confinement, and if the rotation is changed to meet the bedding needs, all forms required by the DNR will be followed. At this point only one farm has current soil samples (with in 3 years)
If approved the farms will have a sampling program to detirmed the soil levels of nutrients. (Are recent samples on them 4-6 year old).

As stated in the MMP the livestock will be creating 10560 tons of manure per year, with the land provided we can handle 11664 tons. (With another 123 acre if needed)

If at this time the DNR as any questions or concerns about the MMP please contact either Frank Moran 712-545-3512 or Joe Turner 712-310-0633

RECEIVED
JAN 30 2006
IOWA DNR
FIELD OFFICE #4

Verification of County Receipt
For Manure Management Plans & Plan Updates

This form is for non-permitted operations that are submitting an original manure management plan (MMP) and **all** confinement feeding operations that must submit an annual updated MMP. This form is not for confinement feeding operations that are applying for a construction permit. (See the Construction Permit Application package for the Verification of County Receipt form used with construction permit applications.)

It must be submitted to the appropriate Department of Natural Resources (DNR) field office to indicate that the county where the confinement feeding operation is located, or will be located, has received a copy of the MMP. If manure is to be applied in additional counties, you must also submit this form indicating that a complete MMP or MMP annual update has been delivered to each of the counties where manure will be applied.

For the confinement feeding operation:

NAME OF OPERATION: Moran Beef Inc.

OWNER: Moran Beef Inc

LOCATION: Pott. SW 1/4 of SE 1/4 17 76-42
(County) (Quarter/Quarter) (Quarter) (Section) (Township No.) (Range No.)

THIS SECTION IS TO BE COMPLETED BY THE COUNTY

COUNTY: Pottawattamie

NAME: Kay E. Mocha

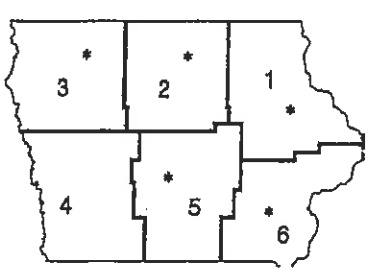
TITLE: County Planning Director
(Member of the County Board of Supervisors or designated official/employee)

On January 26, 2006, on behalf of the Board of Supervisors,

I received a complete copy of the:

☑ **Original manure management plan, OR**
☐ **Manure management plan annual update**

Please send this signed and dated receipt to the DNR field office where the operation is located:



Field Office #1
909 West Main, Suite 4
Manchester, IA 52057
563-927-2640

Field Office #2
2300 15th St SW
Mason City, IA 50401
641-424-4073

Field Office #3
1900 N. Grand Ave
Spencer, IA 51301
712-262-4177

Field Office #4
1401 Sunnyside Lane
Atlantic, IA 50022
712-243-1934

Field Office #5
401 SW 7th Suite I
Des Moines, IA 50309
515-725-0268

Field Office #6
1023 W Madison
Washington, IA 52353
319-653-2135

RECEIVED
JAN 30 2006
IOWA DNR
FIELD OFFICE #4

Manure Management Plan Form

Part 1. CONFINEMENT FEEDING OPERATION INFORMATION **Page 1-1**

Instructions: Complete this form for your confinement feeding operation.

The information within this form, and the attachments, describes my confinement feeding operation, my manure storage and handling system, and my planned manure management system. I (we) will manage the manure, and the nutrients it contains, as described within this manure management plan (MMP) and any revisions of the plan, individual field information, and field summary sheet, and in accordance with current rules and regulations. Deviations permitted by Iowa law will be documented and maintained in my records.

Signed *Frank Moran* Date *1/25/06*

Owner and the name of the confinement feeding operation:

Owner *Moran Beef Inc* Phone *(712) 545-3512*
Name of the confinement operation *Moran Beef Inc.*
Address *25843 Old Lincoln Hwy*
Honey Creek Iowa 51542

Contact person for the confinement feeding operation:

Contact person *Frank Moran* Phone *712-545-3209*
Address *25843 Old Lincoln Hwy*
Honey Creek Iowa 51542
email Address

Location of the confinement feeding operation:
County *Pottawattamie*
Township *Norwalk*
(township name or township/range number)
Section *17* Quarter (1/4) Section *SE*

This manure management plan is for:
___ an existing operation, not currently expanding
___ an existing operation, currently expanding
X a new confinement feeding operation

RECEIVED
JAN 3 0 2006
IOWA DNR
FIELD OFFICE #4

General Description: Describe your livestock production and manure management system in your own words: *The livestock production will be 900-999 capacity Beef Bedded confinement.*

Instructions: (1) Complete this form for those livestock production facilities in your operation that produce liquid manure. Complete the form on page 1.3 if all manure produced is in a solid (dry) form. Complete both forms if both liquid and solid manure is produced.
(2) Footnotes for Tables 1.1 and 1.2 are given on page 1.5.

Table 1.1 **Animal weight capacity of this facility:**

Column 1	2	3	4	5	6
Animal Species	**Manure Storage Structure(s)** [a]	**Production Phase**	**Maximum Number Of Animals Confined** (head)	**Average Weight per Animal** (lb/head) [b]	**Animal Weight Capacity** (lb) [c]
Beef					
				Total Animal Weight Capacity of Operation (lb)	

Estimated Annual Animal Production (Maximum animal capacity [column 4] X production cycles per year): ____________ **animals/year**

Table 1.2 **Yearly liquid manure and nitrogen production (complete for each manure storage structure used).**

Column 1	2	3	4	5		6
				Nitrogen Content of the Manure [g]		
				5A	5B	
Manure Storage Structure(s) [d]	**Building or Production Phase**	**Gallons Manure per Animal Space/Day** [e]	**Gallons Manure Produced/Year** [f]	**N Concentration** [h] (lb/1000 gal)	**N Production** [i] (lb/space/year)	**Total Nitrogen Produced/Year** [j] (lb)
		Estimated Manure Produced/Year (gallons)			**Estimated N Produced/Year** (lb)	

Source of Manure Nitrogen Content Data (column 5, Table 1.2): standard tables, analysis of manure samples, other: ____________

Part 1 Confinement Feeding Operation Information **SOLID Manure Systems** **Page 1.3**

ATTACHMENT 11 Page 4 of 26

Instruc

(1) Complete this form for those livestock production fa... in your operation that produce <u>solid (dry) manure</u>. Comp... ...orm on page 1.2 if all manure produced is in a liquid form. Complete both forms if both liquid and solid manure is produced.

(2) Footnotes for Tables 1.3 and 1.4 are given on Page 1.6.

Table 1.3 Animal weight capacity of this facility:

Column 1	2	3	4	5
Animal Species	**Production Phase**	**Maximum Animal Capacity** (head)	**Average Weight per Animal** (lb/head) [k]	**Animal Weight Capacity** (lb) [l]
Beef		960	900	864,000
			Total Animal Weight Capacity of Operation (lb)	864,000

Annual Animal Production (Maximum animal capacity [column 3] X production cycles per year): 960 **animals per year**

Table 1.4 Yearly solid manure and nitrogen production (include each solid manure storage structure used)

Column 1	2	3	4	5		6
				Nitrogen Content of the Manure [p]		
				5A	5B	
Manure Storage Structure(s) [m]	**Building or Production Phase**	**Tons of Manure per Animal Space/Year** [n]	**Tons Manure Produced/Year** [o]	**N Concentration** (lb/ton) [q]	**N Production** (lb/space/year) [r]	**Total Nitrogen Produced/Year** (lb) [s]
Bedded Confinment	Building	10,560	10,560	12#/Ton	12	116,160
		Estimated Manure Produced/Year (tons)	10560	**Estimated N Produced/Year** (lb)		116,160

Source of Manure Nitrogen Content Data (column 5, Table 1.4): standard tables, analysis of manure samples, other: ISU Pub. 1811 Nov 2003 Managing Manure Nut. Table 2 Beef - Confined Solid Manure

Part 1

Nutrient Availability of Applied Manure

Table 1.5 Available Nitrogen Concentration in Applied Manure (after deducting application losses)

Cc	2	3	4	5		6			
Manure Storage Structure [t]	N concentration [u] (lb/1000 gal or lb/ton)	Planned Method of Application [v]	Application Loss Factor [w]	1st Year Available N [x]		2nd Year Available N [x]		3rd Year Available N [x]	
				5A [y] %	5B [z] (lb/1000 gal or lb/ton)	6A [y] %	6B [z] (lb/1000 gal or lb/ton)	7A [y] %	7B [z] (lb/1000 gal or lb/ton)
Bedded Beef Confinement	12	Broadcast Surface Apply	70	70%	8.4 / Ton	15	1.8 / Ton	15	1.8 / Ton

Table 1.6 Nitrogen Application Losses

Application Method	Application Loss Factor *
Knifed in or soil injection of liquid manure	0.98
Surface-apply liquid or solid (dry) manure with incorporation within 24 hours	0.95
Surface-apply liquid or solid (dry) manure with incorporation after 24 hours	0.80
Surface-apply liquid manure with no incorporation	0.75
Surface-apply solid (dry) manure with no incorporation	0.70
Irrigate liquid manure with no incorporation	0.60

* Percent of Applied Nitrogen Remaining After Deducting Application Losses

Instructions:

Developing Manure Management Plan for Individual Fields

(1) Complete this form for each field being used for manure application in this plan. If several fields on a farm have similar crop rotations and county average yields or proven yields for a farm are used to determine optimum crop yields, these fields may be combined and reported as one.
(2) Footnotes are given on page 2.5 and 2.6

Field designation [a] Neola **Farm location** Pott Co Neola Twp Sec 18 (NE 1/4) Sec 17 (NW 1/2 of NW 1/2)
(County, Township, Section, ¼ Section)

Field is: ✓ owned by the owner of the animal feeding operation
___ rented for crop production
___ available under terms of written manure application agreement (attach copy of agreement)

Total acres in this field 235 acres
Acres not available for manure application [b]... 123 acres
Net acres available for manure application...... 116 acres

Method used to determine optimum yields [c]:
___ Iowa Ag Statistics county yield averages [d]
County average yields - FSA catastrophic crop insurance program [e]
✓ Multi-peril insurance proven yields [e]
✓ Individual farm proven yield records [e]
___ Farm Service Agency (FSA) yields[e]
___ Soil survey interpretation record

Optimum yields for this field [f]:

Crop	Optimum yield (bu/acre, tons/acre)
Corn	183
Soybeans	51

Reduction of soil loss and surface water pollution: Identify the methods, structures, or practices that will be used to prevent or diminish soil loss and potential surface water pollution during the application of manure on this field: The Farm is ~~too~~ bottom Ground - conservation tillage May be done to work in the manure

Does this field include highly erodible land (HEL) on which manure will be applied: Yes ___ No ✓
(If yes, a summary or copy of the conservation plan for this HEL cropland must be provided as an attachment to this plan.)

Will spray irrigation be used to apply manure on this field [g]**:** Yes ___ No ✓
(If yes, identify irrigation method): ___ low-pressure irrigation system
___ restricted spray irrigation
___ other (identify): ___

ATTACHMENT 11 Page 7 of 26

Field designation (same as on page 2.1) Neola

Soil tests (optional): Has field been soil tested in last 3 years to determine phosphorus (P) and potassium (K) levels? **Yes** ____ **No** ✓

If yes, levels of P and K found :

	Very Low	Low	Optimum	High	Very High
P			X		
K			X		

Phosphorus and potassium concentrations of manure [h] (optional):

Manure storage type	P_2O_5 (lb/1000 gal, lb/ton)	K_2O (lb/1000 gal, lb/ton)	Source of data
Bedded Beef Confinement	6	12	Pm 1811

Crop nutrient use rates (lb/bu or lb/ton) [i]:

Crop	N use rate	P_2O_5 use rate (Optional)	K_2O use rate (Optional)	Source of use rate information
Corn	1.1	.55	6.5	Pm 1811
Soybeans	3.8	.8	1.5	Pm 1811

Crop schedule: **Year 1:** Corn **Year 2:** Bean **Year 3:** Corn
Year 4: Bean **Year 5:** Corn **Year 6:** Bean

Timing of planned manure application: Oct - Apr.
[month(s) or season(s)]

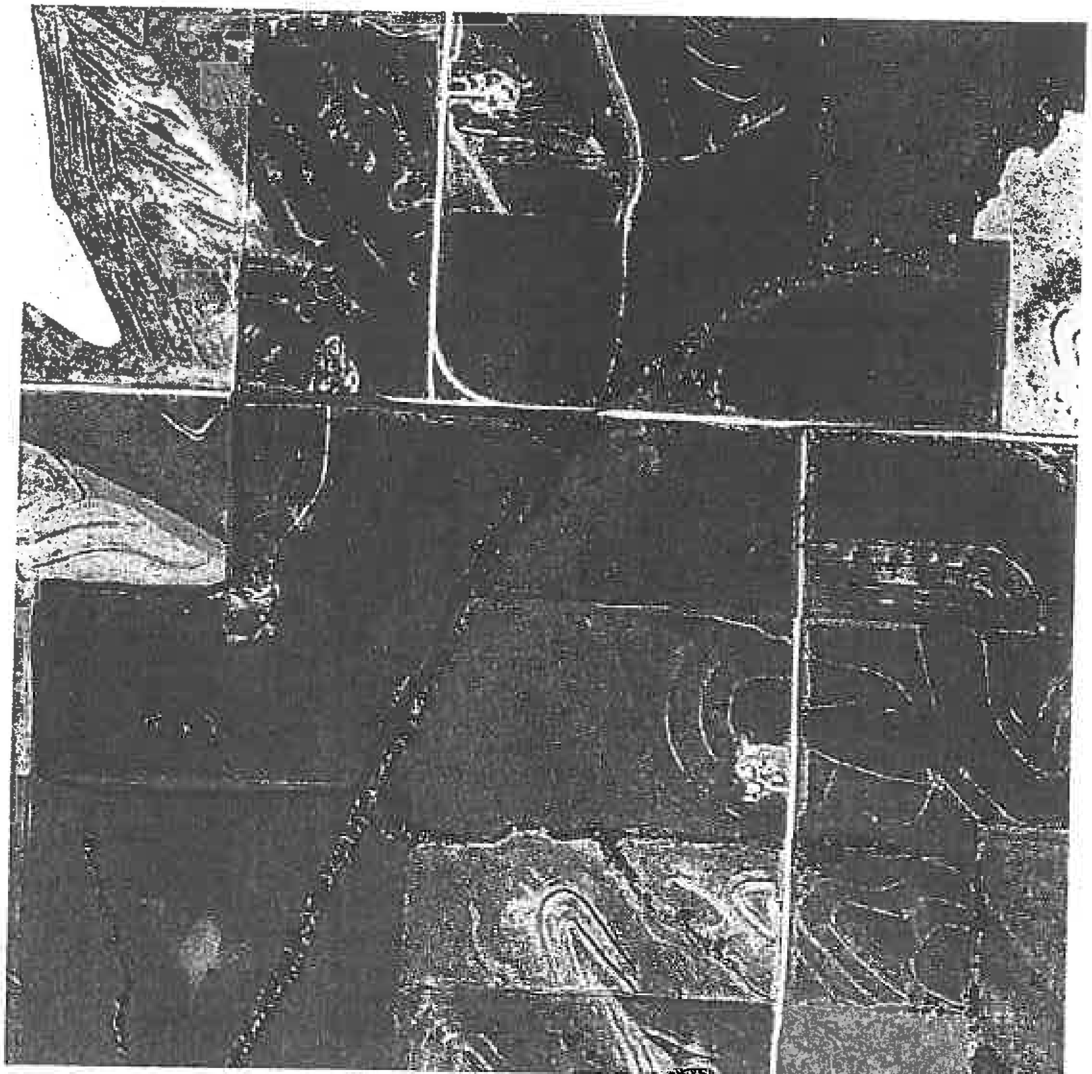
Season and year of first application on this field: Fall 2006

Field designation (same as on page 2.1) Neola

Table 2.1 **Manure management plan for this field**

			Year[j] 1	2	3	4	5	6
1	**Crop** (corn, soybeans, etc.)		Corn	Bean	Corn	Bean	Corn	Bean
2	**Optimum Crop Yield** (from page 2.1)	(bu or tons/ac)	183	51	183	51	183	51
3	**Net crop acres available for manure application** (from page 2.1)	(acres)	116	116	116	116	116	116
4	**Crop N needed (or crop N utilization)** = optimum crop yield (from line 2) X crop N use rate (from page 2.2)	(lb/acre)	201	193	201	193	201	193
5a	• **Legume N credit**[k]	(lb/acre)	50	–	50	–	50	–
5b	• **Commercial N credit** (amount of N applied in commercial fertilizers)	(lb/acre)	–	–	–	–	–	–
5c	• **Manure N carryover credit**[l]	(lb/acre)	0	1.8	3.6	3.6	3.6	3.6
6	• **Total N Credits** (add lines 5a, 5b, & 5c)	(lb/acre)	50	1.8	53.6	3.6	53.6	3.6
7	**Remaining crop N need** (line 4 minus line 6)	(lb/acre)	141	191	147	189	147	189
8	Before completing the remainder of Table 2.1, read Instructions for Table 2.2 on page 2.4. If the operation intends to apply manure to this field during the period of this manure management plan, identify the manure storage structure and application method to be used, and complete the remainder of this table							
	Manure storage structure:		(from column 1, Table 1.5, page 1.4)					
	Planned method of manure application:		(from column 3, Table 1.5, page 1.4)					
9	**1st Year Available N** (from column 5B, Table 1.5, page 1.4, for the manure structure and application method identified in line 8)	(lb/1000 gal or lb/ton)	8.4	8.4	8.4	8.4	8.4	8.4
10	**Manure application rate that will supply remaining crop N need** = remaining crop N need (line 7) ÷ 1st year available N (line 9)	(gal/acre) x 1000 **OR** (tons/acre)	17.8	22.5	17.8	22.5	17.8	22.5
11a	• **P_2O_5 applied if manure is applied at rate given in line 10** = (line 10 X P_2O_5 concentration from page 2.2) **Optional**	(lb/acre)	102	136	102	136	102	136
11b	• **K_2O applied if manure is applied at rate given in line 10** = (line 10 X K_2O concentration from page 2.2) **Optional**	(lb/acre)	213	264	213	264	213	264
12	**Planned manure application rate per acre on this field**[m] (cannot exceed rate listed on line 10)	(gal/acre or tons/acre)	17	22	17	22	17	22
13	**Acres on which manure will be applied** (cannot exceed net available acres identified in line 3)	(acres)	116	116	116	116	116	116
14	**Planned total manure application on this field** = Planned manure application rate (line 12) X acres on which manure will be applied (line 13)	(gal/field or tons/field)	1972	2552	1972	2552	1972	2552
15	**Amount of remaining crop N need that will be supplied by manure** = planned application rate (line 12) X 1st year available N (line 9)	(lb/acre)	142	184	142	184	142	184
16	**Additional N that can be applied per acre as commercial fertilizer (in addition to amount listed in line 5b)** = line 7 minus line 15	(lb/acre)	1	9	5	6	5	5

neola



N

One in = 1340 feet

0 460 920 1380 1840 2300

Date: 1/25/2006
Farm: neola
Client: moran
Area: 249.05 ac

neola	(249.05 ac)

SST

ATTACHMENT 11 Page 10 of 26

USDA

Dale L. DuVal
District Conservationist

Conservation Plan

Moran Beef Inc
25843 Highway 183
Honey Creek, IA 51542-4241

Crop

Tract: 1066

CONSERVATION CROP ROTATION

Rotation is corn/bean.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	50.3 ac.	5	2002		
8	11.2 ac.	5	2002		
Total:	61.5 ac.				

CONSERVATION TILLAGE

Corn is no-tilled into soybeans stubble leaving at least 40% after planting. Soybean are no-tilled into corn stalks leaving at least 60% after planting.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	50.3 ac.	5	2002		
8	11.2 ac.	5	2002		
Total:	61.5 ac.				

CONTOUR FARMING

This/these fields will be farmed on the contour. Row grades will not exceed 2% slpoe.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	50.3 ac.	5	2002		
8	11.2 ac.	5	2002		
Total:	61.5 ac.				

FIELD BORDER

A strip of perennial vegetation established at the edge of a field by planting or by converting it from trees to herbaceous vegetation or shrubs. To control erosion, protect edges of fields that are used as "turnrows" or travel lanes for farm machinery, reduce competition from adjacent woodland, provide wildlife food and cover, or improve the landscape.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	800.0 ft.	5	2002		
8	1,000.0 ft.	5	2002		
Total:	1,800.0 ft.				

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TERRACE

An earth embankment, a channel, or a combination ridge and channel constructed across the slope. To: (1) reduce slope length, (2) reduce erosion, (3) reduce sediment content in runoff water, (4) improve water quality, (5) intercept and conduct surface runoff at a nonerosive velocity to a stable outlet, (6) retain runoff for moisture conservation, (7) prevent gully development, (8) reform the land surface, (9) improve farmability, or (10) reduce flooding.

Field	Planned Amount	Month	Year	Applied Amount	Date
8	500.0 ft.	4	2002	500.0 ft.	Apr-17-2002
Total:	500.0 ft.			500.0 ft.	

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Part 2

Developing Manure Management Plan for Individual Fields

Instructions:

(1) Complete this form for each field being used for manure application in this plan. If several fields on a farm have similar crop rotations and county average yields or proven yields for a farm are used to determine optimum crop yields, these fields may be combined and reported as one.

(2) Footnotes are given on page 2.5 and 2.6

Field designation [a] Underwood West **Farm location** Pott. Co. Norwalk Twp Sec 19 (SE ¼)(NE ½ of NE ¼) (SE ½ of SW ¼)
(County, Township, Section, ¼ Section)

Field is:
✓ owned by the owner of the animal feeding operation
____ rented for crop production
____ available under terms of written manure application agreement (attach copy of agreement)

Total acres in this field 218 acres
Acres not available for manure application [b] ... ~~[illegible]~~ acres
Net acres available for manure application...... 218 acres

Method used to determine optimum yields [c]**:**
____ Iowa Ag Statistics county yield averages [d]
____ County average yields - FSA catastrophic crop insurance program [e]
✓ Multi-peril insurance proven yields [e]
____ Individual farm proven yield records [e]
____ Farm Service Agency (FSA) yields [e]
____ Soil survey interpretation record

Optimum yields for this field [f]**:**

Crop	Optimum yield (bu/acre, tons/acre)
Corn	183
Soybeans	51

Reduction of soil loss and surface water pollution: Identify the methods, structures, or practices that will be used to prevent or diminish soil loss and potential surface water pollution during the application of manure on this field: Conservation tillage Practice or No-till if manure allow for it. The farm is in Compliance with NRCR Standards

Does this field include highly erodible land (HEL) on which manure will be applied: **Yes** ✓ **No** ____
(If yes, a summary or copy of the conservation plan for this HEL cropland must be provided as an attachment to this plan.)

Will spray irrigation be used to apply manure on this field [g]**:** **Yes** ____ **No** ✓
(If yes, identify irrigation method): ____ low-pressure irrigation system

_____ restricted spray irrigation
_____ other (identify): _______________

Part 2 Determining Maximum Allowable Manure Application Rates for Individual Fields

Field designation (same as on page 2.1) underwood west

Soil tests (optional): Has field been soil tested in last 3 years to determine phosphorus (P) and potassium (K) levels? **Yes** _____ **No** ✓ (will be if Plan is approved)

If yes, levels of P and K found :

	Very Low	Low	Optimum	High	Very High
P					
K					

Phosphorus and potassium concentrations of manure [h] (optional):

Manure storage type	P_2O_5 (lb/1000 gal, lb/ton)	K_2O (lb/1000 gal, lb/ton)	Source of data
Bedded Confined Beef	6#	12#	ISU Pub 1811

Crop nutrient use rates (lb/bu or lb/ton) [i]:

Crop	N use rate	P_2O_5 use rate (Optional)	K_2O use rate (Optional)	Source of use rate information
Corn	1.1	.55	6.5	PM 1811
Soybeans	3.8	.8	1.5	PM 1811

Crop schedule: Year 1: Beans Year 2: Corn Year 3: Bean
Year 4: Corn Year 5: Bean Year 6: Corn

Timing of planned manure application: oct - may
[month(s) or season(s)]

Season and year of first application on this field: fall 2006

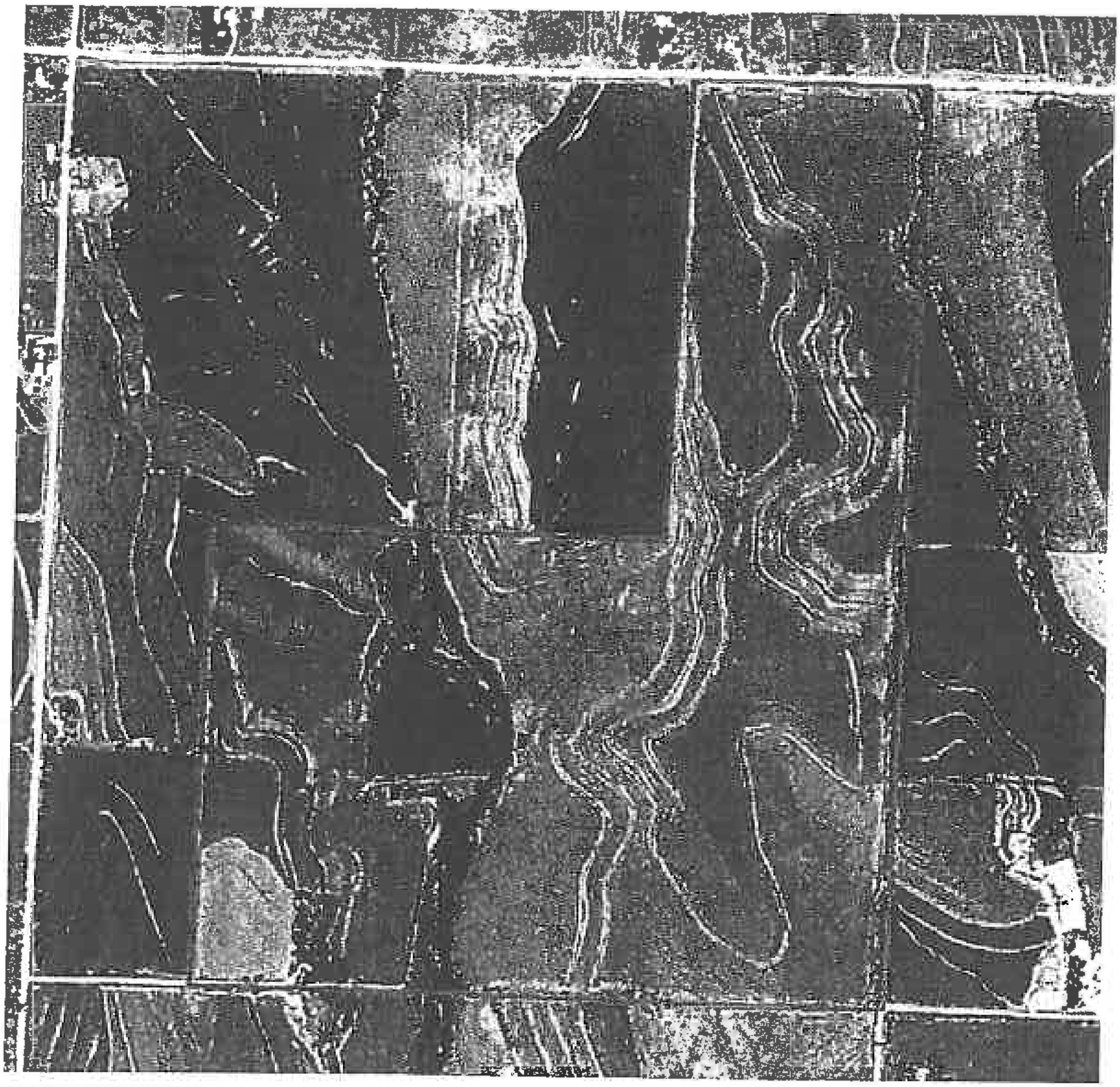
ATTACHMENT 11 Page 14 of 36

Field designation (same as on page 2.1) Underwood West

Table 2.1 Manure management plan for this field

		Year[j]	1	2	3	4	5	6
1	**Crop** (corn, soybeans, etc.)		Bean	Corn	Bean	Corn	Bean	Corn
2	**Optimum Crop Yield** (from page 2.1)	(bu or tons/ac)	51	183	51	183	51	183
3	**Net crop acres available for manure application** (from page 2.1)	(acres)	218	218	218	218	218	218
4	**Crop N needed (or crop N utilization)** = optimum crop yield (from line 2) X crop N use rate (from page 2.2)	(lb/acre)	193	201	193	201	193	201
5a	• **Legume N credit**[k]	(lb/acre)	–	50	–	50	–	50
5b	• **Commercial N credit** (amount of N applied in commercial fertilizers)	(lb/acre)	–	-	–	–	–	–
5c	• **Manure N carryover credit**[l]	(lb/acre)	0	1.8	3.6	3.6	3.6	3.6
6	• **Total N Credits** (add lines 5a, 5b, & 5c)	(lb/acre)	0	52	3.6	53.6	3.6	53.6
7	**Remaining crop N need** (line 4 minus line 6)	(lb/acre)	193	149	189	147	189	147
8	Before completing the remainder of Table 2.1, read Instructions for Table 2.2 on page 2.4. If the operation intends to apply manure to this field during the period of this manure management plan, identify the manure storage structure and application method to be used, and complete the remainder of this table							
	Manure storage structure:					(from column 1, Table 1.5, page 1.4)		
	Planned method of manure application:					(from column 3, Table 1.5, page 1.4)		
9	**1st Year Available N** (from column 5B, Table 1.5, page 1.4, for the manure structure and application method identified in line 8)	(lb/1000 gal or lb/ton)	8.4	8.4	8.4	8.4	8.4	8.4
10	**Manure application rate that will supply remaining crop N need** = remaining crop N need (line 7) ÷ 1st year available N (line 9)	(gal/acre) x 1000 **OR** (tons/acre)	22.7	17.8	22.5	17.5	22.5	17.5
11a	• **P_2O_5 applied if manure is applied at rate given in line 10** = (line 10 X P_2O_5 concentration from page 2.2) **Optional**	(lb/acre)	136	102	136	102	136	102
11b	• **K_2O applied if manure is applied at rate given in line 10** = (line 10 X K_2O concentration from page 2.2) **Optional**	(lb/acre)	264	213	264	213	264	213
12	**Planned manure application rate per acre on this field**[m] (cannot exceed rate listed on line 10)	(gal/acre or tons/acre)	22	17	22	17	22	17
13	**Acres on which manure will be applied** (cannot exceed net available acres identified in line 3)	(acres)	218	218	218	218	218	218
14	**Planned total manure application on this field** = Planned manure application rate (line 12) X acres on which manure will be applied (line 13)	(gal/field or tons/field)	4796	3706	4796	3206	4796	3706
15	**Amount of remaining crop N need that will be supplied by manure** = planned application rate (line 12) X 1st year available N (line 9)	(lb/acre)	184	143	184	143	184	143
16	**Additional N that can be applied per acre as commercial fertilizer** (in addition to amount listed in line 5b) = line 7 minus line 15	(lb/acre)	9	6	5	4	5	4

1



N

One in = 1070 feet

0 367 734 1101 1468 1835

Date: 1/25/2006
Field: 1
Farm: underwood 2
Client: moran
Area: 325.31 ac

Boundary	**(325.31 ac)**

SST

ATTACHMENT 11 Page 26 of 26

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
Council Bluffs Field Office (712)328-2489

05/18/00

CONSERVATION PLAN

Client: Moran Enterprises, Inc   Moran Enterprises, Inc
Assisted By: JAG

LAND UNITS		PLANNED			APPLIED		
TRACT	FIELD	AMOUNT	MONTH	YEAR	AMOUNT	DATE	PLANNED CONSERVATION TREATMENT
							CROP
tT3032	3, 4	212.5Ac					A CROP ROTATION of corn soybeans will be used on these fields. CONTOUR FARMING will be used for all planting and tillage operations. TERRACES will be constructed/maintained to reduce sheet and rill erosion. The following CONSERVATION TILLAGE system will be used: Soybean stubble is spring tilled leaving at least 20% of the ground covered by residue after planting corn. Corn stalks are tilled leaving at least 40% of the ground covered by residue after planting soybeans. FIELD BORDERS are required as shown on the conservation plan map. Areas that are unterraced will use a corn bean rotation and no-tilled leaving 40% bean stubble after planting corn, and 60% corn stalks after planting beans.
tT3032	3 HEL*	49.6ac	05	1994	49.6ac	01/25/1996	CONSERVATION CROP ROTATION
	4 HEL*	162.9ac	05	1994	162.9ac	01/25/1996	
t[illegible]032	3 HEL*	49.6ac	05	1994	49.6ac	06/01/1998	CONSERVATION TILLAGE
	4 HEL*	162.9ac	05	1994	162.9ac	06/01/1998	
tT3032	3 HEL*	49.6ac	05	1994	49.6ac	06/01/1998	CONTOUR FARMING
	4 HEL*	162.9ac	05	1994	162.9ac	01/25/1996	
tT3032	3 HEL*	900.0ft	05	1994	900.0ft	01/25/1996	FIELD BORDER
	4 HEL*	5500.0ft	05	1994			
tT3032	3 HEL*	5350.0ft	08	1988	5350.0ft	11/30/1999	TERRACE
	3 HEL*	3450.0ft	05	1994			
	4 HEL*	16600.0ft	08	1988	16600.0ft	07/14/1997	
	4 HEL*	4150.0ft	05	1994			
	4 HEL*	2475.0ft	06	1994	2475.0ft	07/29/1996	
tT3032	3 HEL*	~~1.0no~~ 435ft	07	1996	~~1.0no~~ 435ft	07/29/1996	WATER AND SEDIMENT CONTROL BASIN

Fields marked as HEL are highly erodible fields.

HEL* Reapplication of this conservation practice on this highly erodible field is required for compliance with the Food Security Act of 1985. See the Conservation Plan for details about first time application.

ATTACHMENT 11 Page 17 of 26

Developing Manure Management Plan for Individual Fields

Instructions:

(1) Complete this form for each field being used for manure application in this plan. If several fields on a farm have similar crop rotations and county average yields or proven yields for a farm are used to determine optimum crop yields, these fields may be combined and reported as one.

(2) Footnotes are given on page 2.5 and 2.6

Field designation [a] 1 Kevin Moran **Farm location** Pottawattamie Co Norwalk Twp Sec 17 East ½
(County, Township, Section, ¼ Section)

Field is:
✓ owned by the owner of the animal feeding operation
___ rented for crop production
___ available under terms of written manure application agreement (attach copy of agreement)

Total acres in this field 288 acres
Acres not available for manure application [b] ... – acres
Net acres available for manure application...... 288 acres

Method used to determine optimum yields [c]**:**
___ Iowa Ag Statistics county yield averages [d]
___ County average yields - FSA catastrophic crop insurance program [e]
___ Multi-peril insurance proven yields [e]
✓ Individual farm proven yield records [e]
___ Farm Service Agency (FSA) yields [e]
___ Soil survey interpretation record

Optimum yields for this field [f]**:**

Crop	Optimum yield (bu/acre, tons/acre)
Corn	183 Bu
Soybeans	51

Reduction of soil loss and surface water pollution: Identify the methods, structures, or practices that will be used to prevent or diminish soil loss and potential surface water pollution during the application of manure on this field: Conservation tillage / No-till
The farm is terraced according to NRCS Standards

Does this field include highly erodible land (HEL) on which manure will be applied: Yes ✓ No ___
(If yes, a summary or copy of the conservation plan for this HEL cropland must be provided as an attachment to this plan.)

Will spray irrigation be used to apply manure on this field [g]**:** Yes ___ No ✓
(If yes, identify irrigation method):
___ low-pressure irrigation system
___ restricted spray irrigation
___ other (identify): ___

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 Determining Maximum Allowable Manure Application Rates for Individual Fields

Field designation (same as on page 2.1) 1 Kevin Morans #

Soil tests (optional): Has field been soil tested in last 3 years to determine phosphorus (P) and potassium (K) levels? **Yes** X **No** ____

If yes, levels of P and K found :

	Very Low	Low	Optimum	High	Very High
P				X	
K				✓	

Phosphorus and potassium concentrations of manure [h] (optional):

Manure storage type	P_2O_5 (lb/1000 gal, lb/ton)	K_2O (lb/1000 gal, lb/ton)	Source of data
Bedded Beef	6#/Ton	12#/Ton	ISU Pub 1811

Crop nutrient use rates (lb/bu or lb/ton) [i]:

Crop	N use rate	P_2O_5 use rate (Optional)	K_2O use rate (Optional)	Source of use rate information
Corn	1.1	.55	.65	Pm 1811
Soybeans	3.8	.8	1.5	

Crop schedule: **Year 1:** Corn **Year 2:** Bean **Year 3:** Corn
Year 4: Bean **Year 5:** ____ **Year 6:** ____

Timing of planned manure application: Oct - April
[month(s) or season(s)]

Season and year of first application on this field: Fall 2006

Corn Yield Based on Removing the Stalk for Bedding

Field designation (same as on page 2.1) 1 Kevin Mosans

Table 2.1 **Manure management plan for this field**

		Year[j]	1	2	3	4	5	6
1	**Crop** (corn, soybeans, etc.)		Corn	Bean	Corn	Bean	Corn	Bean
2	**Optimum Crop Yield** (from page 2.1)	(bu or tons/ac)	183	51	183	51	183	51
3	**Net crop acres available for manure application** (from page 2.1)	(acres)	288	288	288	288	288	288
4	**Crop N needed (or crop N utilization)** = optimum crop yield (from line 2) X crop N use rate (from page 2.2)	(lb/acre)	201	193	201	193	201	193
5a	• **Legume N credit**[k]	(lb/acre)	50	—	50	—	50	~~5~~ —
5b	• **Commercial N credit** (amount of N applied in commercial fertilizers)	(lb/acre)	—	—	—	—	—	—
5c	• **Manure N carryover credit**[l]	(lb/acre)	—	1.8	3.6	3.6	3.6	3.6
6	• **Total N Credits** (add lines 5a, 5b, & 5c)	(lb/acre)	50	1.8	53.6	3.6	53.6	3.6
7	**Remaining crop N need** (line 4 minus line 6)	(lb/acre)	151	191.2	147.4	189.4	147.4	189.4
8	Before completing the remainder of Table 2.1, read Instructions for Table 2.2 on page 2.4. If the operation intends to apply manure to this field during the period of this manure management plan, identify the manure storage structure and application method to be used, and complete the remainder of this table							
	Manure storage structure:					(from column 1, Table 1.5, page 1.4)		
	Planned method of manure application:					(from column 3, Table 1.5, page 1.4)		
9	**1st Year Available N** (from column 5B, Table 1.5, page 1.4, for the manure structure and application method identified in line 8)	(lb/1000 gal or lb/ton)	8.4	8.4	8.4	8.4	8.4	8.4
10	**Manure application rate that will supply remaining crop N need** = remaining crop N need (line 7) ÷ 1st year available N (line 9)	(gal/acre) x 1000 **OR** (tons/acre)	17.8	22.36	17.5	22.5	17.5	22.5
11a	• **P_2O_5 applied if manure is applied at rate given in line 10** = (line 10 X P_2O_5 concentration from page 2.2) **Optional**	(lb/acre)	102	136.56	102	136	102	136
11b	• **K_2O applied if manure is applied at rate given in line 10** = (line 10 X K_2O concentration from page 2.2) **Optional**	(lb/acre)	213	264	213	264	213	264
12	**Planned manure application rate per acre on this field**[m] (cannot exceed rate listed on line 10)	(gal/acre or tons/acre)	17	22	17	22	17	22
13	**Acres on which manure will be applied** (cannot exceed net available acres identified in line 3)	(acres)	288	288	288	288	288	288
14	**Planned total manure application on this field** = Planned manure application rate (line 12) X acres on which manure will be applied (line 13)	(gal/field or tons/field)	4896	6336	4896	6336	4896	6336
15	**Amount of remaining crop N need that will be supplied by manure** = planned application rate (line 12) X 1st year available N (line 9)	(lb/acre)	142	184	142	184	142	184
16	**Additional N that can be applied per acre as commercial fertilizer** **(in addition to amount listed in line 5b)** = line 7 minus line 15	(lb/acre)	9	7	5	5	5	5

1

N

One in = 1082 feet

0 371 742 1113 1484 1855

Date: 1/25/2006
Field: 1
Farm: underwood1
Client: moran
Area: 325.22 ac

Boundary	**(325.22 ac)**

SST

USDA

Dale L. DuVal
District Conservationist

Conservation Plan

Moran Beef Inc
25843 Highway 183
Honey Creek, IA 51542-4241

Crop

Tract: 2243

WASTE STORAGE FACILITY

A fabricated structure for temporary storage of animal wastes or other organic agricultural wastes. To temporarily store liquid or solid wastes as part of a pollution-control or energy-utilization system to conserve nutrients and energy and to protect the environment.

Field	Planned Amount	Month	Year	Applied Amount	Date
4	1.0 no.	7	2002	1.0 no.	Jul-1-2002
Total:	1.0 no.			1.0 no.	

CONSERVATION CROP ROTATION

Rotation is corn/bean.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.4 ac.	5	1990		
3.1	28.0 ac.	5	1990		
3.2	14.6 ac.	5	1994		
4	85.2 ac.	5	1990		
5.1	50.0 ac.	5	1990		
5.3	19.0 ac.	5	1994		
5.4	54.8 ac.	5	1994		
Total:	268.0 ac.				

CONSERVATION CROP ROTATION

Crop rotation of continuous corn.

Field	Planned Amount	Month	Year	Applied Amount	Date
5.2	26.0 ac.	5	1994		
Total:	26.0 ac.				

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CONSERVATION TILLAGE

Soybean stubble is spring tilled leaving at least 20% residue after planting corn. Corn stalks are tilled leaving at least 40% residue after planting soybeans.

Field	Planned Amount	Month	Year	Applied Amount	Date
3.2	14.6 ac.	5	1994		
4	85.2 ac.	5	1993		
Total:	99.8 ac.				

CONSERVATION TILLAGE

Corn is no-tilled into soybeans stubble leaving at least 40% after planting. Soybean are no-tilled into corn stalks leaving at least 60% after planting.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.4 ac.	5	1993		
3.1	28.0 ac.	5	1993		
5.1	50.0 ac.	5	1990		
5.3	19.0 ac.	5	1994		
5.4	54.8 ac.	5	1994		
Total:	168.2 ac.				

CONSERVATION TILLAGE

Corn is no-tilled into corn stalks leaving at least 50% of ground covered by residue after planting.

Field	Planned Amount	Month	Year	Applied Amount	Date
5.2	26.0 ac.	5	1994		
Total:	26.0 ac.				

CONTOUR FARMING

Farming sloping land in such a way that preparing land, planting, and cultivating are done on the contour. (This includes following established grades of terraces or diversions.) To reduce erosion and control water.

Field	Planned Amount	Month	Year	Applied Amount	Date
4	85.2 ac.	5	1990	85.2 ac.	Jan-4-1992
Total:	85.2 ac.			85.2 ac.	

CONTOUR FARMING

This/these fields will be farmed on the contour. Row grades will not exceed 2% slpoe.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.4 ac.	5	1990		
3.1	28.0 ac.	5	1990		
3.2	14.6 ac.	5	1994		
5.1	50.0 ac.	5	1990		
5.3	19.0 ac.	5	1994		
5.4	54.8 ac.	5	1994		
Total:	182.8 ac.				

FIELD BORDER

A strip of perennial vegetation established at the edge of a field by planting or by converting it from trees to herbaceous vegetation or shrubs. To control erosion, protect edges of fields that are used as "turnrows" or travel lanes for farm machinery, reduce competition from adjacent woodland, provide wildlife food and cover, or improve the landscape.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	1,150.0 ft.	4	1994		
3.1	150.0 ft.	4	1994		
3.2	700.0 ft.	5	1994		
4	800.0 ft.	4	1994		
5.3	250.0 ft.	5	1994		
5.4	800.0 ft.	5	1994		
Total:	3,850.0 ft.				

GRASSED WATERWAY

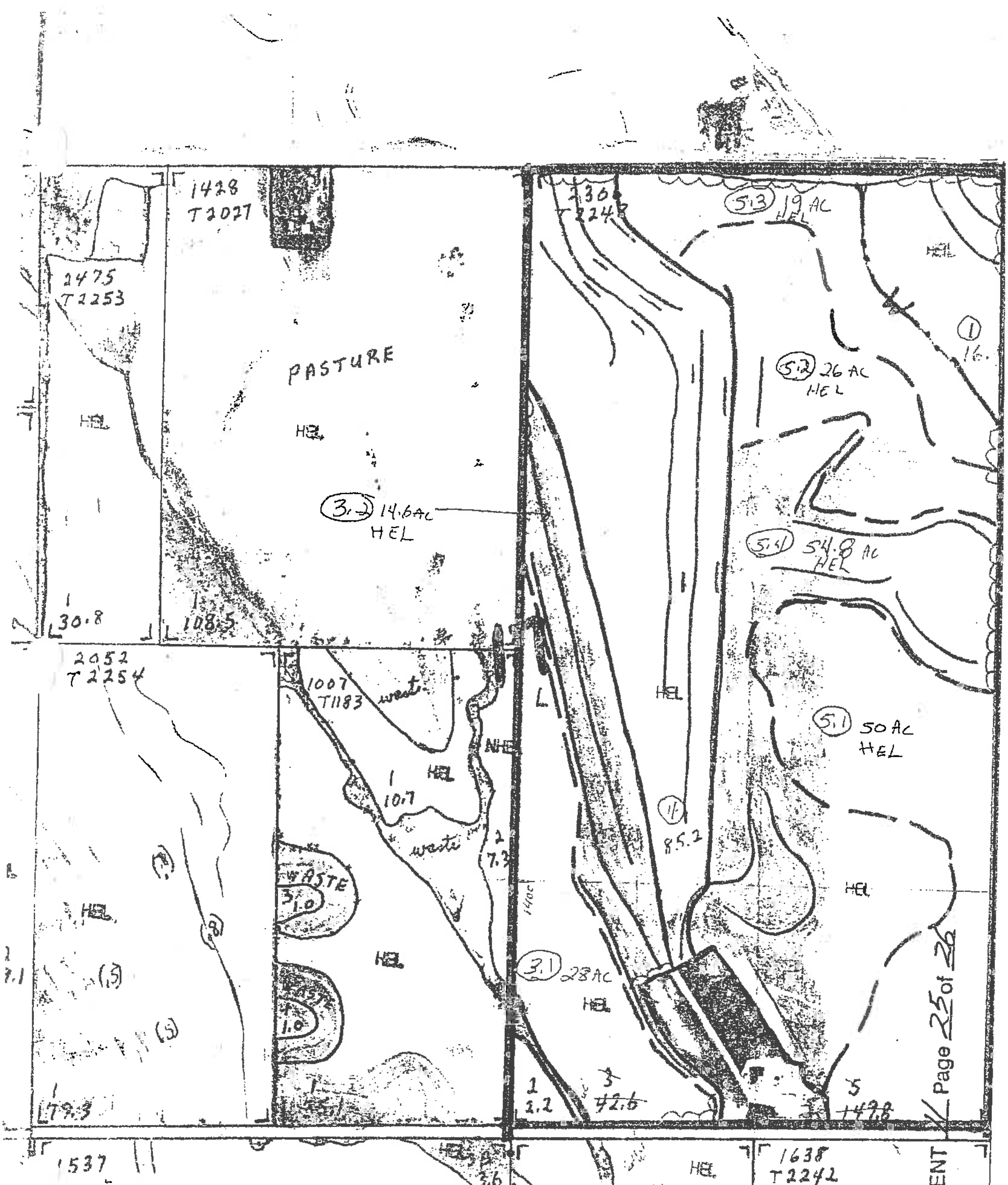
A natural or constructed channel that is shaped or graded to required dimensions and established in suitable vegetation for the stable conveyance of runoff. To convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding and to improve water quality.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.4 ac.	5	1989	1.5 ac.	May-1-1989
Total:	16.4 ac.			1.5 ac.	

TERRACE

An earth embankment, a channel, or a combination ridge and channel constructed across the slope. To: (1) reduce slope length, (2) reduce erosion, (3) reduce sediment content in runoff water, (4) improve water quality, (5) intercept and conduct surface runoff at a nonerosive velocity to a stable outlet, (6) retain runoff for moisture conservation, (7) prevent gully development, (8) reform the land surface, (9) improve farmability, or (10) reduce flooding.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	885.0 ft.	9	1988	885.0 ft.	Sep-1-1988
3.2	5,000.0 ft.	5	1989	5,000.0 ft.	May-1-1989
4	2,400.0 ft.	1	1992	2,400.0 ft.	Jan-4-1992
4	800.0 ft.	7	2002	800.0 ft.	Jul-1-2002
Total:	9,085.0 ft.			9,085.0 ft.	



NOT TO SCALE (1990 FLIGHT) WEST POTTAWATTAMIE--CROP YEAR___

ATTACHMENT K

Year-by-Year Summary of Manure Management Plan

Table 3.1 Manure Management Plan Summary for Year: 2006

Column 1	2	3	4	5	6	7	8
Field (from page 2.1)	**Planned Crop** (from line 1, Table 2.1)	**Net Acres Available** (from line 3, Table 2.1)	**Manure Storage Structure** (from line 8, Table 2.1)	**Acres Receiving Manure** [a] (from line 13, Table 2.1)	**Manure Application Method** (from line 8, Table 2.1)	**Planned Manure Application** Gallons/Acre or Tons/Acre (from line 12, Table 2.1)	Gallons/Field or Tons/Field [b] (from line 14, Table 2.1)
1 Kevin Moten	Corn	288	Bedded	288	Broadcast	17	4896
~~Underwood~~							
Underwood W	Bean	218	Bedded	218	Broadcast	22	4796
Neale	Corn	116	Bedded	116	Broadcast	17	1972
Estimated land area required for manure application (acres)				622	**Estimated manure produced / year**		11,664

[a] If manure from more than one manure storage structure will be applied to a field, the total acres of that field receiving manure (for all storage structures) should not exceed the net acres available in that field.

[b] For each manure storage structure, the gallons or tons of manure applied to all fields (total of the gallons or tons applied to all fields from that structure, as listed in column 8) should equal the gallons or tons of manure produced per year, as given in column 4 of Table 1.2 (for liquid manure) or Table 1.4 (for solid manure).

Fields of Opportunities

STATE OF IOWA

CHESTER J. CULVER, GOVERNOR
PATTY JUDGE, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
RICHARD A. LEOPOLD, DIRECTOR

April 24, 2009

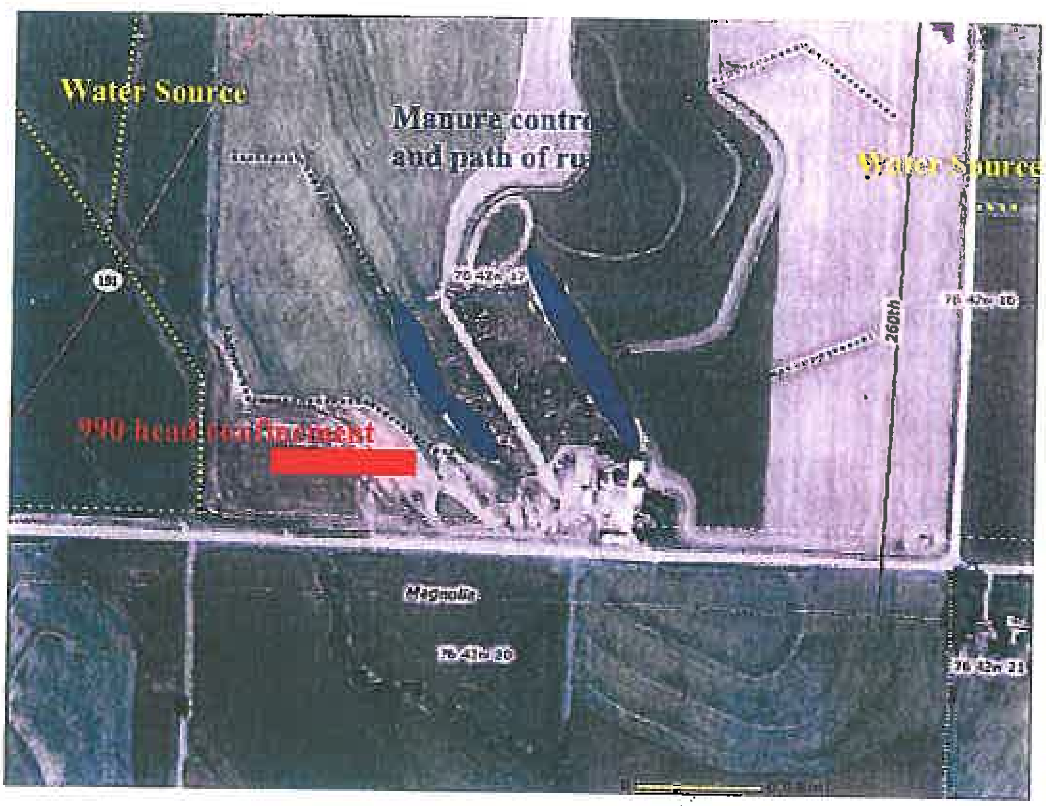
Moran Beef, Inc.
Attn: Frank Moran
25843 Hwy 183
Honey Creek, IA 51542

SUBJECT: Open Feedlot Visit - Pottawattamie County
Facility ID # 64583 – Confinement
Facility ID # 64122 – Open Lot

Dr. Mr. Moran:

On March 5, 2009, I conducted a routine compliance inspection at your permitted open cattle feedlot located in Section 18, Crescent Township. Following that inspection we drove to your other feedlot located in Section 17, Norwalk Township (near Underwood). The purpose of the visit was to discuss recent changes in the department's rules regarding combined animal feeding operation.

At this feedlot you have a 975 head open cattle feedlot and a 990 head cattle confinement operation. Below is an aerial photo of your operation.



ATTACHMENT 12 Page 1 of 3

FIELD OFFICE #4 / 1400 Sunnyside Lane, Atlantic, Iowa 50022
712-243-1934 / FAX 712-243-6251

The purpose of this letter is to assure you are aware of the requirements for you operation.

Starting December 31, 2008, a new Iowa law (passed in the spring of 2008 to bring state law into agreement with federal law) went into effect. The new law changes the way animals are counted for the purpose of determining if an operation is required to have a National Pollutant Discharge Elimination System (NPDES) Permit. The new law requires producers to combine animals of the same type that are housed in both an open feedlot (unroofed or partially roofed) and in confinement buildings (totally roofed).

The new law applies to animal feeding operations including livestock markets, not cow – calf operations on pasture. For more information on which facilities are required to obtain a NPDES Permit see the enclosed fact sheets entitled "NPDES Permits Determining if a Combination Open Feedlot and Animal Confinement Must Apply for an NPDES Permit in 2008" or go to the DNR web page (www.iowadnr.com).

Our records indicate that your combined open feedlot / confinement facility houses 1,000 beef cattle or more and would require an NPDES Permit for any discharge to a water of the state. A discharge can include manure, manure laden runoff, or process wastewater (such as runoff from bedding, feed stuffs, or compost areas) that would reach surface waters. A discharge can occur from the facility or from manure application, if it results in manure runoff to a water of the state.

It is recommended that all facilities that meet the requirement (in terms of number of animals) obtain an NPDES Permit even if there are questions as to whether the facility discharges to a water of the state. Not applying for a permit is in effect a claim of no discharge. Hence, any discharge that reaches a water of the state is a violation subject to enforcement. Failing to accurately assess your operation may increase the risk of an unplanned discharge to a water of the state and subsequent enforcement. You may want to employ an objective third party to help you assess your feedlot. The Environmental Resources Coalition, through the CLEANmp program funded by EPA, can provide low or no cost technical assistance and NMP development to operations west of the Mississippi River. More information is available at www.erc-env.org/ or (800)897-1163.

If an NPDES Permit is required, a Nutrient Management Plan (NMP) that includes both the confinement and the open lot portion and meeting the requirements of the Iowa Phosphorus Index will be required. A construction permit would also be required prior to construction and/or modification of manure controls.

Any unpermitted discharge (release) from your facility must be reported to the department, as required by Subrule 567 IAC 65.101(9), within 6 hours of onset or discovery. The verbal report can be made during normal office hours by calling this office at 712/243-1934 or after hours by calling 800/281-8694. Leaving a recorded message does **not** satisfy the reporting requirement.

Failing to properly retain and manage manure can lead to elevated levels of nitrates, ammonia, phosphorus, organic matter, fecal bacteria, e-coli, chlorides, and other microorganisms in both groundwater and surface water. These conditions can endanger human health as well as that of wildlife and other livestock. Your efforts and attention to manure management at your feedlot will benefit your neighbors and community by ensuring good water quality and environmental compliance.

This letter is not intended to be an all-inclusive list of potential or existing violations. As the owner or operator of this facility, you are responsible for complying with all local, state and federal laws, as well as any relevant ordinances, regulations and other requirements. Nothing in this letter shall be construed to prevent the Department from taking further action if such action is, in the sole discretion of the Department, deemed to be warranted.

All administrative rules cited above can be viewed at http://www.legis.state.ia.us/IAC.html.

Relevant sections of the Iowa Code can be viewed at http://www.legis.state.ia.us/IowaLaw.html.

If you have determined that your facility needs an NPDES Permit please submit the following:

1. NPDES permit application on DNR Form 542-4001 (enclosed)
2. NPDES application fee on DNR Form 542-1250 (enclosed, make the check payable to Iowa DNR)
3. NMP on DNR Form No. 542-2021
4. Completed compliance schedule for a combined CAFO (see page 2 of DNR Form No. 542-0190 for an example)
5. Mail items 1-4 to the following: Iowa DNR, AFO Program, 502 East 9th Street, Des Moines, IA 50319-0034

Please refer to DNR Form No. 542-0190 (enclosed) Compliance Steps for Combined CAFOs.

If you have any questions please contact me via email at alison.manz@dnr.iowa.gov or by phone at (712) 243-1934 / office or (712) 250-0219/ cell.

Sincerely,

Alison Manz

Alison Manz
Environmental Specialist
Field Services and Compliance

cc: Gene Tinker, AFO Coordinator, DNR, Des Moines
Reza Khosravi, AFO NPDES Permit Writer, DNR, Des Moines
Joe Turner, PO Box 301, Neola, IA 51559
Facility File, Pottawattamie County

Enc: Rules and Forms

File: ARM/arm/underwood030509.ol.moran unpermitted letter.manz.doc

Facility: Moran Beef, Inc. Date: 6/4/09 Arrival time: 9:30am

DRIVE-BY

1. Drive-by conducted from public right-of-way? ☒ Yes ☐ No

   Determine the direction "North" with respect to the facility and provide a brief sketch of the layout and orientation (as can be viewed from the public right-of-way): ➜

Facility Orientation

See Map

3. Obvious concerns visible from public right-of-way (photos)? ☒ Yes ☐ No

- Containers	- Tanks	- Processing Equipment
- Loading Areas	- Unloading Areas	- Security Devices
- Open Drums	- Stressed Vegetation	- Unusual Staining
- Unusual Odors	- Obvious Discharges	- Improper Disposal
- Safety Concerns	- Other Concerns	

SITE ENTRY AND IN BRIEFING

1. ☒ Used main entrance ☒ Entered during normal operating hours ☐ Excessive delays (>15 minutes - denial of access?) - ☒ No
2. Facility Representative(s): Frank Moran Title: Assistant Vice President
   Kevin Moran Title: Manager of facility since 1986
   Joe Turner Consultant
3. Does representative have intimate knowledge of all waste management practices? ☒ Yes ☐ No How long in position? >20 Years
4. **Introduction:**

☒ Presented credentials
☒ Verified presence at correct facility (checked address/I.D. #)
☒ Explained authority to conduct inspection (Section 308 of CWA)
☒ Explained the purpose, scope, and order of the inspection
☒ Explained documentation process - worksheets, checklists, photo's, notes, statements, etc
☒ Explained facility's right to claim CBI
☒ Explained responsibility to provide accurate information and provided copies of Section 1001 and 1002 U.S.C. to facility
☒ Identified personal safety considerations: none
☒ Completed Multimedia screening checklist
☒ Provided SBREFA handout.
☒ Obtained GPS reading

Was full access granted? ☒ Yes ☐ By facility representative Other (name): Frank Moran

☐ No - Access denied Name of person denying access:________ Time of denial:________

Reason for denial, or limitations placed on access:

EXIT BRIEFING

1. Reviewed all data collected and documented all concerns or violations? ☒ Yes ☐ No

   - Location of the violation, type and amount of waste involved, time frame, frequency, specific dates & when first started occurred
   - Illegal units - unit location (diagram/picture), dimensions, conditions, construction material, gradient of the base (for spills), other information.
   - Illegal disposal - how, when (each occurrence), where sent or disposed of, how shipped, who shipped, when shipped/disposed of, quantity

☒ Identified/verified violations from previous inspection were corrected (if applicable)
☒ Addressed all unresolved inspection related issues
☒ Summarized findings and observations for the facility representatives

NOPV issued? ☒ Yes ☐ No ☐ Violations clearly identified and explained, including: circumstances, location, and applicable regulations

☒ Explained the importance of a timely (10 day) and adequate response
☒ Explained that findings and observations are based on your current knowledge of the CWA and that the final findings may differ
☒ Explained that compliance officer will make the final compliance decisions and that all compliance questions should be directed toward them
☒ Explained that recommendations provided are for informational purposes only and ***DO NOT*** require specific actions by the facility
☒ Provided facility with CBI form
☒ Prepared Document Receipt form

3. Specific information requested from facility? ☐ Yes ☒ No
4. Facility appears to have awareness of the CWA regulations and/or has its own environmental staff? ☒ Yes ☐ No
5. Facility has copy of applicable regulations? ☒ Yes ☐ No

   Attitude and demeanor of facility representative(s): ☒ OK ☐ Not OK

Stream at Discharge from Site
Location: Unnamed Tributary Directly west of confinement Building
GPS
Latitude: N/A

Longitude: N/A

Channel Width (1): 2-3 ft

Bank Depth (2): 7-8 ft

Substrate Type (3): a

Avg. Water Depth: 2-4"

Visible Flow? ☒ Yes ☐ No
Sediment from site? ☐ Yes ☒ No

Dimensions (5): N/A

Site Characteristics
Bank vegetative Cover (4): 100 %
Type of cover:
☒ Grass ☒ Weeds ☐ Woods

Photographs: #15

Culvert Size: N/A

Footnotes and additional notes are on the second page.

Stream at Downstream of discharge
Location:
GPS
Latitude:

Longitude:

Channel Width (1):

Bank Depth (2):

Substrate Type (3):

Avg. Water Depth:

Visible Flow? ☐ Yes ☐ No
Sediment from site? ☐ Yes ☐ No

Dimensions(5):

Site Characteristics
Bank vegetative Cover (4): %
Type of cover:
☐ Grass ☐ Weeds ☐ Woods

Photographs:

Culvert Size:

Nexus: perennial stream
Location: Mosquito Creek Directly South of Underwood IA.
GPS
Latitude: N/A

Longitude: N/A

Channel Width (1): 60'

Bank Depth (2): 15'

Substrate Type (3): a

Avg. Water Depth: 2-3 ft

Visible Flow? ☒ Yes ☐ No
Sediment from site? ☐ Yes ☒ No

Dimensions(5): N/A

Site Characteristics
Bank vegetative Cover (4): 100 %
Type of cover:
☒ Grass ☒ Weeds ☒ Woods

Photographs: #20 & #21

Culvert Size: 60 ft Bridge

Distance to site: 1 mile east

(1) Model input of Channel Width: Distance from the top of one bank to the top of the other bank.

(2) Model input of bank depth: Distance from top of bank to bottom of stream.

(3) Model input of Substrate type:

a. **Fine silt/sand:** gritty, no rocks

b. **Gravel:** lady bug-sized to marble-sized rocks

c. **Coarse Gravel:** Marble-sized to Tennis ball

d. **Cobble:** Tennis ball to basketball

e. **Boulder:** Larger than basketball

(4) Model input of Vegetative Cover in percent coverage of the upper banks, check the appropriate type listed.

(5) Estimate of sediment in the stream or off-site. Measurements in three dimensions would be best.

Additional Site Notes:

General CAFO Inspection Form

Facility ID ~~Permit~~ Number: 64122 + 64583

Responsible Official / On-site Representative: Frank Moran

Contacted: Leona + Frank Moran

Facility Name: Moran Beef, Inc.

Corporate Status: Incorporated

Facility Address: 25794 Magnolia Road

Underwood, Iowa 51576

Phone Number: 712-545-3512

County: Pottawattamie

Date / Time of Entrance, Exit: 06/04/2009

Current Temperature 68°F

Current Precipitation Amounts .30 on 6/2/09

Legal: Quarter SE¼ Section 17 Township 76N Range 42W

Latitude: N/A Longitude: N/A

Nearest U.S. Water (Attach flow path on separate sheet): Mosquito Creek + Unnamed Tri

Status of Named Surface Water (i.e. intermittent, perennial & state designations) Mosquito Creek is perennial + the unnamed Tributary flows 12 months out of the year

Do animals have direct access to the surface water(s)? NO

Years in operation: Since 1986

Facility size: ≈40 Acres

Total land area devoted to pens: ≈25 Acres

Where are the animal wastes stored: Stored in the pens + in Terraces/SSBs

Is the manure pile protected from run-on: Yes

Does the run-off from the waste pile flow to the lagoon: N/A → NO Lagoon

Are there any portions of the production area where run-off is not controlled: Yes The entire open Feed lot is not controlled – but has solids settling Basins for open..

Total application area: 686 Acres for both operations + 165 for open Lots

How are liquids land applied: N/A SSB → Have standpipes to remove stormwater which discharge to terraces + grass waterways

How are solids disposed of: Pull Type Spreaders – 16 Ton

How is the volume of solid or liquid waste measured: Distance Traveled + number of Loads per field

Comments on application areas: Facility has a Manure Management Plan for the Total Confinement Building Bedding Pack.

Number of employees: 4 - full time

If number of employees is 25 or greater, is facility connected to a public water supply [40 CFR 141.2]: N/A

Permitted number of animal units: N/A Confinement less than 1000
Open Lots Less than 1,000

Number of Animal Units at the time of the inspection: 1485 → 862 in confinement
625 open lot

Are animals confined/maintained for a period of greater then 45 days: yes

Is there vegetation, forage growth or post harvest residues anywhere in the production area:
NO

Has the facility discharged since the last inspection: yes

Date, time, reason, duration, location and volume of discharge:
The Solids Settling Basins discharge to a grassy waterway
- Process waste water can flow to unnamed tributary on west side of facility

Is the facility discharging at the time of the inspection (Attach sample results and field sheets): NO

Last Inspection / Comments/Facility History: See Report

Recordkeeping and Additional Measures:

Visual inspections. There must be routine visual inspections of the CAFO production area, at a minimum, the following must be visually inspected:

1) Weekly inspections of all storm water diversion devices, runoff diversion structures, and devices channeling contaminated storm water to the wastewater and manure storage and containment structure [40 CFR 412.37(a)(i)]:
N/A - NO

2) Daily inspections of water lines, including drinking water or cooling water lines. [40 CFR 412.37(a)(ii)]: N/A - NO

3) Weekly inspections of the manure, litter, and process wastewater impoundments; the inspection will note the level in liquid impoundments [40 CFR 412.37(a)(iii)]: N/A - NO

- Kansas requires staff gauge readings on the 1st and 15th of every month, during precipitation events, during liquid application and daily readings if the freeboard has been exceeded.
- Nebraska requires staff gauge reading monthly, during precipitation events and during liquid application.
- Missouri requires monthly staff gauge readings.

Are precipitation records kept on a daily basis [40 CFR 412.31(a)(2)(i)(A)]: NO - N/A.

- Nebraska requires that a rain gauge be kept on site.
- Missouri allows use of the nearest weather station.

Type of Crop and Expected crop yields [40 CFR 412.37(c)(1)]: Yes - MMP only

Dates manure, litter, or process waste water is applied to each field [40 CFR 412.37(c)(2)] – (Obtain records): Yes - MMP only

Weather conditions at the time of application and for 24 hours prior to and following application [40 CFR 412.37(c)(3)] – (Obtain Records):
NO - N/A

Test methods used to sample and analyze manure, litter, process waste water and soil sampling [40 CFR 412.37(c)(4)] – (Obtain Records):
Yes - MMP only

Results from manure, litter, process waste water and soil sampling [40 CFR 412.37(c)(5)] – (Obtain Records):
Yes - MMP only

Explanation of the basis for determining manure application rates [40 CFR 412.37(c)(6)] – (Obtain Records):
Yes - MMP only (confinement)

Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than manure, litter, or process waste water [40 CFR 412.37(c)(7)] – (Obtain Records):
Yes – MMP

Total amount of nitrogen and phosphorus actually applied to each field [40 CFR 412.37(c)(8)] – (Obtain Records): Yes – Book values

The method used to apply manure, litter or process waste water [40 CFR 412.37(c)(9)] – (Obtain Records): Yes – MMP Solids only

Date(s) of manure application equipment inspection [40 CFR 412.37(c)(10)] – (Obtain Records):
No – N/A

Is manure applied within 100 feet of surface water [40 CFR 412.4(c)(5)]: NO per MMP

- Missouri setbacks are: 300 feet from any losing stream, open sinkholes, water supply wells or water supply reservoirs; 50 feet from intermittent streams, public roads, or property boundaries; 100 feet from permanent flowing streams, public roads, or property boundaries; 100 feet from permanent flowing streams.

Are receipts for any waste sold or given away kept on-site [122.42(e)(3)] and [412.31(a)(2)(A)]:
NO

Is a Nutrient Management Plan utilized [122.42(e)(i)]: NO → MMP for Total Confinement only

How does the facility dispose of dead [122.42(e)(1)(ii)]:
Composting

Does the facility prepare an annual report [122.42(e)(4)(i)]: NO

Method of carcass disposal: [40 CFR 412.37(a)(4)] 40 CFR 122.42(e)(3)]

Method of carcass disposal:	___Burial	___Incineration
[40 CFR 412.37(a)(4)] 40 CFR 122.42(e)(3)]	___Rendering	X Composting
	___Other ___	

N/A

Adequate vegetative cover on earthen berms: ___Yes ___No
(To reduce erosion and retain the integrity of the structure)

Visible marker for max / min operating levels: ___Yes ___No
[40 CFR 412.37(a)(2)]

Trees / brush on berm: ___Yes ___No
(Affects liner seal)

Evidence of erosion on berm: ___Yes ___No
(Affects liner seal)

N/A

Evidence of burrowing animals: ___Yes ___No
(Affects liner seal)

Sedimentation basins full: ___Yes ___No
[40 CFR 412.37(a)(iii)]

Manure storage area:

N/A

Does it drain to the lagoon? ___Yes ___No
[40 CFR 412.2(h)]
Is it protected from run-on and run-off? ___Yes ___No

Other comments/notes: N/A

____

____

Observed lagoon freeboard:

N/A

Lagoon__________ Freeboard__________ Compliant: ___Yes ___No

Lagoon__________ Freeboard__________ Compliant: ___Yes ___No

Lagoon__________ Freeboard__________ Compliant: ___Yes ___No

Lagoon__________ Freeboard__________ Compliant: ___Yes ___No

Does the system(s) have an outfall or discharge point: Solid Settling Basin only Discharges to grassy waterways

Comments on Lagoon/areas: N/A

____

____

____

REPORT OF CONCENTRATED ANIMAL FEEDING OPERATION SAMPLING INSPECTION

At

Moran Beef, Incorporated
25794 Magnolia Road
Underwood, Iowa 51576
(712) 545-3512
Facility ID# 64583, 64122

ON
October 30, 2009

BY

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region VII
Environmental Services Division

1.0 INTRODUCTION

At the request of the Water, Wetlands and Pesticides Division, Water Enforcement Branch, a Concentrated Animal Feeding Operation (CAFO) compliance sampling inspection (CSI) was performed at Moran Beef, Incorporated on October 30, 2009. This inspection was to follow-up on an inspection conducted on June 4, 2009. This inspection was performed pursuant to Section 308(a) of the Federal Water Pollution Control Act, as amended. This narrative report and attachments present the findings and observations made during the inspection.

2.0 PARTICIPANTS

Moran Beef, Incorporated (Moran Beef):
Frank Moran, Assistant Vice President (402)-681-3871 - cell
Kevin Moran, Facility Manager (712) 545-3512

U.S. Environmental Protection Agency (EPA):
Trevor Urban, Environmental Scientist (Lead Inspector) (913) 551-7133
Rickey Roberts, Environmental Scientist

3.0 INSPECTION PROCEDURES

Mr. Roberts and I arrived at the facility at approximately 10:40am on October 30, 2009, and spoke with Mr. Frank Moran and Mr. Kevin Moran. I asked Mr. Frank Moran if I could perform a visual inspection of the facility to determine if process waste water was discharging into the unnamed tributary located on the west side of the facility and he said yes. Mr. Frank Moran stated that he was busy trying to complete corn harvest and gave me permission to inspect the facility unescorted.

Mr. Roberts and I conducted a visual reconnaissance of the facility, searching for areas of concern observable from the county roads such as discharges, drainage patterns, flow directions, distance and direction of nearest perennial waters and visual condition of perennial waters. We also observed the area directly northwest of the total confinement building and discovered process waste water was discharging into the unnamed tributary at that location. **The facility is located approximately one mile southwest of Underwood, IA., on Magnolia Road. An unnamed tributary is located directly southwest of the facility (within 50 yards of the total confinement building) and flows southeast for approximately one mile before reaching Mosquito Creek. Mosquito Creek is located approximately ¾ of a mile east of the facility and flows southwest (parallel to I-80) for approximately twenty miles before reaching the Missouri River, south of Council Bluffs, IA. Both the unnamed tributary and Mosquito Creek were flowing at the time of the inspection and Mosquito Creek is identified as perennial water per the USGS topographic maps.**

I returned to the facility shop/office and informed Mr. Frank and Kevin Moran that I observed process waste water discharging into the unnamed tributary. I then explained that I would be collecting grab samples at the discharge point and asked if they wanted split samples. Mr. Frank Moran stated that he did not need split samples and requested a copy of the sampling results. I informed Mr. Frank and Kevin Moran that I would provide them a copy of the sampling results along with the CSI report.

I conducted this inspection in accordance with the procedures described herein and the following EPA Region VII Standard Operating Procedures (SOPs), unless otherwise noted:

SOP No.
2332.9A Bio-Security Procedures for Conducting NDPES Compliance Evaluations at Animal Feeding Operations
2332.8B Clean Water Act Concentrated Animal Feeding Operation Inspection Program
2332.2B NPDES Compliance Sampling Inspection
2333.1B Field Equipment Calibration and Maintenance
2334.3B Wastewater Sample Collection
2420.4B Field Chain of Custody for Environmental Samples
2420.5C Identification, Documentation, and Tracking of Samples
2420.6C Sample Container Selection, Preservation, and Holding Times

Mr. Roberts and I collected grab samples directly northwest of the total confinement building where the process waste water discharge was entering the unnamed tributary from a ten inch PVC pipe **(sample #102)** and directly below the discharge in the unnamed tributary **(sample #104)**. We also collected grab samples approximately ten feet upstream **(sample #101)** and downstream **(sample #103)** from the process waste water discharge point. I placed each sample directly into clean 1-quart containers. I measured each sample for pH and temperature using a field meter. I also used the appropriate preservative as required for the samples.

I completed my sampling inspection and spoke with Mr. Kevin Moran at his facility residence. Mr. Kevin Moran acknowledged receipt of the Confidentiality Notice, which he signed indicating no confidential business information had been provided during the inspection and a Receipt for Documents and Samples (see attachments 1 & 2). Four samples were taken during the inspection and no Notice of Potential Violation (NOPV) was issued to the facility at the time of the CSI. Seven photographs were taken during the inspection. See attachment 3 for the digital photograph chain of custody/photo log and photos #1 - #7. See attachment 4 for the facility layout, photo locations and direction taken. No Global Positioning System (GPS) reading was taken prior to leaving the facility.

4.0 FACILITY DESCRIPTION

The Moran Beef facility is located approximately one mile southwest of Underwood, IA., on Magnolia Road. The facility's physical address is 25794 Magnolia Road, Underwood, IA. 51576. The legal description for the facility is the SE¼ of Section 17, in Township 76N, Range 42W, in Pottawattamie County, Iowa, within the Mosquito Creek and Missouri River Basins.

Moran Beef has two Iowa Department of Natural Resources (IDNR) facility ID numbers. According to the IDNR file, facility ID #64583 is for the total confinement building operation and facility ID #64122 is for the open lot feeding operation. Moran Beef was inspected by the EPA on June 4, 2009, and determined to be a large CAFO. Moran Beef does not have an NPDES permit and must control all process waste water generated from both the open confinement feeder cattle operation and the total confinement building. Moran Beef was visited by the IDNR on March 5, 2009, and the recent changes in the IDNR's rules regarding combined animal feeding operations were discussed. Moran Beef was advised that they must either apply for a NPDES permit or maintain less than 1,000 animal units total capacity at the facility. Refer to the June 4, 2009, EPA compliance inspection report for more facility details

The open feedlot has been at this location since 1977, and Moran Beef purchased the facility in 1986. Construction of the total confinement building began in 2006, and was completed in 2007. The facility has four employees and their hours of operation are 7:00 am – 5:00 pm, Monday through Friday. The open lots consist of pens 1-10 and are located on the crest of a hill with pens 7-10 sloping east and pens 1-6 sloping west. Process waste water from the east and west pens are collected in one of three solids settling basins (SSBs), and then discharged into grassy waterways and/or into fields. The total confinement building is divided into four pens (1-4) and is located at the bottom of the hill, west of the open confinement lots. The total confinement building utilizes corn stocks for bedding pack and has a berm built around it to prevent storm water run on. A cattle alleyway which connects the open confinement lots and the total confinement building runs down the hill between pens 1 & 2 parallel to Magnolia Road and is not included in a controlled area.

Pens 1 & 2 are utilized as working and sick pens and process waste water from these pens is collected into the southwest SSB located directly below pens 2 & 3. The process waste water is then connected to an underground tile drain that discharges approximately 100 yards south of the southwest SSB tile inlet, near the cattle alleyway, at the bottom of the hill. The process waste water from the tile drain discharge point flows northwest and then west around the north side of the total confinement building to a ten inch white PVC pipe and into the unnamed tributary. Process waste water from pens 3 – 6 is collected into the northwest SSB located directly below pens 4 – 6. The tile drain inlet is located at the northwest end of the SSB. The tile drain inlet is connected to an underground tile drain that discharges approximately 375 yards northwest from the tile drain inlet north of the total confinement building. The process waste water from the northwest SSB discharge point flows south through a grassy waterway for approximately 400 yards to the ten inch white PVC pipe located northwest of the total confinement building and into the unnamed tributary. The unnamed tributary flows southeast for approximately one mile before reaching Mosquito Creek.

5.0 FINDINGS AND OBSERVATIONS

The Water Enforcement Branch (WENF) of the Water, Wetlands & Pesticides Division (WWPD) requested a CAFO sampling inspection to determine if Moran Beef is in compliance with the CWA and if the livestock waste control facilities (LWCFs) were capturing all process waste water and not discharging to a water of the United States.

On the morning of October 30, 2009, Mr. Roberts and I observed process waste water discharging into the unnamed tributary at a location directly northwest of the total confinement building from a ten inch PVC pipe (see photos #1 - #6 and attachment 4). The facility received approximately 0.47 of an inch of rain on October 29, 2009 and approximately 0.33 of an inch of rain on October 30, 2009. The weather conditions at the time of the inspection were windy, cloudy and cold (50°F), with intermittent light rain.

As stated above the open lots consist of pens 1-10 and are located on the crest of a hill with pens 7-10 sloping east and pens 1-6 sloping west. The east SSB grassy waterway was not inspected during the CSI. Process waste water from pens 3 – 6 is collected into the northwest SSB located directly below pens 4 – 6. The tile drain inlet is located at the northwest end of the SSB. The tile drain inlet is connected to an underground tile drain that discharges approximately 375 yards northwest from the tile drain inlet north of the total confinement building. The process waste water from the northwest SSB discharge point flows south through a grassy waterway for approximately 400 yards to a ten inch PVC pipe located northwest of the total confinement building and into the unnamed tributary. During the inspection, I visually observed the grassy waterway and did not observe a discharge from the northwest SSB. However, the process waste water from pens 1 & 2 is collected into the southwest SSB located directly below pens 2 & 3. The process waste water is then connected to an underground tile drain that discharges approximately 100 yards south of the southwest SSB tile inlet, near the cattle alleyway, at the bottom of the hill. **During the inspection, I observed process waste water flowing from the southwest SSB tile drain discharge point. Process waste water continued to flow northwest and then west around the north side of the total confinement building to the ten inch white PVC pipe and into the unnamed tributary (see photos #1 - #6).** Mr. Roberts and I collected grab samples directly northwest of the total confinement building where the process waste water discharge was entering the unnamed tributary from the ten inch PVC pipe **(sample #102)** and directly below the discharge in the unnamed tributary **(sample #104)**. We also collected grab samples approximately ten feet upstream **(sample #101)** and downstream **(sample #103)** from the process waste water discharge point. I placed each sample directly into clean 1-quart containers. I measured each sample for pH and temperature using a field meter which was pre and post calibrated in the field. I also used the appropriate preservative as required for the samples. A site safety plan was prepared and is included as attachment 5. **Table 1** represents the analytical data from the samples collected on October 30, 2009. See attachment 6 for the chain of custody form and field sheets and attachment 7 for the data transmittal for project ID# TUMBINCAFO.

Table 1: Analytical Results for Samples Collected During Inspection.

Parameter[1]	Sample #101	Sample #102	Sample #103	Sample #104
Ammonia –N	0.23	59.4	0.15	2.34
Total Kjeldahl Nitrogen (TKN)	0.487	171	2.06	4.86
Total Phosphorus (Total P)	0.100 U[2]	52.7	0.609	1.37
Nonfilterable Solids (NFS)[3]	5.25	510	105	69.6
Nitrate+Nitrite	9.40	0.549	8.71	8.80
pH	7.36	7.62	7.61	7.59
Temperature	11.1	9.9	11.4	11.4

[1]Parameters are reported in milligrams per liter (mg/L), pH measured in standard units, temperature measured in degrees Celsius.
[2]The analyte was not detected at or above the reporting limit.
[3]The pH and temperature for the NFS samples are noted on the field sheets.

6.0 SUMMARY

Moran Beef was determined to be a large CAFO at the time of the inspection and therefore must control all process waste water generated from the entire facility including the east and west open confinement feedlot operation. On the morning of October 30, 2009, Mr. Roberts and I observed process waste water discharging into the unnamed tributary at a location directly northwest of the total confinement building from a ten inch PVC pipe. Mr. Roberts and I collected grab samples where the process waste water discharge was entering the unnamed tributary from the ten inch PVC pipe **(sample #102)** and directly below the discharge in the unnamed tributary **(sample #104)**. We also collected grab samples approximately ten feet upstream **(sample #101)** and downstream **(sample #103)** from the process waste water discharge point. **Table 1** represents the analytical data from the samples collected on October 30, 2009. See attachment 6 for the chain of custody form and field sheets and attachment 7 for the data transmittal for project ID# TUMBINCAFO. The analytical sample results indicate that pollutants from the process waste water discharge had entered the unnamed tributary.

Trevor L. Urban
Environmental Scientist
Date: 01/22/2010

ATTACHMENTS:

1 Confidentiality Notice (1 page)
2 Receipt for Documents and Samples (1 page)
3 Digital Photograph Image Chain of Custody/Photo Log and Photos #1 - #7 (9 pages)
4 Facility Satellite Photo/Maps (2 pages)
5 Site Safety Check Off List (2 pages)
6 Chain of Custody Form and Field Sheets (5 pages)
7 Data Transmittal for project ID# TUMBINCAFO (6 pages)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RECEIPT FOR DOCUMENTS AND SAMPLES

Facility Name
Moran Beef, Inc

Facility Address
~~25845~~ 25794 Magnolia Underwood, Iowa 51576

Documents Collected? YES___ (list below) NO X

Samples Collected? YES X (list below) NO___ Split Samples: YES___ NO X

Documents/Samples were: 1)Received no charge X 2)Borrowed___ 3)Purchased___

Amount Paid: $ -0- Method: Cash___ Voucher___ To Be Billed___

The documents and samples described below were collected in connection with the administration and enforcement of the applicable statute under which the information is obtained.

Receipt for the document(s) and/or sample(s) described below is hereby acknowledged:

Samples → 101, 102, 103 + 104 - 2 cubitainers each
= 8 cubitainers (1 quart each)

Facility Representative (print)	Signature/Date	
Kevin Moran	Kevin Moran	10/30/09
Inspector (print)	**Signature/Date**	
Trevor Urban	[signature]	10/30/09

U.S. EPA, Region VII, 901 N. 5th Street, Kansas City, KS 66101

(rev: 1/20/93)

ATTACHMENT 1 Page 1 of 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CONFIDENTIALITY NOTICE

Facility Name	
Moran Beef, Inc.	
Facility Address	
25794 Magnolia Underwood IA 51576	
Inspector (print)	
Trevor Urban	
U.S. EPA, Region VII, 901 N. 5th St., Kansas City, KS 66101	Date 10/30/09

The United States Environmental Protection Agency (EPA) is obligated, under the Freedom of Information Act, to release information collected during inspections to persons who submit requests for that information. The Freedom of Information Act does, however, have provisions that allow EPA to withhold certain confidential business information from public disclosure. To claim protection for information gathered during this inspection you must request that the information be held CONFIDENTIAL and substantiate your claim in writing by demonstrating that the information meets the requirements in 40 CFR 2, Subpart B. The following criteria in Subpart B must be met:

1. Your company has taken measures to protect the confidentiality of the information, and it intends to continue to take such measures.
2. No statute specifically requires disclosure of the information.
3. Disclosure of the information would cause substantial harm to your company's competitive position.

Information that you claim confidential will be held as such pending a determination of applicability by EPA.

I have received this Notice and DO NOT want to make a claim of confidentiality at this time.	
Facility Representative Provided Notice (print)	Signature/Date
Kevin Moran	Kevin Moran 10-30-09

I have received this Notice and DO want to make a claim of confidentiality.	
Facility Representative Provided Notice (print)	Signature/Date

Information for which confidential treatment is requested:

(Rev: 11/15/99)

ATTACHMENT 2 Page 1 of 1

PHOTO LOG

Facility Name / City: Moran Beef, Inc.
Underwood, Iowa 51576
Facility ID#: 64583, 64122
EPA ID#: N/A
Date: October 30, 2009
Photographer: Trevor Urban
Type of Camera: Canon Power Shot G5, Serial #: 6924106032
Digital Recording Media: Flashcard
All digital photos were copied by: Trevor Urban on November 5, 2009
All digital photos were copied to: CD-R
Original copy is stored in: CD-R. Digital photos were downloaded to CD-R all by Trevor Urban. No changes were made in the original image files prior to storage on the CD-R.

Report Photo #	Photographer	Date	Approx. Time	Flashcard Name (IMG_xxxx.jpg) CD-ROM Name (xxx.jpg)	Description
1	Trevor Urban	10/30/09	12:29 PM	6589 001	Photo of the process waste water discharge point into the unnamed tributary from the west end of the white 10 inch PVC pipe located directly northwest of the total confinement building. Also shown are the sampling locations of samples #101, #102 and #104. Photo taken facing north.
	Trevor Urban	10/30/09	12:29 PM	6590 002	Same as photo #1. Photo of the process waste water discharge point into the unnamed tributary from the west end of the white 10 inch PVC pipe located directly northwest of the total confinement building. Also shown is the sampling location of sample #103. Photo taken facing north.
3	Trevor Urban	10/30/09	12:30 PM	6591 003	Close-up of photo #1. Photo of the process waste water discharge point into the unnamed tributary from the west end of the white 10 inch PVC pipe located directly northwest of the total confinement building. Also shown are the sampling locations of samples #102 and #104. Photo taken facing north.
4	Trevor Urban	10/30/09	12:31 PM	6592 004	Photo of the east end of the white 10 inch PVC pipe with process waste water flowing into it located directly northwest of the total confinement building. Photo taken facing east.
5	Trevor Urban	10/30/09	12:31 PM	6593 005	Expanded view of photo #4. Photo of the flow pathway of the process waste water from the open feedlot confinement pens shown in the back ground, through the corn field before it enters the east end of the white 10 inch PVC pipe. Photo taken facing east.
6	Trevor Urban	10/30/09	12:31 PM	6594 006	Same as photo #5. Close-up photo of the flow pathway and process waste water from the open feedlot confinement pens shown in the back ground, through the corn field before it enters the east end of the white 10 inch PVC pipe. Photo taken facing east.
7	Trevor Urban	10/30/09	12:34 PM	6595 007	Photo of samples #101 - #104 taken from the west end of the white 10 inch PVC pipe process waste water discharge and from the unnamed tributary during the CSI. Also shown on the back of the vehicle is the field measurement equipment for pH and temperature. Photo taken from the northwest corner of the total confinement building facing northeast.

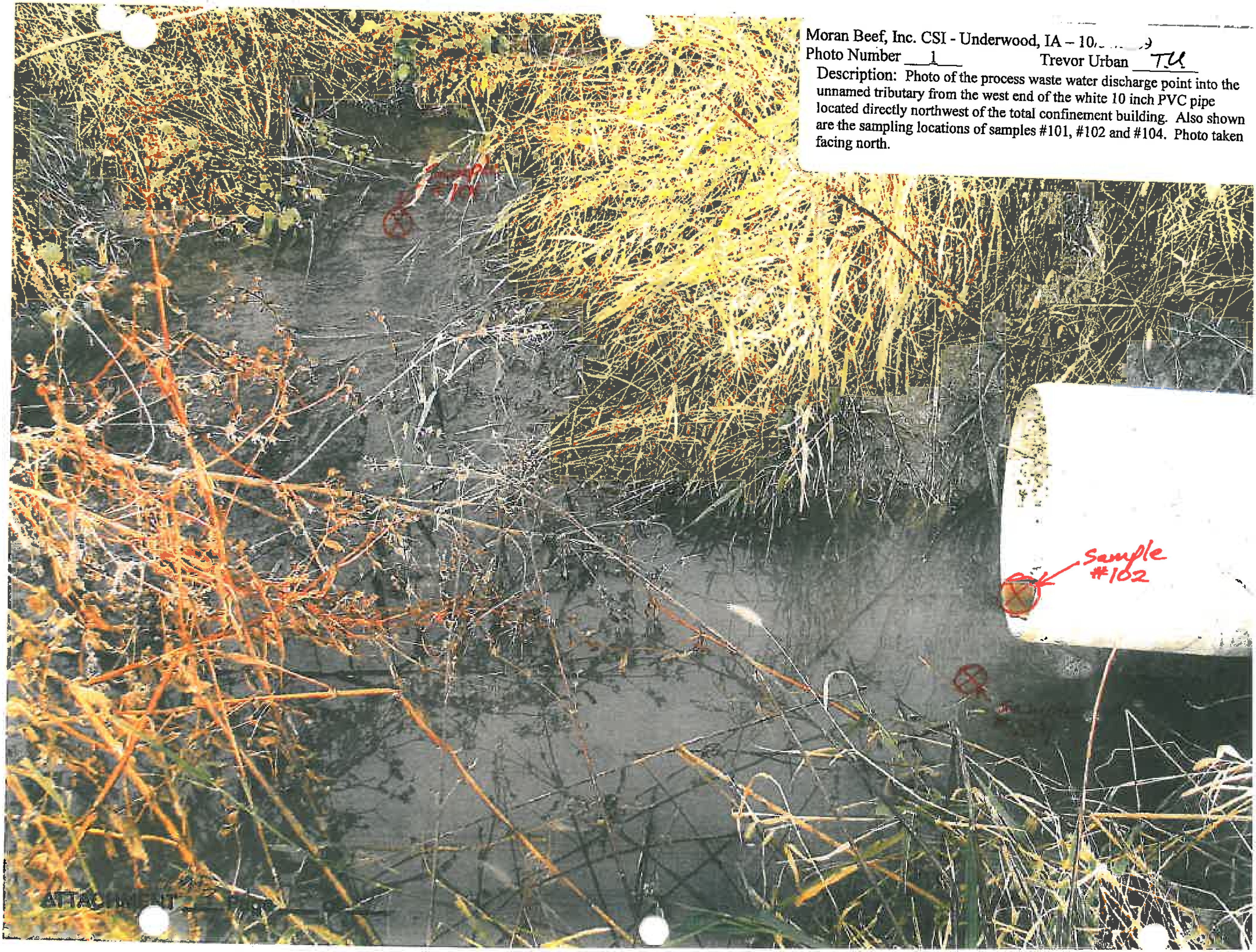
Moran Beef, Inc.
Located in Underwood, IA

Photos taken by Trevor Urban
on October 30, 2009

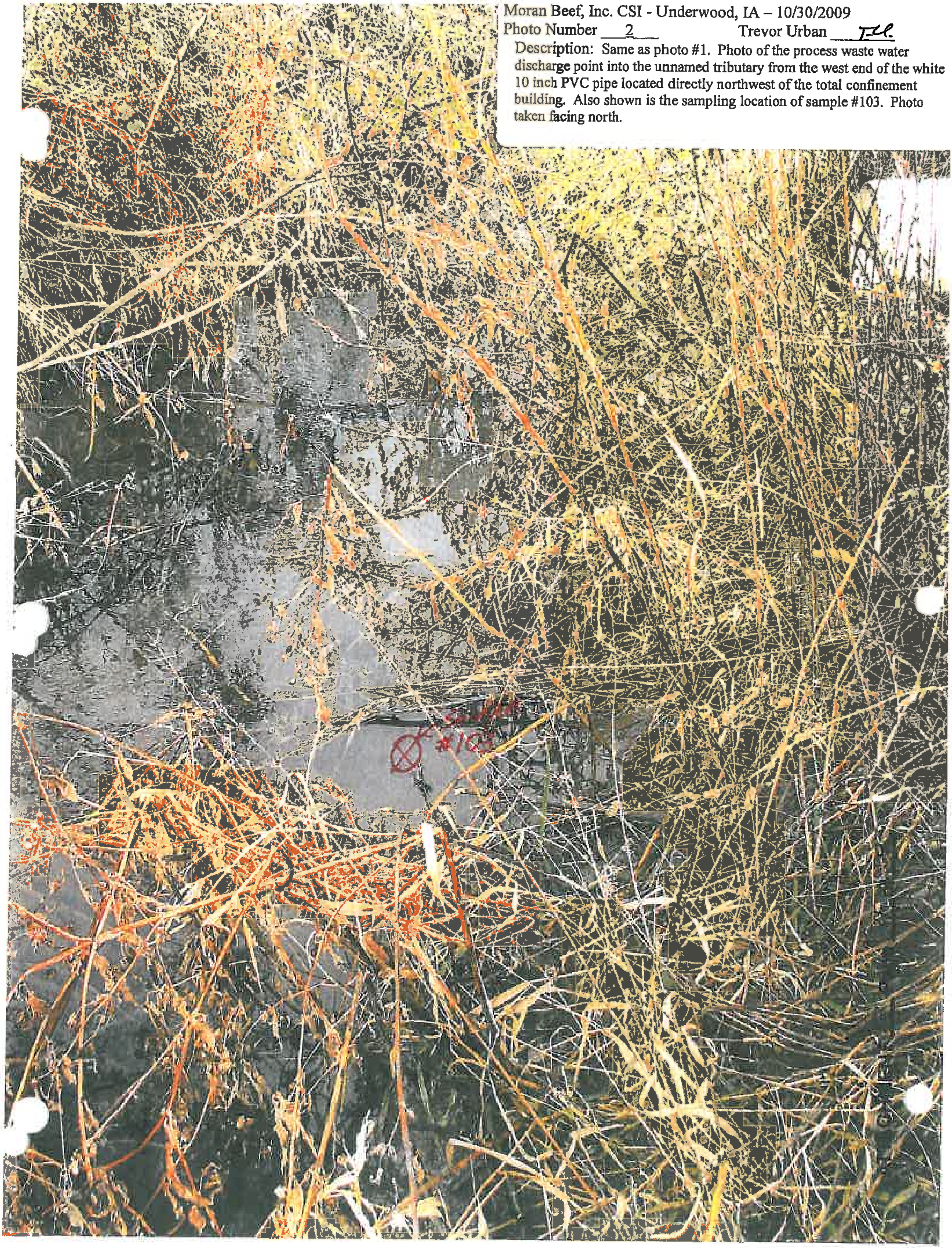
Moran Beef, Inc. CSI - Underwood, IA – 10/…

Photo Number 1 Trevor Urban TU

Description: Photo of the process waste water discharge point into the unnamed tributary from the west end of the white 10 inch PVC pipe located directly northwest of the total confinement building. Also shown are the sampling locations of samples #101, #102 and #104. Photo taken facing north.



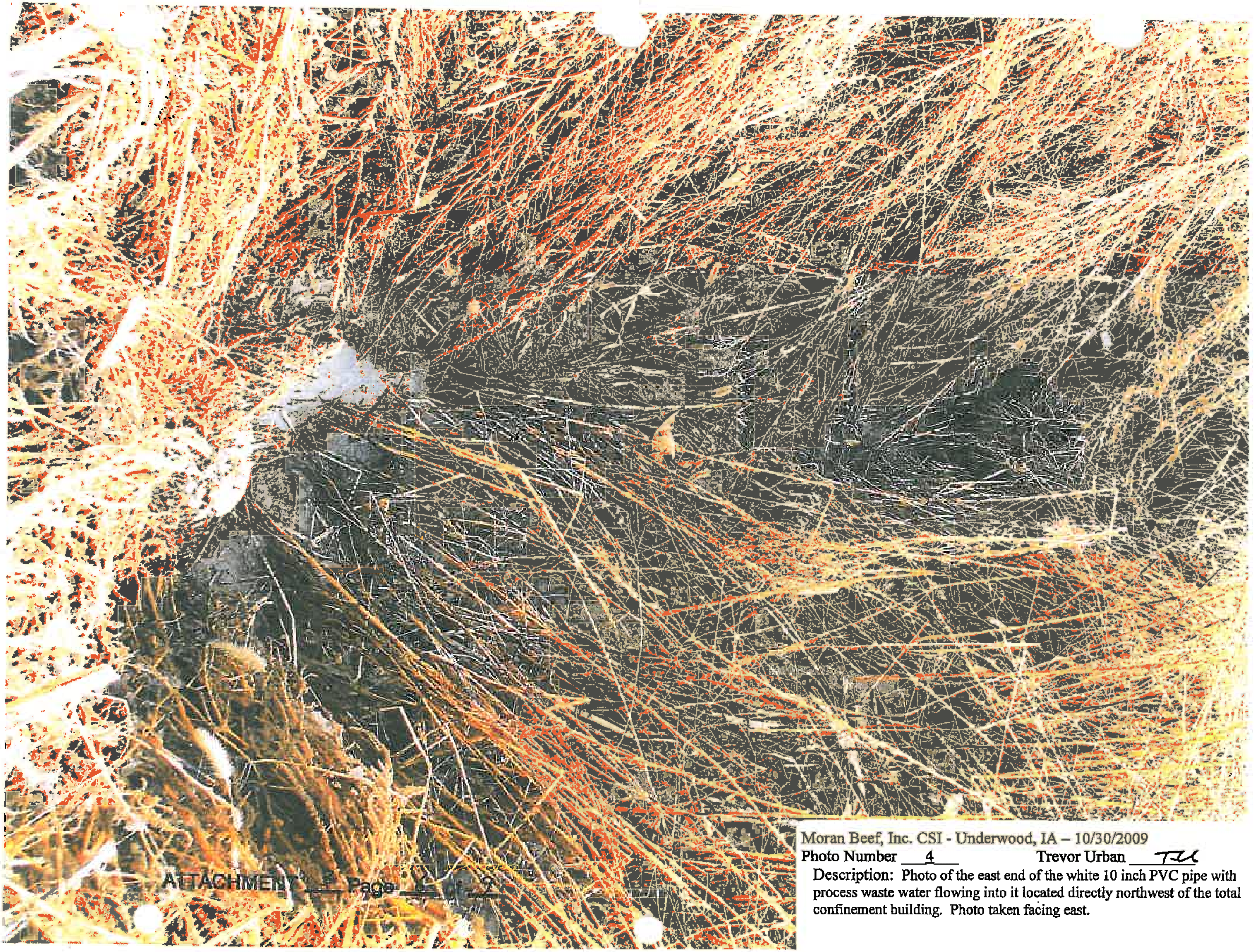
Moran Beef, Inc. CSI - Underwood, IA – 10/30/2009
Photo Number 2 Trevor Urban
Description: Same as photo #1. Photo of the process waste water discharge point into the unnamed tributary from the west end of the white 10 inch PVC pipe located directly northwest of the total confinement building. Also shown is the sampling location of sample #103. Photo taken facing north.



Moran Beef, Inc. CSI - Underwood, IA – 10.

Photo Number 3 Trevor Urban TU

Description: Close-up of photo #1. Photo of the process waste water discharge point into the unnamed tributary from the west end of the white 10 inch PVC pipe located directly northwest of the total confinement building. Also shown are the sampling locations of samples #102 and #104. Photo taken facing north.



ATTACHMENT 5 Page 2 of 2

Moran Beef, Inc. CSI - Underwood, IA – 10/30/2009
Photo Number 4 Trevor Urban TU
Description: Photo of the east end of the white 10 inch PVC pipe with process waste water flowing into it located directly northwest of the total confinement building. Photo taken facing east.

Moran Beef, Inc. CSI - Underwood, IA – 10/30/2009
Photo Number 5 Trevor Urban TU
Description: Expanded view of photo #4. Photo of the flow pathway of the process waste water from the open feedlot confinement pens shown in the back ground, through the corn field before it enters the east end of the white 10 inch PVC pipe. Photo taken facing east.

Moran Beef, L   3I - Underwood, IA – 10/30/2009
Photo Number 6   Trevor Urban T.U.
Description: Same as photo #5. Close-up photo of the flow pathway and process waste water from the open feedlot confinement pens shown in the back ground, through the corn field before it enters the east end of the white 10 inch PVC pipe. Photo taken facing east.

Moran Beef, Inc. CSI - Underwood, IA – 10/30/2009
Photo Number 7 Trevor Urban TU
Description: Photo of samples #101 - #104 taken from the west end of the white 10 inch PVC pipe process waste water discharge and from the unnamed tributary during the CSI. Also shown on the back of the vehicl is the field measurement equipment for pH and temper re. Photo taken from the northwest corner of the total confinement bu g facing northeast

ATTACHMENT 3 Page 7 of 7

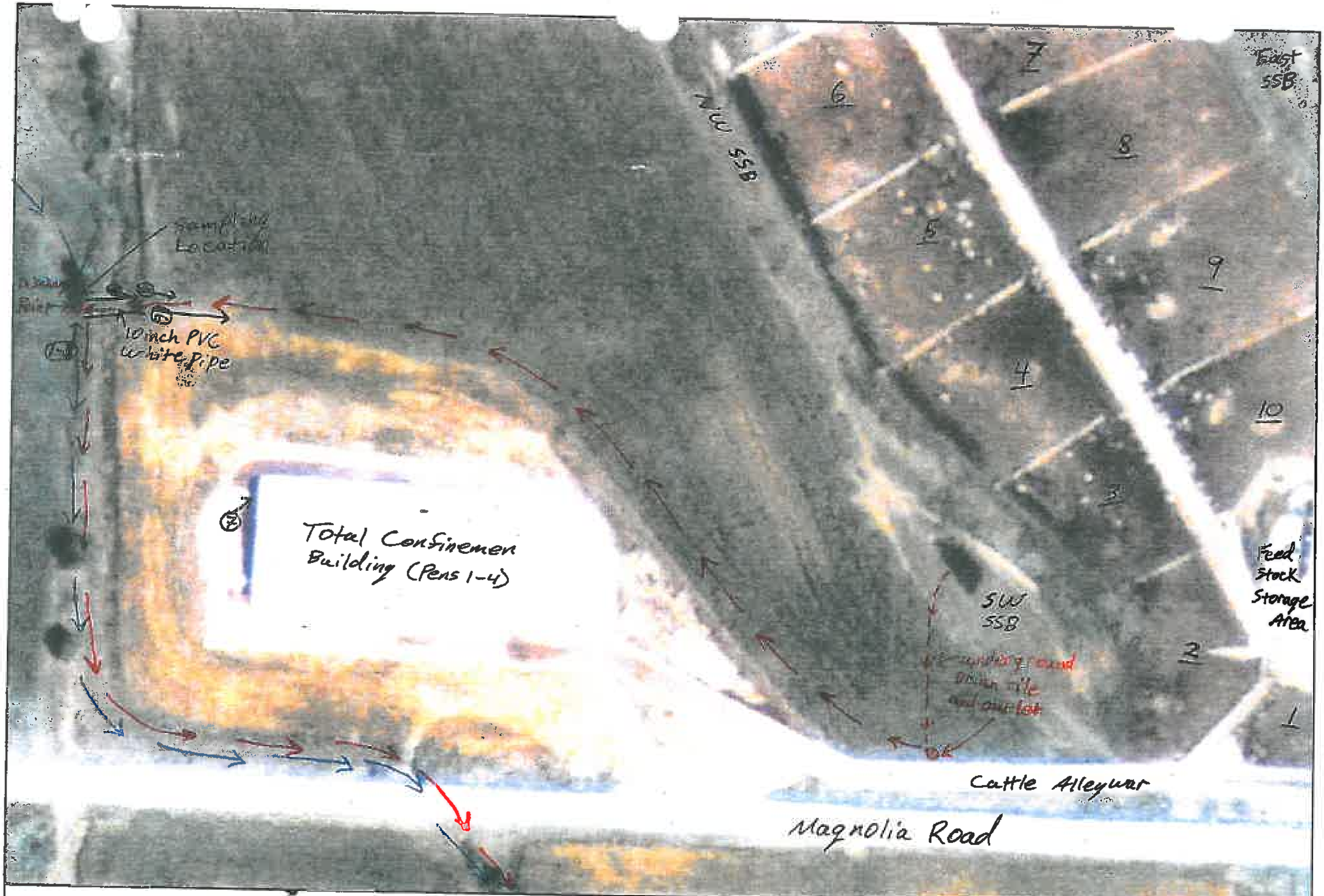
Moran Beef
Underwood, Iowa

♂ = Photo # + Direction Taken
→ → → = Process waste water Discharge + Flow Pathway
→ → → = Unnamed Tributary + Flow Pathway

0 15 30 60 Yards

N

ATTACHMENT 4 Page 1 of 2



Moran Beef
Underwood, Iowa

= Photo # + Direction Taken

= Pen

→ → → = Process waste water Discharge + Flow Pathway

→ → → = unnamed Tributary + Flow Pathway

0 25 50 100 Yards

N

ATTACHMENT 4 Page 2 of 2

Site Safety Check Off List

Before Sampling Activity

1. Activity Number TUMBINCAFO 2. Name(s) of EPA Personnel Trevor Urban + Rickey Roberts
3. Facility Name Moran Beef, Inc. City Underwood State Iowa
   Address 25794 Magnolia Road
   Underwood, Iowa 51576
4. Activity Description: ☒ Facility Inspection ☐ Site Evaluation

   Sampling -- ☐ Air ☒ Water ☐ Drum ☐ Soil ☐ Waste Piles ☐ Residential ☐ Other
5. Site Topography: ☐ Mountains ☒ Rivers ☒ Valley ☒ Hill ☐ Level

   ☒ Rural ☐ Urban ☐ Suburban
6. Incident Safety Plan: ☐ Region ☐ ERT ☐ Facility ☒ Not Developed

   ☐ Reviewed ☐ Briefed

   Note if the plan is reviewed/briefed on site: Yes - General Safety

   Site Accessibility: ☐ Good ☒ Poor ☐ Fair

7. Suspected Chemical(s) and pathway with source(s) involved
   (A) Preservative acid
   (B) E-Coli / Pathogens
   (C)
   (D)

8. Emergency Numbers, Locations and Estimated Time for Response to Arrive
   A. Fire 911
   B. Police 911
   C. Ambulance 911

9. Is a communication device to summon emergency response readily available at the site?

   ☒ Yes ☐ No

10. Is an eye wash available? ☒ Yes ☐ No
    (Note that one should be carried with the inspector)

11. Is ~~the~~ the estimated time for the arrival of emergency response under 20 minutes?

    ☒ Yes ☐ No

12. If any or all of the responses to 9, 10, or 11 above are **No**, sampling ***will not*** occur under this QAPP.

13. Is Emergency Response Present on Site for First Aid? ☒ Yes ☐ No

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Trevor Urban	Moran Beef, Inc.	30 / 10 / 2009	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	1 Liter CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	TYPE OF CONTAINERS — NUMBERS OF CONTAINERS PER SAMPLE NUMBER					SAMPLED MEDIA					
4705-101	2					✓					Clear water
4705-102	2					✓					Dark Brown / Yellow
4705-103	2					✓					Opquae / Cloudy
4705-104	2					✓					Light Yellowish / Brown

Complete

PM delivered
Sealed clr to BD
rck @ 4°C
10/30/09

DESCRIPTION OF SHIPMENT.	MODE OF SHIPMENT
8 PIECE(S) CONSISTING OF ____ BOX(ES)	____ COMMERCIAL CARRIER: ____
1 ICE CHEST(S); OTHER ____	____ COURIER
	X SAMPLER CONVEYED ____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD 10/30/09

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Trevor Urban — ☒ SEALED ☐ UNSEALED	10/30/09	5:05pm	Nicole Cole 1730pm — ☐ SEALED ☐ UNSEALED	Analysis
RELINQUISHED BY — ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY — ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY — ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY — ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

ATTACHMENT 6 Page 1 of 5

7-EPA-9262(Revised 5/85)

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 4705 **Sample Number:** ~~2~~ 101 **QC Code:** __ **Matrix:** Water **Tag ID:** 4705-~~2~~-101

Project ID: TUMBINCAFO **Project Manager:** Trevor Urban
Project Desc: Moran Beef, Inc. - CAFO sampling
City: Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: Stream Sample 2 10 ft upstream/north of Discharge outfall/ directly NW of Confinement Build

Storet ID: ______ **External Sample Number:** ______

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 10/30/09 12:15
Longitude: ___ ___ ___ **End:** 10/30/09 12:18

Field Measurement

Parameter	NFS Value		Units
Temperature :	11.32	11.1c	Deg C
pH :	7.54	7.36	SU

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	2 mL H2SO4/L	28	Days	1 Nitrogen, Nitrate+Nitrite in Water
1 - 1 Liter Cubitainer	4 Deg C	7	Days	1 NFS or Nonfilterable Solids
1 - 1 Liter Cubitainer	5 mL H2SO4/L	28	Days	1 Ammonia in Water by Automated Distillation
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Phosphorus in Water, Colorimetric

Sample Comments:
(N/A)

→ 1 cubitainer
→ 1 Cubitainer } Clear Water

Sample Collected By: TU

ATTACHMENT 6 Page 2 of 5

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 4705 **Sample Number:** ~~1~~ 102 **QC Code:** __ **Matrix:** Water **Tag ID:** 4705-~~1~~ 102

Project ID: TUMBINCAFO **Project Manager:** Trevor Urban
Project Desc: Moran Beef, Inc. - CAFO sampling
City: Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: Discharge from Outfall Pipe on west side of Facility ... of confinement building
Storet ID: ________ **External Sample Number:** ________

Expected Conc: (or Circle One: Low Medium High)

		Date	Time(24 hr)
Latitude: __ __ __	**Sample Collection: Start:**	10/30/09	12:20
Longitude: __ __ __	**End:**	10/30/09	12:24

Field Measurement

Parameter	Value (NFS)		Units
Temperature :	9.8°C	9.9°C	Deg C
pH :	7.65	7.62	SU

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 1 Liter Cubitainer	2 mL H2SO4/L	28 Days	1 Nitrogen, Nitrate+Nitrite in Water
1 - 1 Liter Cubitainer	4 Deg C	7 Days	1 NFS or Nonfilterable Solids
1 - 1 Liter Cubitainer	5 mL H2SO4/L	28 Days	1 Ammonia in Water by Automated Distillation
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28 Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28 Days	1 Total Phosphorus in Water, Colorimetric

Sample Comments:
(N/A)

→ 1 cubitainer → Dark Brown

→ 1 cubitainer → Dark Brown/Yellow

Sample Collected By: TU

ATTACHMENT 6 Page 3 of 5

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 4705 **Sample Number:** ~~2~~ 103 **QC Code:** __ **Matrix:** Water **Tag ID:** 4705-~~2~~-103

Project ID: TUMBINCAFO **Project Manager:** Trevor Urban
Project Desc: Moran Beef, Inc. - CAFO sampling
City: Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: Stream Sample ≈ 10ft ~~below~~ downstream/Southof Discharge Directly ... of Confinement Building

Storet ID: ______ **External Sample Number:** ______

Expected Conc: (or Circle One: Low Medium High)

		Date	Time(24 hr)
Latitude: ___ ___ ___	**Sample Collection: Start:**	10/30/09	12:18
Longitude: ___ ___ ___	**End:**	10/30/09	12:20

Field Measurement

Parameter	Value	NFS	Units
Temperature :	11.32	11.42	Deg C
pH :	7.63	7.61	SU

Laboratory Analyses:

Container	Preservative	Holding Time	Analysis
1 - 1 Liter Cubitainer	2 mL H2SO4/L	28 Days	1 Nitrogen, Nitrate+Nitrite in Water
1 - 1 Liter Cubitainer	4 Deg C	7 Days	1 NFS or Nonfilterable Solids
1 - 1 Liter Cubitainer	5 mL H2SO4/L	28 Days	1 Ammonia in Water by Automated Distillation
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28 Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28 Days	1 Total Phosphorus in Water, Colorimetric

Sample Comments:

(N/A)

1 Cubitainer -
1 Cubitainer - → Opaque/Cloudy

Sample Collected By: TU

ATTACHMENT 6 Page 4 of 5

Sample Collection Field Sheet
US EPA Region 7
Kansas City, KS

ASR Number: 4705 **Sample Number:** ~~4~~ 104 **QC Code:** ___ **Matrix:** Water **Tag ID:** 4705-~~4~~ 104

Project ID: TUMBINCAFO **Project Manager:** Trevor Urban
Project Desc: Moran Beef, Inc. - CAFO sampling
City: Underwood **State:** Iowa
Program: Water Enforcement

Location Desc: Stream Sample directly below discharge pipe NW of Confinement Building

Storet ID: ______ **External Sample Number:** ______

Expected Conc: (or Circle One: Low Medium High) **Date** **Time(24 hr)**

Latitude: ___ ___ ___ **Sample Collection: Start:** 10/30/09 12:26
Longitude: ___ ___ ___ **End:** 10/30/09 12:30

Field Measurement

Parameter	NFS	Value	Units
Temperature :	11.4°C	11.4°C	Deg C
pH :	7.59	7.59	SU

Laboratory Analyses:

Container	Preservative	Holding Time		Analysis
1 - 1 Liter Cubitainer	2 mL H2SO4/L	28	Days	1 Nitrogen, Nitrate+Nitrite in Water
1 - 1 Liter Cubitainer	4 Deg C	7	Days	1 NFS or Nonfilterable Solids
1 - 1 Liter Cubitainer	5 mL H2SO4/L	28	Days	1 Ammonia in Water by Automated Distillation
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Kjeldahl Nitrogen in Water Colorimetric
1 - 1 Liter Cubitainer	5mL H2SO4 to pH<2.5, 4 Deg C	28	Days	1 Total Phosphorus in Water, Colorimetric

Sample Comments:
(N/A)

1 cubitainer
1 cubitainer } Light Yellowish Brown

Sample Collected By: TU

ATTACHMENT 6 Page 5 of 5

United States Environmental Protection Agency
Region 7
901 N. 5th Street
Kansas City, KS 66101

Date: DEC 0 1 2009

Subject: Transmittal of Sample Analysis Results for ASR #: 4705
Project ID: TUMBINCAFO
Project Description: Moran Beef, Inc. - CAFO sampling

From: Michael F. Davis, Chief
Chemical Analysis and Response Branch, Environmental Services Division
12/2/09

To: Trevor Urban
ENSV/ARCM

Enclosed are the analytical data for the above-referenced Analytical Services Request (ASR) and Project. The Regional Laboratory has reviewed and verified the results in accordance with procedures described in our Quality Manual (QM). In addition to all of the analytical results, this transmittal contains pertinent information that may have influenced the reported results and documents any deviations from the established requirements of the QM.

Please contact us within 14 days of receipt of this package if you determine there is a need for any changes. Please complete the enclosed Customer Satisfaction Survey and Data Disposition/Sample Release memo for this ASR as soon as possible. The process of disposing of the samples for this ASR will be initiated 30 days from the date of this transmittal unless an alternate release date is specified on the Data Disposition/Sample Release memo.

If you have any questions or concerns relating to this data package, contact our customer service line at 913-551-5295.

Enclosures

cc: Analytical Data File.

Project Manager: Trevor Urban **Org:** ENSV/ARCM **Phone:** 913-551-7133
Project ID: TUMBINCAFO
Project Desc: Moran Beef, Inc. - CAFO sampling
Location: Underwood **State:** Iowa **Program:** Water Enforcement
Purpose: Enforcement **GPRA PRC:** 501E50C

Explanation of Codes, Units and Qualifiers used on this report

Sample QC Codes: QC Codes identify the type of sample for quality control purpose.

__ = Field Sample

Units: Specific units in which results are reported.

Deg C = Degrees Celsius
SU = Standard Units (pH)
mg/L = Milligrams per Liter

Data Qualifiers: Specific codes used in conjunction with data values to provide additional information on the quality of reported results, or used to explain the absence of a specific value.

(Blank)= Values have been reviewed and found acceptable for use.
U = The analyte was not detected at or above the reporting limit.

ASR Number: 4705 **Sample Information Summary** 12/01/2009

Project ID: TUMBINCAFO **Project Desc:** Moran Beef, Inc. - CAFO sampling

Sample No	QC Code	Matrix	Location Description	External Sample No	Start Date	Start Time	End Date	End Time	Receipt Date
101 - __		Water	Steam sample = 10' upstream/North of discharge outfall directly NW of confinement bldg.		10/30/2009	12:15	10/30/2009	12:18	10/30/2009
102 - __		Water	Discharge from Outfall pipe on West side of facility NW of confinement bldg.		10/30/2009	12:20	10/30/2009	12:24	10/30/2009
103 - __		Water	Stream sample = 10' downstream/South of discharge directly NW of confinement bldg.		10/30/2009	12:18	10/30/2009	12:20	10/30/2009
104 - __		Water	Stream sample directly below discharge pipe NW of confinement bldg.		10/30/2009	12:26	10/30/2009	12:30	10/30/2009

Analysis **Comments About Results For This Analysis**

1 Ammonia in Water by Automated Distillation

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3133.1G

Samples: 101-__ 102-__ 103-__ 104-__

Comments:

1 NFS or Nonfilterable Solids

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3142.3E

Samples: 101-__ 102-__ 103-__ 104-__

Comments:

1 Nitrogen, Nitrate+Nitrite in Water

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3133.2H for acidified samples (for total NO3+NO2 analysis).

Samples: 101-__ 102-__ 103-__ 104-__

Comments:

1 pH of Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter

Samples: 101-__ 102-__ 103-__ 104-__

Comments:
(N/A)

1 Temperature of Water by Field Measurement

Lab: (Field Measurement)

Method: Measurement of field parameter

Samples: 101-__ 102-__ 103-__ 104-__

Comments:
(N/A)

Total Kjeldahl Nitrogen in Water Colorimetric

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Analysis	Comments About Results For This Analysis

Method: EPA Region 7 RLAB Method 3133.3F

Samples: 101-__ 102-__ 103-__ 104-__

Comments:
(N/A)

1 Total Phosphorus in Water, Colorimetric

Lab: Region 7 EPA Laboratory - Kansas City, Ks.

Method: EPA Region 7 RLAB Method 3133.4E

Samples: 101-__ 102-__ 103-__ 104-__

Comments:
(N/A)

Analysis/ Analyte	**Units**	**101-__**	**102-__**	**103-__**	**104-__**
1 Ammonia in Water by Automated Distillation					
Ammonia as Nitrogen	mg/L	0.23	59.4	0.15	2.34
1 NFS or Nonfilterable Solids					
Solids, nonfilterable	mg/L	5.25	510	105	69.6
1 Nitrogen, Nitrate+Nitrite in Water					
Nitrate + Nitrite as Nitrogen	mg/L	9.40	0.549	8.71	8.80
1 pH of Water by Field Measurement					
pH	SU	7.36	7.62	7.61	7.59
1 Temperature of Water by Field Measurement					
Temperature	Deg C	11.1	9.9	11.4	11.4
1 Total Kjeldahl Nitrogen in Water Colorimetric					
Total Kjeldahl Nitrogen	mg/L	0.487	171	2.06	4.86
1 Total Phosphorus in Water, Colorimetric					
Phosphorus	mg/L	0.100 U	52.7	0.609	1.37

REPORT OF CONCENTRATED ANIMAL FEEDING OPERATION INSPECTION

At

Moran Beef, Incorporated
25794 Magnolia Road
Underwood, Iowa 51576
(712) 545-3512

ON
May 13, 2010

BY

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region VII
Environmental Services Division

1.0 INTRODUCTION

At the request of the Water, Wetlands and Pesticides Division, Water Enforcement Branch, a follow-up inspection to Concentrated Animal Feeding Operation (CAFO) inspections performed on June 4, 2009, and October 30, 2009 was conducted at Moran Beef, Incorporated on May 13, 2010. This follow-up inspection was performed pursuant to Section 308(a) of the Federal Water Pollution Control Act, as amended. This narrative report and attachments present the findings and observations made during the follow-up inspection.

2.0 PARTICIPANTS

Moran Beef, Incorporated (Moran Beef):
Frank Moran, Assistant Vice President (402)-681-3871 - cell
Kevin Moran, Facility Manager (712) 545-3512

Turner's Ag Consulting Company: (TAC):
Joe Turner, Consultant/Owner (712) 310-0633

U.S. Environmental Protection Agency (EPA):
Joe Heafner, Life Scientist (913) 551-7091
Rick Roberts, Environmental Scientist

3.0 INSPECTION PROCEDURES

I met with Mr. Kevin Moran at the facility on the morning of May 13, 2010, I presented my credentials and I informed Mr. Kevin Moran that I would be performing a follow-up inspection to previous CAFO inspections that were conducted on April 4, 2009, and October 30, 2009, at the Underwood, Iowa, facility. Mr. Kevin Moran stated he would inform his brother, Mr. Frank Moran of the inspection. Mr. Frank Moran and Mr. Joe Turner showed up at the facility shortly after being contacted by Mr. Kevin Moran. I explained to Mr. Frank Moran that I would be following up on the previous CAFO inspections, which would consist of a visual inspection of the western half of the facility to determine if the facility was capturing all process wastewater.

4.0 FACILITY DESCRIPTION

4.1 Facility Operations

The Moran Beef facility is located approximately one mile southwest of Underwood, IA., on Magnolia Road. The facility's physical address is 25794 Magnolia Road, Underwood, IA. 51594. The legal description for the facility is the SE¼ of Section 17, in Township 76N, Range 42W, in Pottawattamie County, Iowa, within the Mosquito Creek and Missouri River Basins.

Open cattle feeding lots are located on the crest of a hill with pens 7-10 sloping east and pens 1-6 sloping west. Process wastewater from the east and west pens are collected in one of four solids settling structures (SSSs), and then discharged into grassy waterways and/or into fields. The east SSS was **not** observed during this inspection. A total confinement building is located at the bottom of the hill, west of the open confinement lots. The total confinement building utilizes corn stocks for bedding pack which are stored south of the building along Magnolia Road. A cattle alleyway which connects the open confinement lots and the total confinement building, runs down the hill between pens 1 & 2 parallel to Magnolia Road and is not included in a controlled area.

5.0 FINDINGS AND OBSERVATIONS

The Water Enforcement Branch (WENF) of the Water, Wetlands & Pesticides Division (WWPD) requested a follow-up inspection to CAFO inspections conducted on April 4, 2009, and October 30, 2009, to determine if Moran Beef is in compliance with the CWA and if the LWCF were capturing all process wastewater.

On the morning of May 13, 2010, I conducted the follow-up inspection of Moran Beef. The area around the facility received approximately 0.40 of an inch of rain on May 12, 2010. The weather conditions at the time of the inspection were overcast (50°F). I met with Messrs. Frank and Kevin Moran and Mr. Turner, and performed a visual inspection of the facility. I determined that Moran Beef was **not** discharging to an unnamed tributary of Mosquito Creek at the time of the inspection.

Process waste water from pens 1 & 2 is collected in the SSS #1 located directly below pens #2 & #3 (see attachment #1). The process wastewater in SSS #1 drains through a drain tile inlet that is connected to an underground tile drain that discharges near the cattle alleyway, at the bottom of the hill. At the time of the inspection the tile inlet was capped and SSS #1 appeared to be holding water (see photo #1). Although SSS #1 appeared to be holding water, it was observed that SSS #1 was leaking through the berm (see photos #4-#6). Process wastewater leaking through SSS #1 was flowing west and was intercepted by a containment berm east of the confinement barn (see photos #5 & #6). The process wastewater followed the containment berm north where it entered a newly constructed SSS #3 (see photos #2 and #3). Mr. Frank Moran stated that he would have to pump out both SSS#1 and SSS#3 to ensure that his facility did not discharge to the tile inlet located northwest of the confinement barn.

Process waste water from pens 3 – 6 is collected into SSS#2 located directly below pens 4 – 6. The tile drain inlet is located at the northwest end of SSS#2. The tile drain inlet is connected to an underground tile drain that discharges through a vegetative waterway for approximately 400 yards then crosses the field and enters a culvert located northwest of the total confinement building and into the unnamed tributary (see #8). At the time of the inspection I did **not** observe process wastewater entering the culvert or discharging to the unnamed tributary of Mosquito Creek.

6.0 SUMMARY

I observed the west side of the Moran Beef, Underwood IA facility and noted that SSS#3 had been constructed to collect process wastewater being captured by the containment berm located east of the confinement building. I also observed what appeared to be a leak in the berm of the SSS#1 located west of pens #2 and #3. The water escaping through the berm was collected by the containment berm and the newly constructed SSS. I did **not** observe a discharge of process wastewater from the facility during the inspection.

Joe Heafner
Life Scientist
Date: 6-11-10

ATTACHMENTS:

1. Facility Satellite Photo/Maps (1 pages)
2. Digital Photograph Image Chain of Custody/Photo Log and Photos #1 - #8 (8 pages)

Moran Beef, Inc.
Underwood, Iowa

- - - - Temporary Berm and SSS#3
→ Fresh water
→ Manure
⊗ Photo and Direction Taken

0 100 200 400 Yards

N

PHOTO LOG DOCUMENTATION LIST

CHAIN OF CUSTODY DOCUMENT

MORAN BEEF INC
25794 MAGNOLIA ROAD
UNDERWOOD (POTTAWATTAMIE COUNTY), IOWA 51576

Facility Name / City: Moran Beef Inc, Underwood, Iowa 51576
Facility ID# N/A
Date: May 13, 2010
Approximate Time Taken (Military Time): Between 0900 – 1000 hours
Photographer / Videographer: All photos were taken by Joe Heafner.
Type of Camera: Olympus, Stylus 720 SW Serial #: A93564253
Digital Recording Media: Flashcard
All digital photos & video were copied by: Joe Heafner on June 9, 2010
All digital photos & video were copied to: CD-R
Original copy is stored in: CD-R. Digital photos were downloaded to CD-R all by Joe Heafner.

Report Photo #	Taken by:	Date	Approximate Time (mil)	File Name (.jpg)	Description
	J. Heafner	5/13/10	0921	P5132134	Taken from west settling structure, west of pens #2 and #3. Looking southeast over the settling structure. Notice tile outlet has been capped in middle of structure.
2.	J. Heafner	5/13/10	0921	P5132135	Taken from same location as photo #1. Looking northwest towards newly constructed settling structure between main feedlot and the confinement building.
3.	J. Heafner	5/13/10	0922	P5132136	Taken from some location as photos #1 and #2. Looking northwest towards newly constructed settling structure between main feedlot and the confinement building. Confinement building at left of photo.
4.	J. Heafner	5/13/10	0924	P5132137	Taken from toe of the west settling structure west of pens #2 and #3. Looking west at the settling structure berm. Note that structure is leaking effluent into field west of structure.
5.	J. Heafner	5/13/10	0924	P5132138	Taken from same location as photo #4. Looking southwest at flow from leak in the west settling structure. Effluent flows west and is intercepted by an earthen berm in middle of photo. Effluent then flows north to the newly constructed settling basin seen in photos #2 and #3.
6.	J. Heafner	5/13/10	0925	P5132139	Taken from earthen berm west of the west settling structure. Looking east back towards the west settling structure. Reverse of photo #5.

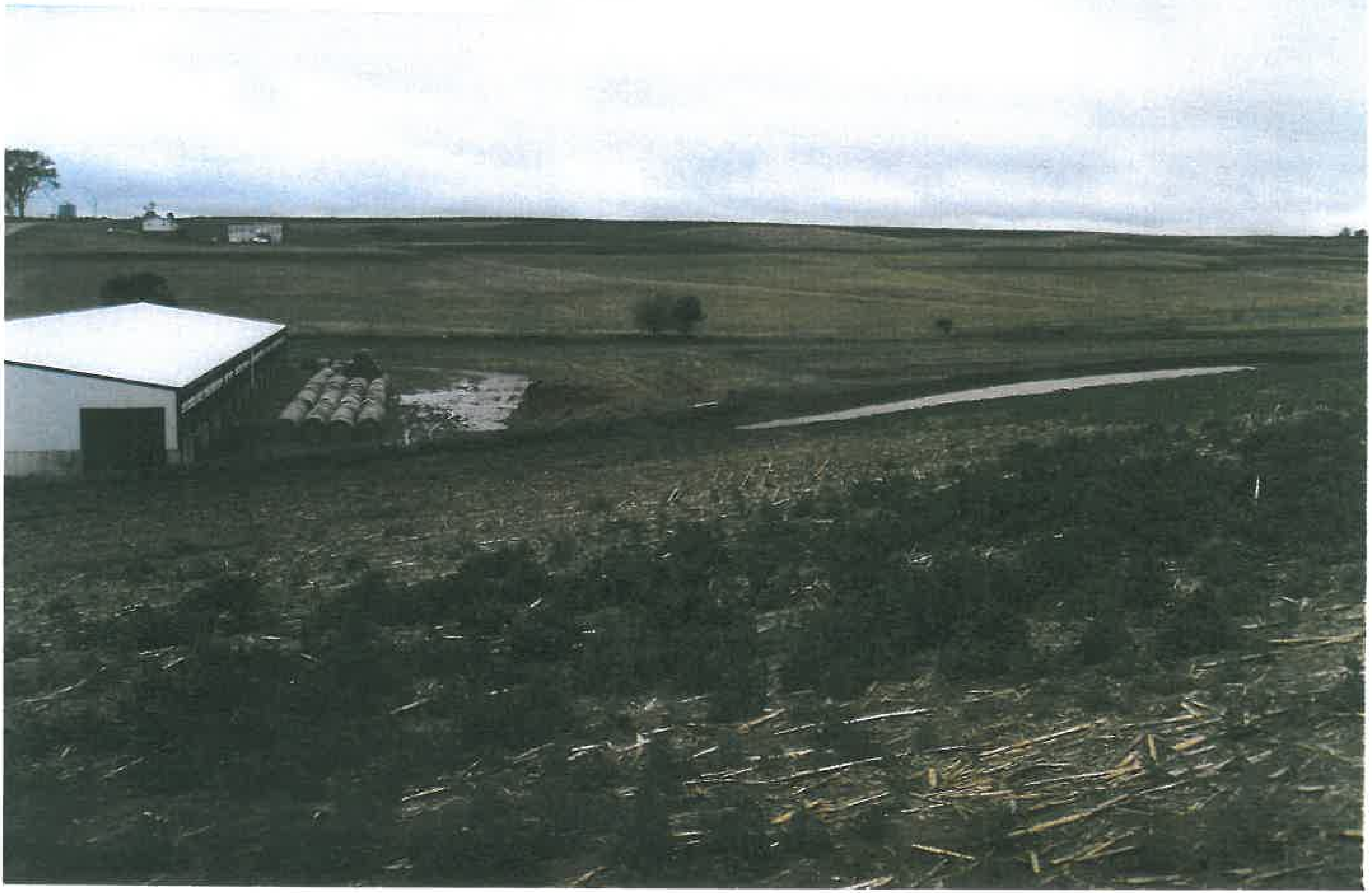
Moran Beef - 'ood IA – 05/13/10
Photo Number __ __ Joe Heafner SM
Taken from west settling structure, west of pens #2 and #3.
Looking southeast over the settling structure. Notice tile outlet has been capped in middle of structure.

ATTACHMENT 2 Page 3 of 10

Moran Beef - ·ood IA – 05/13/10
Photo Number __ __ Joe Heafner JH
Taken from same location as photo #1. Looking northwest towards newly constructed settling structure between main feedlot and the confinement building.

ATTACHMENT 2 Page 4 of 10

Moran Beef ' vood IA – 05/13/10
Photo Number __ _ Joe Heafner SH
Taken from some location as photos #1 and #2. Looking northwest towards newly constructed settling structure between main feedlot and the confinement building. Confinement building at left of photo.



Moran Beef . vood IA – 05/13/10
Photo Number __ ___ Joe Heafner SH
Taken from toe of the west settling structure west of pens #2 and #3. Looking west at the settling structure berm. Note that structure is leaking effluent into field west of structure.

Moran Beef - ... wood IA – 05/13/10
Photo Number ___ Joe Heafner SAH
Taken from same location as photo #4. Looking southwest at flow from leak in the west settling structure. Effluent flows west and is intercepted by an earthen berm in middle of photo. Effluent then flows north to the newly constructed settling basin seen in photos #2 and #3.

Moran Beef – C wood IA – 05/13/10
Photo Number 6 Joe Heafner SAH
Taken from earthen berm west of the west settling structure.
Looking east back towards the west settling structure. Reverse of photo #5.

ATTACHMENT 2 Page 8 of 10

Moran Beef -   vood IA – 05/13/10
Photo Number __.__   Joe Heafner SH
Taken from the same location as photo #6. Looking north at earthen berm intercepting flow from leaking west settling basin. Effluent flows to the north and is captured by newly constructed settling structure seen in photos #2 and #3.

Moran Beef ıderwood IA – 05/13/10
Photo Numbe. Joe Heafner JH
Taken from near the northwest corner of the confinement barn. Looking north at the vegetative filter that collects effluent from pens #4- #6. Effluent flows from the pens into settling structure and then piped to vegetative filter. Filter discharges to field before entering tile inlet and discharging to stream.

ATTACHMENT 2 Page 10 of 10

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

MEMORANDUM SEP 28 2010

SUBJECT: EPA site visit at Moran Beef, Inc., Underwood, Iowa

FROM: Stephen Pollard, Environmental Scientist 9/28/10
WWPD/WENF

TO: Facility File

One June 23, 2010, I performed a site visit at Moran Beef, Inc.(Facility) located near Underwood, Iowa. The purpose of the visit was to document actions that the Facility had undertaken to comply with EPA's Administrative Compliance Order (Order) issued to them on January 13, 2010. The Facility is located approximately one mile southwest of Underwood, Iowa, on Magnolia Road. The facility's physical address is 25794 Magnolia Road, Underwood, Iowa, 51576. The legal description for the Facility is the SE ¼ of Section 17, Township 76 North, Range 42 West, Pottawattamie County, Iowa. The National Weather Service reported that Underwood, Iowa and the surrounding area had received 1.56 inches of rainfall earlier in the day. It was not raining at the time of my visit.

I arrived at the facility at approximately 3:45 PM on Wednesday, June 23, 2010. I spoke with Mr. Kevin Moran. I told him that I was in the area and wanted to stop in and check on their compliance status and make sure they were meeting the requirements of the Order. I also requested permission to go on site and look at the interim measures they had put in place to comply with the Order. He indicated that it was alright with him but he wanted to check with his brother, Mr. Frank Moran. He then proceeded to call Frank Moran on his cell phone and asked that I speak with him. I spoke with Frank Moran and told him the purpose of my visit and that I wanted to go on site. He granted me access. I also inquired about the status of their NPDES permit application. He indicated that his engineer was almost finished and should be submitting the application package shortly. I thanked him for the information and we ended the call.

I then proceeded to the western portion of the Facility that includes the settling basins that capture runoff from the western portion of the open feedlots. It also includes their confinement building which houses approximately 900 head of cattle. I first assessed the actions undertaken by the Facility to stop illegal discharges that were flowing out of the southwest solid settling basin (SSB) and into the unnamed tributary of Mosquito Creek. I observed an earthen berm that had been recently constructed between the southwest SSB and the confinement building to catch effluent that was coming from the SSB. I estimated the berm to be approximately eight feet tall and approximately 200 yards long.

I then proceeded to walk around the confinement building. I observed bedding material (cornstalks) stockpiled at the eastern end of the confinement building. I also observed storm water runoff flowing from the stockpiled bedding and surrounding area (Photo 1). It was flowing in north westerly direction until it reached the north side of the confinement building where it then proceeded to flow in westerly direction towards an unnamed tributary of Mosquito Creek. I proceeded along the north side of the confinement building and continued to observe the flow of storm water to the west. When I arrived at the west end of the confinement building I observed a white PVC riser pipe protruding from the ground (Photo 2). Upon further investigation I determined that the riser was perforated and was acting as a drainage pipe for the surrounding area. I also observed that a channel had been excavated to facilitate drainage of the surrounding area into the drain pipe (Photo 3). I then proceeded to walk along the south side of the confinement building along the alley way used for feeding and transporting cattle to and from the open feedlot portions of the facility. This alley way extended along the southern and western portion of the confinement building and was not covered. I observed incidental manure solids, bedding material and spilled feed along the alley way. Rainfall that falls onto this alley way is uncontrolled and will flow west to the drainage pipe located at the western end of the building.

Having completed my walk-around of the confinement building I then focused on locating the outfall for the drainage pipe mentioned above. I proceeded to walk along the unnamed tributary of Mosquito Creek that flows along the western and southern side of the confinement building. Given the recent heavy rainfall, flow in the unnamed tributary was substantial and I estimated the depth of water to be about three feet. I was not able to find the outfall of the drainage pipe and concluded that it was most likely submerged underwater because of the high water levels.

I then proceeded to walk north along the western edge of the Facility's property for approximately 300 yards to assess runoff from a grass waterway that ran adjacent to the corn field. During EPA's previous inspections on June 4, 2009 and October 30, 2009 EPA documented that the Facility was discharging effluent from the west SSB into this grassed waterway. Because of the wet and muddy conditions resulting from the recent rainfall, I was not able to walk the entire length of the grassed waterway and I did not observe the outlet pipe at the north end of the grassed water way. I did observe runoff flowing in the grassed waterway. This runoff then flowed out into the cornfield and flowed south for approximately 200 yards before flowing into a culvert that discharged into the unnamed tributary of Mosquito Creek (Photos 4-7). This completed my site visit and I exited the property.

This site visit was performed while on my way to the Sioux City, Iowa area to perform other duties for the EPA. As a result I did not have sampling equipment at my disposal that would allow me to collect representative samples of runoff.

Attachment: Digital Photographs/Index

Photo #1	Facility Name:	**Moran Beef, Inc.**	Date:	6/23/2010
Description:	Facing south southeast. Photos shows stormwater runoff flowing from stockpiled bedding material along the eastern end of the confinement building.			

Photo #2	Facility Name:	**Moran Beef, Inc.**	Date:	6/23/2010
Description:	Facing northeast. Photos shows tile inlet located along the western end of the confinement building. Photo also shows stormwater runoff from the immediate area surrounding the confinement building flowing into the tile inlet.			

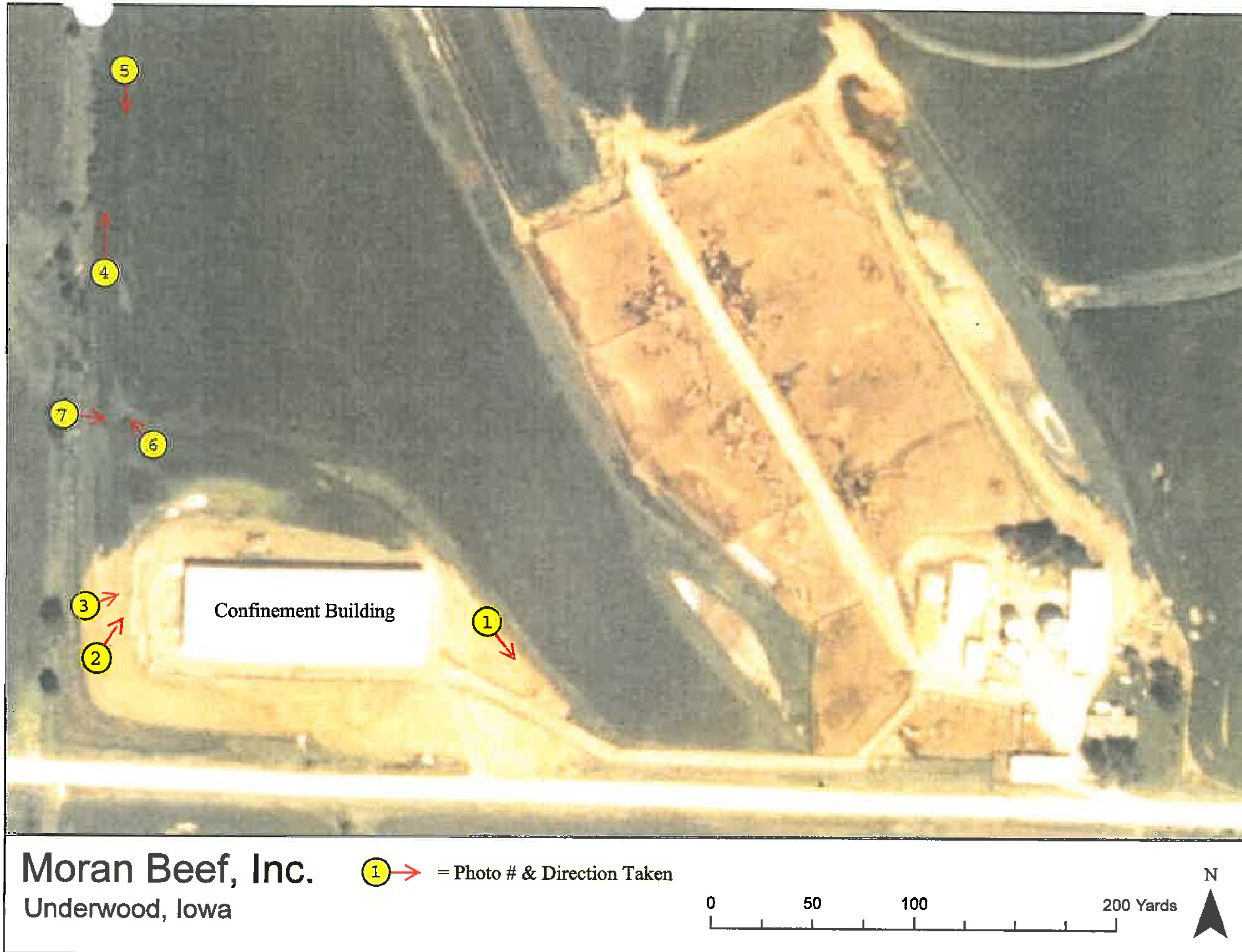
Photo #3	Facility Name:	**Moran Beef, Inc.**	Date:	6/23/2010
Description:	Facing east. Photo of tile inlet located along the western end of the confinement building. Photo also shows stormwater runoff from the immediate area surrounding the confinement building flowing into the tile inlet.			

Photo #4	Facility Name:	**Moran Beef, Inc.**	Date:	6/23/2010
Description:	Facing north. Photo of runoff from grassed waterway along western boundary of the facility.			

Photo #5	Facility Name:	Moran Beef, Inc.	Date:	6/23/2010
Description:	Facing south. Photo of runoff from grassed waterway near the point at which it flows into the corn field. Confinement building is located in the upper left corner of the photo. The unnamed tributary of Mosquito Creek is located in the upper right corner.			

Photo #6	Facility Name:	Moran Beef, Inc.	Date:	6/23/2010
Description:	Facing northwest. Photo of runoff from grassed waterway immediately before it discharges into the culvert located northwest of confinement building.			

Photo #7	Facility Name:	**Moran Beef, Inc.**	Date:	6/23/2010
Description:	Facing East. Photo of runoff from grassed waterway flowing into the culvert located northwest of confinement building. This culvert discharges directly into the unnamed tributary of Mosquito Creek. The Culvert is located in the bottom left corner of the photograph.			



Confinement Building
1
2
3
4
5
6
7
Moran Beef, Inc.
Underwood, Iowa
1 = Photo # & Direction Taken
0
50
100
200 Yards
N

REPORT OF CONCENTRATED ANIMAL FEEDING OPERATION INSPECTION

At

Moran Beef, Incorporated
25794 Magnolia Road
Underwood, Iowa 51576
(712) 545-3512

ON
September 23, 2010

BY

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region VII
Environmental Services Division

1.0 INTRODUCTION

At the request of the Water, Wetlands and Pesticides Division, Water Enforcement Branch, a follow-up inspection to Concentrated Animal Feeding Operation (CAFO) inspections performed on June 4, 2009, October 30, 2009, and May 13, 2010, was conducted at Moran Beef, Incorporated on September 23, 2010. This follow-up inspection was performed pursuant to Section 308(a) of the Federal Water Pollution Control Act, as amended. This narrative report and attachments present the findings and observations made during the follow-up inspection.

2.0 PARTICIPANTS

Moran Beef, Incorporated (Moran Beef):
Frank Moran, Assistant Vice President (402) 681-3871 (via phone on September 24, 2010)
Kevin Moran, Facility Manager (712) 545-3512 (via phone on September 23, 2010)

U.S. Environmental Protection Agency (EPA):
Joe Heafner, Life Scientist (913) 551-7091
Stephen Pollard, Environmental Scientist (913) 551-7582

3.0 INSPECTION PROCEDURES

I spoke with Mr. Kevin Moran via telephone on the morning of September 23, 2010, and I informed Mr. Kevin Moran that I would be performing a follow-up inspection to previous CAFO inspections that were conducted on June 4, 2009, October 30, 2009, and May 13, 2010 at the Underwood, Iowa facility. Mr. Kevin Moran stated that he was not available and he gave me permission to come onto the property and conduct the inspection. I also spoke via telephone with Mr. Frank Moran on September 24, 2010, and I informed him of all activities that we were conducted at the facility the previous day, which included collecting samples of stormwater runoff from around the confinement barn located west of the feedlot.

I conducted this inspection in accordance with the procedures described herein and the following EPA Region VII Standard Operating Procedures (SOPs), unless otherwise noted:

SOP No.
2332.9A Bio-Security Procedures for Conducting NDPES Compliance Evaluations at Animal Feeding Operations
2332.8B Clean Water Act Concentrated Animal Feeding Operation Inspection Program
2332.2B NPDES Compliance Sampling Inspection
2333.1B Field Equipment Calibration and Maintenance
2334.3B Wastewater Sample Collection
2420.4B Field Chain of Custody for Environmental Samples
2420.5C Identification, Documentation, and Tracking of Samples
2420.6C Sample Container Selection, Preservation, and Holding Times

I collected grab samples at four different locations near the total confinement barn on September 23, 2010. I took a grab sample near the northeast corner of the confinement barn (**site #1, sample number 5120-1**). The sample consisted of leachate from a bedding storage area located east of the confinement barn. I also took a grab sample of process wastewater as it was entering an unnamed tributary of Mosquito Creek via a tile line that was connected to a stand pipe located on the west side of the confinement barn (**site #2, sample number 5120-2**). Separate grab samples were also taken downstream (**site #3, sample number 5120-6**) and upstream (**site #4, sample number 5120-5**) of the tile line along the unnamed tributary of Mosquito Creek. Samples were placed directly into clean-labeled containers. I measured each sample for pH and temperature using a field meter. Samples were analyzed for the following, Biochemical Oxygen Demand (BOD), E. coli, Ammonia Nitrogen (NH_3-N), Total Kjeldahl Nitrogen (TKN), Nitrate+Nitrite as Nitrogen (NO_2+NO_3-N), Total Phosphorous (Total P) and Non Filterable Solids (NFS). Samples analyzed for BOD and E.coli were packaged separately and conveyed to Midwest Laboratories located in Omaha, Nebraska (**see chain of custody and data transmittal packet as attachment 2**). All other samples were packaged and conveyed to EPA Region 7's Science and Technology Center (STC) for analysis.

4.0 FACILITY DESCRIPTION

4.1 Facility Operations

The Moran Beef facility is located approximately one mile southwest of Underwood, IA., on Magnolia Road. The facility's physical address is 25794 Magnolia Road, Underwood, IA. 51594. The legal description for the facility is the SE¼ of Section 17, in Township 76N, Range 42W, in Pottawattamie County, Iowa, within the Mosquito Creek and Missouri River Basins.

Open cattle feeding lots are located on the crest of a hill with pens 7-10 sloping east and pens 1-6 sloping west. Process wastewater from the east and west pens are collected in one of four solids settling structures (SSSs), and then discharged into grassy waterways and/or into fields. The east SSS was not evaluated during this inspection. A total confinement building is located at the bottom of the hill, west of the open confinement lots. The total confinement building utilizes corn stocks for bedding pack, which are stored south of the building along Magnolia Road. A cattle alleyway, which connects the open confinement lots and the total confinement building, runs down the hill between pens 1 & 2 parallel to Magnolia Road and is not included in a controlled area.

5.0 FINDINGS AND OBSERVATIONS

On the morning of September 23, 2010, I conducted the follow-up inspection of Moran Beef. The area around the facility received approximately 1.14 inches of rain from September 21, 2010 through September 23, 2010, with approximately 0.64 inches of rain received on September 23, 2010 (**see attachment 3**). The weather conditions at the time of the inspection were periods of light rain (70°F).

I observed two areas of concern during the inspection. The first area was located near the bedding storage area east of the confinement barn. Brown colored leachate was flowing northwest away from the storage area toward the tile inlet west of the confinement barn. I sampled the leachate near the northeast corner of the confinement barn. The second area of concern was along the western end of the confinement barn. I observed a drainage tile inlet located directly west of the confinement building that receives runoff from the areas surrounding the confinement barn. The outlet for this tile was not visible in the tributary of Mosquito Creek, however I did observe manure solids and feedstuffs present in the tributary directly west of the tile inlet. I estimated the depth of manure solids to be approximately 12 inches. While speaking with Mr. Frank Moran on September 24, 2010, he acknowledged that the tile outlet was in this area and he believed that the outlet was no longer visible because it had been "pushed down" into the tributary. He believed that with the amount of precipitation that the area had received in the past year that the bank of the tributary had shifted causing the outlet to be "pushed down" into the tributary. I grabbed a sample at the location where the tile outlet on the west side of the confinement barn was discharging into the tributary. Samples were also taken upstream and downstream of the tile outlet along the tributary.

Table 1 represents the analytical data from the samples collected on September 23 2010 (**see attachment 2 for complete data transmittal packet**).

Table 1: Analytical Results for Samples Collected During Inspection.

Parameter[1]	Site #1 5120-1	Site #2 5120-2	Site #3 5120-6	Site #4 5120-5
NH_3-N	**	**	**	**
TKN	**	**	**	**
Total P	**	**	**	**
NFS	**	**	**	**
NO_2+NO_3-N	**	**	**	**
BOD	18	68	5	2
E. coli	> 2,500	>2,500	>2,500	1,200
pH	8.43	7.02	7.4	7.52
Temperature	23.0	18.6	19.5	19.3

[1]Parameters are reported in milligrams per liter (mg/L), pH measured in standard units, Temperature measured in degrees Celsius, E. coli is measured as colony forming units (cfu)/100mL
** Analysis is not complete at time of report

6.0 SUMMARY

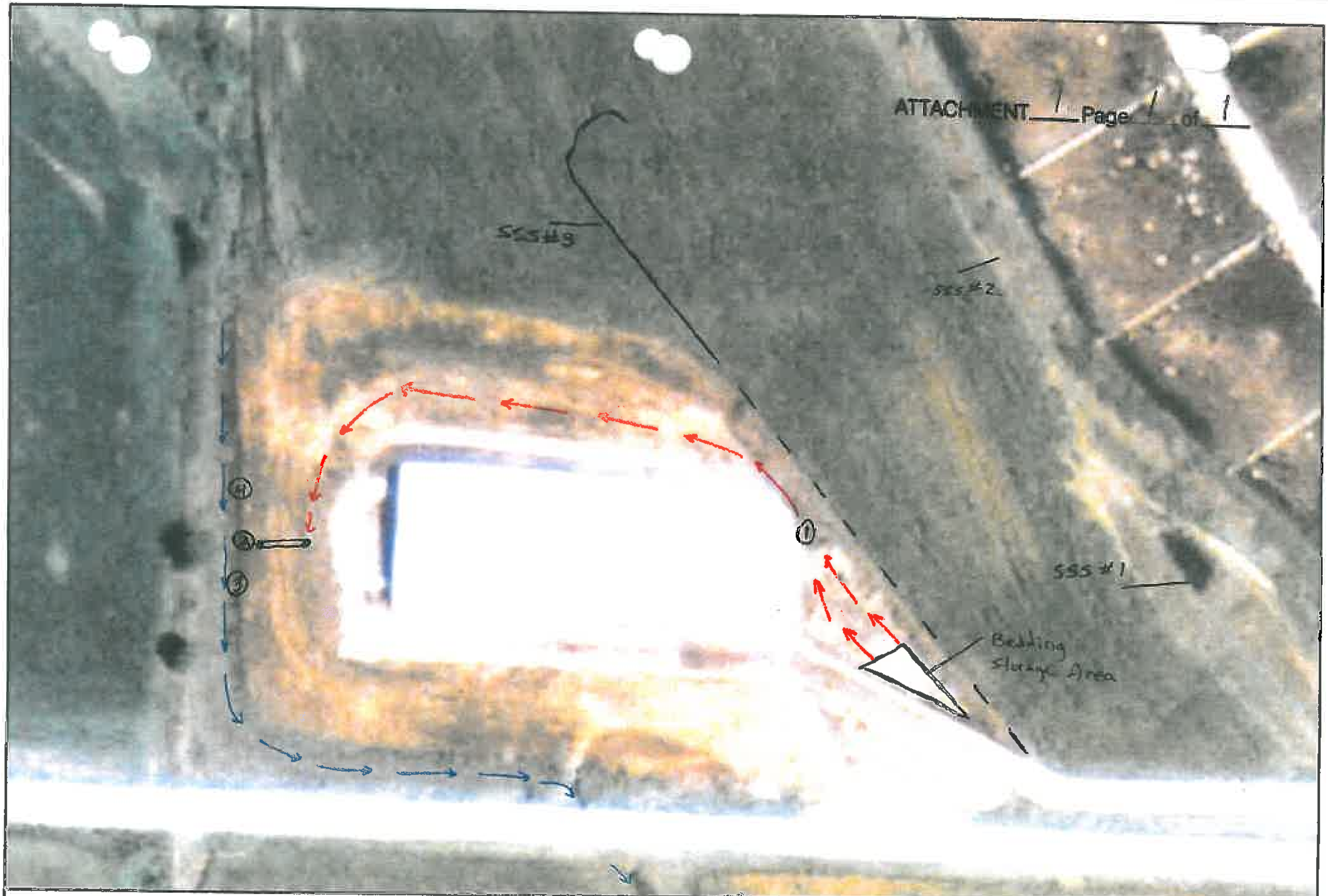
I observed two areas of concern during the inspection. The first area was located near the bedding storage area east of the confinement barn. Leachate from the bedding storage area east of the confinement barn was flowing northwest towards the tile inlet on the west end of the confinement barn. I took a sample of the leachate near the northeast corner of the confinement barn. The second area of concern was along the western end of the confinement barn. I observed manure solids and feedstuffs discharging into the unnamed tributary of Mosquito Creek from a tile outlet located directly west of the confinement building. Samples were taken of the manure and feedstuffs. Upstream and downstream samples were taken as well.

Joe Heafner
Life Scientist
Date: 9-30-10

ATTACHMENTS:

1. Facility Satellite Photo/Maps (1 page)
2. Data Transmittal Package from Midwest Laboratories (3 pages)
3. Weather data from September 21, 2010 through September 23, 2010 (2 pages)

ATTACHMENT 1 Page 1 of 1



Moran Beef, Inc.
Underwood, Iowa

⊗ Sample Collection Location
→ Fresh water
Tile Outlet
→ Direction of Process Wastewater
Solid Settling Basin #3

0 25 50 100 Yards

N

Report Number
10-272-2125

Midwest Laboratories Inc.®
13611 "B" Street • Omaha, Nebraska 68144-3693 • (402) 334-7770 • FAX (402 334-9121
www.midwestlabs.com

REPORT OF ANALYSIS
For: (25910) SAIC
(703)375-2287

Mail to: SAIC
KATIE MERRIMAN/DAVID LARIT
12100 SUNSET HILLS ROAD MS 4-3
RESTON VA 20190

Date Reported: 09/29/10
Date Received: 09/23/10

ASR 5021

ATTACHMENT 2 Page 1 of 3

Lab number: 1762148

Analysis	Level Found	Units	Detection Limit	Method	Analyst-Date	Verified-Date
Sample ID: 5021-1						
E coli	> 2500	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	18	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29
Sample ID: 5021-2						
E coli	> 2500	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	68	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29
Sample ID: 5021-5						
E coli	1,200	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	2	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29
Sample ID: 5021-6						
E coli	> 2500	MPN/100 mL	1	IDEXX SM 9223B	clh-09/24	kej-09/28
Biochemical oxygen demand	5	mg/L	2	SM 5210B	kkr-09/24	cmw-09/29

Notes:
*Sample was setup with 100 mL used in E coli determination. All the
*wells were positive for 3 of 4 samples. If high amounts were
*expected, we could have done dilutions to determine the exact #

For questions contact

Prem W. Arora

Prem Arora
Environmental Project Manager
prem@midwestlabs.com (402)829-9878

25910

09-23-10P04:02 RCVD

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
Joe Heafner	ASR 5021	23 / 9 / 10	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	1L CUBITAINER	1 gal BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
5021-1	1	1	1762148 2			X					BOD E.Coli
5021-2	1	1	1762149 2			X					
5021-5	1	1	1762150 2			X					
5021-6	1	1	1762151 2			X					
Total	4	4									
	8										

NUMBERS OF CONTAINERS PER SAMPLE NUMBER

U.S. Environmental Protection Agency
Region 7 Kansas, Missouri, Iowa, Nebraska

Joe Heafner
Life Scientist
Environmental Services Division

ENSV/EFCB
901 North 5th Street
Kansas City, Kansas 66101

Phone: 913-551-7091
Fax: 913-551-8699
E-mail: heafner.joseph@epa.gov

HAND DELIVERED ON ICE

4

1762148 - 1762151

DESCRIPTION OF SHIPMENT

1 PIECE(S) CONSISTING OF 1 BOX(ES)

X ICE CHEST(S); OTHER

MODE OF SHIPMENT

___ COMMERCIAL CARRIER:

___ COURIER

X SAMPLER CONVEYED

Conveyed to Midwest Labs Omaha NE (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Joe Heafner ☐ SEALED ☐ UNSEALED	9/23/10	1527	Heather Ramig ☐ SEALED ☐ UNSEALED	
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET ___ of ___
	~~ASR [illegible]~~ 5120 JAH 7-23/10		

CONTENTS OF SHIPMENT

SAMPLE NUMBER	CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers etc.)
5120 04H ~~[illegible]~~											
5120 04H ~~[illegible]~~											
5120 04H ~~[illegible]~~											
5120 04H ~~[illegible]~~											

TYPE OF CONTAINERS — NUMBERS OF CONTAINERS PER SAMPLE NUMBER — SAMPLED MEDIA

Project Manager
Transposed #'s on
samples JAH
7/23/10

ATTACHMENT 2 Page 3 of 3

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
___ PIECE(S) CONSISTING OF ___ BOX(ES)	___ COMMERCIAL CARRIER ___
___ ICE CHEST(S), OTHER ___	___ COURIER
	___ SAMPLER CONVEYED ___ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED / UNSEALED			SEALED / UNSEALED	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED / UNSEALED			SEALED / UNSEALED	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
SEALED / UNSEALED			SEALED / UNSEALED	

7-EPA-9262 (Revised 5/85)

Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

ATTACHMENT 3 Page 1 of 2

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000
CXUS53 KOAX 281000
CF6OMA
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                          STATION:    OMAHA EPPLEY, NEBRASKA
                                          MONTH:      SEPTEMBER
                                          YEAR:       2010
                                          LATITUDE:    41 17 N
                                          LONGITUDE:   95 54 W
```

TEMPERATURE IN F:							:PCPN:	SNOW:		WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
									12Z	AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	81	68	75	4	0	10	0.04	0.0	0	8.7	24	120	M	M	9	3	30	120
2	73	59	66	-4	0	1	0.01	0.0	0	12.0	29	310	M	M	5	3	37	320
3	72	55	64	-6	1	0	0.00	0.0	0	11.7	29	310	M	M	1		38	310
4	77	50	64	-6	1	0	0.00	0.0	0	7.7	18	150	M	M	1	12	23	170
5	88	61	75	6	0	10	0.00	0.0	0	16.3	29	160	M	M	5		36	170
6	90	59	75	6	0	10	0.01	0.0	0	15.7	35	160	M	M	5	3	44	310
7	76	54	65	-3	0	0	0.00	0.0	0	10.3	25	300	M	M	0		31	280
8	78	49	64	-4	1	0	0.00	0.0	0	8.1	18	140	M	M	7		26	140
9	81	65	73	5	0	8	T	0.0	0	12.7	23	120	M	M	9		29	130
10	70	64	67	0	0	2	0.02	0.0	0	8.4	21	130	M	M	10	1	25	140
11	81	53	67	0	0	2	0.00	0.0	0	7.0	17	310	M	M	2	1	23	320
12	88	56	72	5	0	7	0.00	0.0	0	7.6	20	220	M	M	2		25	220
13	86	61	74	8	0	9	0.14	0.0	0	7.3	30	120	M	M	6	13	38	120
14	84	63	74	8	0	9	0.00	0.0	0	6.0	15	160	M	M	5	18	18	160
15	81	63	72	6	0	7	0.05	0.0	0	10.8	24	330	M	M	6	3	29	340
16	67	57	62	-3	3	0	0.00	0.0	0	10.5	20	330	M	M	7		26	340
17	85	56	71	6	0	6	0.00	0.0	0	9.0	16	350	M	M	5		20	360
18	68	48	58	-7	7	0	0.38	0.0	0	11.1	29	310	M	M	10	13	38	290
19	57	48	53	-11	12	0	0.02	0.0	0	4.8	13	10	M	M	9	1	17	360
20	90	55	73	9	0	8	0.00	0.0	0	14.4	33	190	M	M	5	12	41	190
21	77	65	71	8	0	6	0.50	0.0	0	7.1	18	170	M	M	8	13	25	160
22	83	67	75	12	0	10	0.00	0.0	0	15.4	33	160	M	M	9		43	170
23	77	57	67	4	0	2	0.64	0.0	0	15.9	29	280	M	M	10	13	38	180
24	74	50	62	0	3	0	0.00	0.0	0	7.4	16	320	M	M	2		23	320
25	65	50	58	-4	7	0	0.61	0.0	0	8.9	26	10	M	M	8	13	33	360
26	67	48	58	-4	7	0	0.00	0.0	0	2.4	9	60	M	M	4	1	36	210
27	75	46	61	0	4	0	0.00	0.0	0	7.7	15	220	M	M	3		21	210
SM	2091	1527			46	107	2.42	0.0		264.9			M		153			

```
AV 77.4 56.6                              9.8 FASTST   M    M    6     MAX(MPH)
                                 MISC ----> # 35 160                  # 44  310
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                        STATION:   OMAHA EPPLEY, NEBRASKA
                                        MONTH:     SEPTEMBER
                                        YEAR:      2010
                                        LATITUDE:    41 17 N
                                        LONGITUDE:   95 54 W

[TEMPERATURE DATA]       [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 67.0    TOTAL FOR MONTH:    2.42   1 = FOG OR MIST
DPTR FM NORMAL:   1.0    DPTR FM NORMAL:    -0.48   2 = FOG REDUCING VISIBILITY
HIGHEST:    90 ON 20, 6  GRTST 24HR  1.47 ON 31- 1      TO 1/4 MILE OR LESS
LOWEST:     46 ON 27                                3 = THUNDER
                         SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                         TOTAL MONTH:   0.0 INCH    5 = HAIL
                         GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                         GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                        VSBY 1/2 MILE OR LESS
                                                    8 = SMOKE OR HAZE
[NO. OF DAYS WITH]       [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                    X = TORNADO
MAX 32 OR BELOW:   0     0.01 INCH OR MORE:  11
MAX 90 OR ABOVE:   2     0.10 INCH OR MORE:   5
MIN 32 OR BELOW:   0     0.50 INCH OR MORE:   3
MIN  0 OR BELOW:   0     1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.     46    CLEAR  (SCALE 0-3)   6
DPTR FM NORMAL    -40    PTCLDY (SCALE 4-7)  14
TOTAL FM JUL 1     46    CLOUDY (SCALE 8-10)  7
DPTR FM NORMAL    -47

[CDD (BASE 65) ]
TOTAL THIS MO.   107
DPTR FM NORMAL    -1     [PRESSURE DATA]
TOTAL FM JAN 1  1367     HIGHEST SLP M ON M
DPTR FM NORMAL   290     LOWEST  SLP 29.43 ON  6

[REMARKS]
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ATTACHMENT 3 Page 2 of 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

SEP 25 2009

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
Article No.: 7006 2760 0000 8649 1589

Frank Moran
Moran Beef, Inc.
25794 Magnolia Road
Underwood, Iowa 51576

Re: Open Cattle Feedlot/Confinement Operation
SE ¼, Section 17, Township 17 North, Range 76N, Potawatomie County, Iowa

Dear Mr. Moran:

Letter of Warning

On June 4, 2009, a representative of the U.S. Environmental Protection Agency (EPA) inspected the above referenced facility. The inspection was conducted under the authority of Section 308 of the Clean Water Act (CWA). A copy of the inspection is enclosed for your information.

Under state and federal CWA regulations, all facilities that confine greater than 1,000 head of feeder cattle for 45 days or more during a twelve-month period are classified as large concentrated animal feeding operations (CAFOs). All large CAFOs that discharge feedlot runoff to waters of the United States are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit. Based on observations made during the inspections, discussions with you during the inspection, and a review of the facility's records, your facility meets the definition of a large CAFO. EPA has also concluded that your facility does not have adequate livestock waste control facilities to prevent manure, process wastewater, or other feedlot runoff from reaching waters of the U.S. Please be advised that any discharge of runoff from your operation to a water of the United States is prohibited without a NPDES permit. As a result, any discharge of livestock wastes into a water of the United States without a permit is a serious violation of the CWA.

You are responsible for maintaining compliance with all applicable state, local and federal laws as they relate to your livestock operation. Please note that EPA reserves its right to pursue appropriate enforcement actions, including penalties, for violations discovered as a result of the inspection.

If there are any questions regarding this report, please contact Stephen Pollard, of my staff, at (913) 551-7582.

Sincerely,

Diane L. Huffman

Diane L. Huffman
Chief, Water Enforcement Branch

Enclosure

cc: Dan Stipe, IDNR Field Office #4

SEP 2 5 2009

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
Article No.: 7006 2760 0000 8649 1589

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CONCURRENCE:WWPD:WENF: WENF 2009 Correspondence\Pollard\MoranLOW-InspectionTrans.doc ms 092409					
NAME	**Pollard**	**Huffman**			
DIV/BRANCH	**WWPD/WENF**	**WWPD/WENF**			
SIGN	[signature]	[signature]			
DATE	9/24/09	9/30/09			

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
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For delivery information visit our website at www.usps.com

OFFICIAL USE

7006 2760 0000 8649 1589

Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To: Frank Moran
Street, Apt. No.; or PO Box No.: 25794 Magnolia Road
City, State: Underwood, Iowa 51576

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Frank Moran
25794 Magnolia Road
Underwood, Iowa 51576

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Kevin Moran ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) Kevin Moran
C. Date of Delivery 9/29/09

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Transfer from service label)* 7006 2760 0000 8649 1589

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

EXPERT OPINION
on
Economic Benefit
In the matter of:
Moran Beef, Incorporated

prepared for:
U.S. Environmental Protection Agency

prepared on:
September 29, 2010

prepared by:
Jonathan S. Shefftz

d/b/a JShefftz Consulting
14 Moody Field Road
Amherst MA 01002

under subcontract to:
Industrial Economics, Incorporated
2067 Massachusetts Avenue
Cambridge MA 02140

Expert Opinion of Jonathan S. Shefftz
Economic Benefit of Noncompliance
September 29, 2010

1. Summary of Opinion

I have been asked by the U.S. Environmental Protection Agency ("EPA") to provide an expert opinion regarding the economic benefit that Respondent Moran Beef, Incorporated may have gained because of alleged environmental noncompliance at its open cattle feedlot located in Iowa's Pottawattamie County.

My opinion is that Respondent has gained an economic benefit of approximately $25,000 if the required controls are to be implemented by the middle of 2011. I may revise my opinion as additional information becomes available to me or upon the reconsideration of existing information.

2. Basis for Opinion

My opinion is based broadly on my expertise in economic and financial analysis. I hold both undergraduate and graduate degrees with a focus on economics in various contexts. My experience with economic benefit calculation dates back to 1992, encompassing expert witness casework, computer model development, training of state and federal agency staff, as well as involvement in federal agency public comment and peer review processes.

More specifically, I have been involved with the periodic revisions and modifications to the U.S. Environmental Protection Agency's "BEN" economic benefit computer model since 1992, first as an employee of Industrial Economics, Incorporated ("IEc") and since April 2006 as a subcontractor to IEc. Both federal and state environmental enforcement staff use the BEN model to develop their economic benefit results for penalty determinations. In 1998, I managed IEc's development (under contract to U.S. EPA) of an entirely new version of the model for the Windows operating system. Since then, I have continued to work on all aspects of IEc's support to EPA on the BEN model, encompassing researching relevant tax code changes, implementing new features, supervising a helpline that assists EPA and state environmental agencies, managing academic peer reviews, developing training course materials, and even typing in individual formulas. I have also published articles on the subject matter (both concerning the BEN model, and related economic benefit issues).

Specifically for this case, I have reviewed compliance-related information provided to me by U.S. EPA staff and also discussed certain aspects of the case with U.S. EPA staff. I have also conducted independent research for various economic inputs. Attached to the main body of this report is my resume, which includes a list of my publications and a list of the cases in which I have testified going back at least four years.

3. Economic Benefit: Context, Theory, and Methodology

In this section, I explain economic benefit's context, theory, and methodology. In the section after this one, I summarize and then provide my economic benefit analysis.

a. Context

Moran Beef is a open cattle feedlot located in Iowa's Pottawattamie County. U.S. EPA alleges that this facility has been illegally discharging livestock waste, without an NPDES permit.

Compliance would have entailed implementing the proper controls or lowering production levels. Instead, Respondent never undertook sufficient or adequate compliance measures during the noncompliance period. With the funds that should have been expended for compliance, Respondent could have instead, for instance, increased investment in other financially productive ventures or provided greater returns to its ownership for personal consumption. Alternatively, had Respondent come into compliance in a timely manner by lowering production levels, then it would have lost the incremental profits associated with that additional production.

b. Theory

When companies (such as Respondent in this case) delay or avoid compliance with environmental requirements, an economic benefit can occur from such delay or avoidance. By postponing compliance, a company can realize a benefit from delaying investing in capital equipment and/or incurring other costs, from delaying or avoiding business interruption losses necessitated by upgrades for compliance, and/or from avoiding the payment of certain necessary ongoing operating and maintenance costs. Economic benefit represents the financial gains that accrue through such delayed and/or avoided expenditures. Funds not spent on environmental compliance are available for financially productive economic activities or, alternatively, the costs associated with obtaining additional funds for environmental compliance are avoided.[1]

By contrast, if compliance were to be achieved via shutting down operations or lowering production levels, then a company can realize a benefit from the profits it would not otherwise have been able to earn were it not operating at that production level. (Economic benefit based on delayed and/or avoided expenditures also represents profits that would not have been available to a

---

[1] The concept that the true cost of any action can be measured by the value of the alternative that must be foregone is known in economics as the concept of "opportunity cost."

compliant company, but the incremental profits in those instances are measured indirectly by examining only the cost differentials, and assuming that all other aspects of the company's operations such as output, pricing, and sales are essentially unaffected.)

Either way, economic benefit is the amount by which a company is financially better off as a result of not having complied with environmental requirements in a timely manner. Economic benefit is "no fault" in nature: a company need not have deliberately chosen to delay compliance (for financial or any other reasons) – or in fact even have been aware of its noncompliance – for it to have accrued the economic benefit of noncompliance.

The appropriate economic benefit estimate should represent the amount of money that would make the company indifferent between compliance and noncompliance. Ideally, for penalty-setting purposes the economic benefit result should be adjusted for the probability of detection, prosecution, and ultimate payment.[2] That is, if Respondent in this case knew that for every noncompliant company in the industry, the probability of ultimately paying a penalty that recaptured economic benefit was only 25 percent (i.e., one-fourth), then the economic benefit result would have to be multiplied by a factor of four for penalty-setting purposes. As the probability of detection-prosecution-payment declines, then the amount of money proportionately increases that would make the company indifferent between compliance and noncompliance. Unfortunately, even rough estimates of these probabilities (whether industry- or medium-specific) are unavailable.[3] Therefore, for purposes of this report, I am unable to assess any probability-adjusted economic benefit component for a civil penalty, and do not apply any such probability-based multiplier factor to my economic benefit results. Hence, were my economic benefit results to be used as the basis for a civil penalty without any further adjustments, this would implicitly assume a 100-percent probability of detection-prosecution-payment for these types of violations.

If a civil penalty fails to recover at least this economic benefit, then Respondent will retain a gain from their noncompliance. Because of the precedent of this retained gain, Respondent and even other entities may see an economic advantage in similar noncompliance, and the penalty will fail to deter potential violators. Economic benefit does not represent compensation to Plaintiffs as in a typical "damages" calculation for a tort case, but instead is the minimum amount that Respondent must pay as a civil penalty to the government so as to return Respondent to the position it would have been in had it complied in a timely manner. Therefore, were the economic benefit not to be fully disgorged in the form of a civil penalty payment, the residual financial gain could be

---

2 This issue was raised by a peer review panel of academic experts in *An Advisory of the Illegal Competitive Advantage (ICA) Economic Benefit (EB) Advisory Panel of the EPA Science Advisory Board* (September 7, 2005). The advisory report is available for downloading at:
http://www.epa.gov/sab/pdf/ica_eb_sab-adv-05-003.pdf

3 See U.S. EPA Office of Inspector General, *EPA Performance Measures Do Not Effectively Track Compliance Outcomes* (December 15, 2005), available at:
http://www.epa.gov/oig/reports/2006/20051215-2006-P-00006.pdf

construed as representing an unfair competitive advantage to Respondent over other companies in its industry.

c. Methodology

The economic benefit calculation incorporates the concept of the "time value of money." For example, in simple terms, a dollar yesterday is worth more than a dollar today, because one had investment opportunities for yesterday's dollar. Thus, the further in the past that the dollar was obtained, the more it is worth in "present-value" terms. The greater the time value of money (i.e., the greater the "discount" or "compounding" rate), the more value past costs have in present-value terms.

To calculate economic benefit, I use standard financial cash flow and net present value analysis techniques, based on modern and generally accepted financial principles. Such an approach is the underpinning of any capital budgeting exercise, and is the standard approach by which alternative investments should be judged according to any financial economics or corporate finance text. This is the same approach that the U.S. EPA's "BEN" economic benefit computer model employs, and is also the same approach that I employ when testifying, whether on behalf of U.S. EPA, U.S. DOJ, state environmental enforcement agencies, or citizen litigators.

First, I calculate: (a) the costs that Respondent should have incurred in order to attain full on-time compliance; and, (b) the costs of delayed compliance that Respondent might be expected to eventually incur. I then adjust for the tax deductions available for these costs. Next, I calculate the present value of the costs, or "cash flows." This adjustment is performed with a rate that reflects the cost of capital over the period of noncompliance. Finally, I subtract the present value of the delayed compliance from the present value of the on-time compliance to determine the economic benefit for Respondent.

A civil penalty insufficient to disgorge the entire amount of the economic benefit figure would fail to make a company financially indifferent between compliance and noncompliance. Such indifference is the first step in achieving financial deterrence, which would additionally require an even higher penalty over and above the disgorgement of the economic benefit. For example, if the economic benefit were $1,000 and the civil penalty only $700, the company would have a $300 incentive to violate the law. By contrast, if the civil penalty were exactly $1,000, the company would come out even, and have no incentive either to comply or not comply. Alternatively, if the penalty were $1,500, the company would have a $500 incentive to comply. Note that all of these examples implicitly assume a 100-percent probability of detection, prosecution, and payment. As previously explained in section 3.b. above, as the probability of detection-prosecution-payment declines, then the amount of money proportionately increases that would make the company indifferent between compliance and noncompliance.

4. Economic Benefit Analysis

Below I explain how I calculate Respondent's economic benefit of noncompliance from avoiding and/or delaying the necessary compliance costs. First I describe the inputs to my calculations, then I present and summarize my results.

Note that I do not analyze the economic benefit based upon an alternative scenario that entails achieving compliance by lowering production levels at an earlier date. This omission is because:

- I do not know whether Respondent would have chosen such a compliance option had it complied on time; and,

- I lack any information on the incremental profit associated with the additional production that would have been foregone had Respondent complied by operating at a lower level.

a. Inputs

My economic benefit calculations use the following inputs:

- *Noncompliance Date:* I use January 1, 2009 as the date by when Respondent should have achieved compliance. Therefore, on this date I model the initial costs as having been incurred, and the annually recurring costs as first being incurred.

- *Compliance Dates:* Although Respondent has not yet incurred the control costs, I use the middle of calendar year 2011 (i.e., July 1) as the anticipated implementation date.

- *Cost Estimates:* Moran Beef has indicated the intention to comply by constructing runoff controls at the facility and has submitted engineering plans for a control system for a 1,400-head open feedlot system along with a 990-head confinement barn. U.S. EPA Region 7 staff developed construction cost estimates based on the 2006 document *Beef Feedlot Systems Manual* published by the Iowa Beef Center at Iowa State University. Specifically, Region 7 examined only the open feedlot portion of the facility (and omitted any costs associated with the confinement building), as provided in the appendix's Table 10 ("Initial Investment for System 1, Earthen Lot with Windbreak") and Table 15 ("Depreciation Life and Repairs Rate"). Region 7 included only the cost estimates for engineering ($50,000 capital) and construction ($90,000 capital) associated with the environmental structures. Since Respondent's submitted plans did not indicate reliance on a center pivot irrigation system, no such cost estimates were included in the economic benefit calculation.

- *Inflation Adjustments and Cost Indices:* To adjust cost estimates from their initial January 2006 estimate date (i.e., for the *Beef Feedlot Systems Manual*) to when they would have been incurred, I use the Construction Cost Index ("CCI") from *Engineering News Record.*

- *Capital Investment Depreciation:* I use the modified Accelerated Cost Recovery System ("MACRS") for initial capital investments as specified by the U.S. Internal Revenue Service, which entails a seven-year double declining balance schedule with conversion to straight line. This is the most rapid depreciation schedule that Respondent would likely use (and be legally allowed to use) for tax purposes, and thus produces the most conservative economic benefit calculation.[4]

- *Capital Equipment Replacement:* I also account for replacement of the environmental structures at the end of their 25-year life (as specified in Table 15 of the *Beef Feedlot Systems Manual*). This additional calculation is necessary because even if the environmental structures are eventually put in place by the end of this year, they will be newer than if they had been put in place in a timely manner. Hence, in the future, their actual replacement will be delayed. I use an imputed lease cost calculation to reflect the value of having newer structures and equipment.

- *Tax Rate:* I use the year-specific U.S. federal and Iowa state combined marginal corporate tax rates. I use the highest marginal rates, even though if anything the actual tax rates for Respondent might be lower. The highest marginal rates produce the lowest after-tax value of compliance costs, and therefore the most conservative, downwardly biased economic benefit results.

- *Penalty Payment Date:* I use a penalty payment date of October 1, 2010, i.e., the first day of the month following the date of this report. Since any settlement or hearing judgment would occur after this date, I also provide information on how this economic benefit should be adjusted forward with the passage of time.

- *Discount/Compound Rate – Methodology:* I use an estimate of Respondent's weighted average cost of capital ("WACC") to compound and discount the company's cash flows. The WACC represents the cost of a company's debt and equity weighted by the value of each source of financing. On average, a company must earn a rate of return that enables it to repay its debt holders (e.g. banks, bondholders) and satisfy its equity owners (e.g., partners, stockholders). Although companies can earn rates in excess of their WACC, companies that do not on average earn returns equivalent to their WACC will not survive (i.e., their lenders will not receive their principal and/or interest payments, and their owners will be dissatisfied

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[4] Depreciation generates positive after-tax cash flows; the nearer these are to the current date, the lower the net present value of the pollution control expenditures.

with their returns). As a result, standard business practices dictate that a company should make its business decisions by discounting cash flows at its WACC. Therefore, the WACC represents the return Respondent would have expected to earn on monies not invested in pollution control, or, viewed alternatively, represents the avoided costs of financing pollution control investments.

- *Discount/Compound Rate – Value:* I use an average of Respondent's cost of capital for 2009 and 2010, and then use an average of these years' figures as the rate to discount and compound all cash flows throughout my economic calculations. Since I lack detailed information on Respondent's finances, I use the figures for "Meat Products" (SIC code 201) as provided by Morningstar's Ibbotson Associates *Cost of Capital Yearbook.*[5]

b. Calculations and Results

The table on the following page provides my calculations and results, which should be fully replicable for any analyst. The economic benefit is approximately $25,183 if the controls are to be implemented by the middle of 2011. These results are almost identical to those that would be obtained by running the U.S. EPA BEN model.[6]

This economic benefit is calculated just after the date of this report, i.e., October 1, 2010. If the penalty payment is further delayed, the economic benefit would continue to be compounded at the rate of 10.03 percent (i.e., my figure of Respondent's cost of capital). This translates into an increase for each month of delay in paying the penalty past October 1, 2010 of $202.

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[5] Although Ibbotson advocates an additional size premium for small companies like Respondent, I omit this to formulate a more conservative cost of capital, and hence more conservative, downwardly biased economic benefit result. The median industry values as reported by Ibbotson are 10.22 percent in 2009 and 9.84 percent in 2010, for an average across those years of 10.03 percent.

[6] The most significant difference in my calculations compared to the BEN model is in the treatment of the depreciation tax shields. BEN calculates the cash flows in each year, whereas for presentation purposes I apply a depreciation tax shield present value to a single year.

Description	Original Cost Estimate	Date When Costs Should Have Been Incurred	Monthly Value for CCI	Inflation-Adjusted Cost from *7660.29* Jan-06 CCI	After-Tax (incl. MACRS) Cost at: 42.8%	Present Value (PV) using: *10.03%* and at: *1-Oct-10* Factor	Result
Initial Cost	$140,000	1-Jan-09	8549.00	$156,242	$105,681	1.1818	$124,893
Delayed Cost	$140,000	1-Jul-11	8971.61	$163,966	$110,905	0.9310	$103,252
Imputed Lease Cost for Interim Period When On-Time (But Not Delay) Equipment Would Need Replacement (with 25-year useful life):							
Start Date	End Date	CCI at Start	Capital Cost	Lease Cost	After-Tax	PV Factor	Result
1-Jan-34	1-Jul-36	12784.44	$233,649	$64,500	$36,894	0.0960	$3,542
						Economic Benefit (i.e., Initial - Delayed + Lease)=	**$25,183**
						monthly increase =	*$202*
Depreciation Schedule Tax Shield PV Factors (MACRS), with rows for Year / PV Factor / MACRS % / PV:							
0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5
0.9533	0.8664	0.7874	0.7157	0.6504	0.5911	0.5373	0.4883
0.1429	0.2449	0.1749	0.1249	0.0893	0.0892	0.0893	0.0446
0.1362	0.2122	0.1377	0.0894	0.0581	0.0527	0.0480	0.0218

5. Qualifications and Compensation

As previously noted under the section entitled Basis for Opinion, following the main body of this report is my resume, which also provides a list of publications and testimony experience. Via a subcontract with Industrial Economics, Incorporated, which in turn is contracting with the U.S. Environmental Protection Agency, my compensation for the time that I have spent preparing this report is $103.49 per hour.

I declare under the penalty of perjury that the statements in this report are true and accurate to the best of my knowledge.

9-29-10
Dated

Jonathan S. Shefftz

ENVIRONMENTAL IMPACTS OF ANIMAL FEEDING OPERATIONS

December 31, 1998

U.S. Environmental Protection Agency
Office of Water
Standards and Applied Sciences Division

Complainant's Ex. No. 9

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EXECUTIVE SUMMARY

According to EPA's 1996 *National Water Quality Inventory*, agricultural operations, including animal feeding operations (AFOs), are a significant source of water pollution in the U.S. States estimate that agriculture contributes to the impairment of at least 173,629 river miles, 3,183,159 lake acres, and 2,971 estuary square miles. Twenty-two states reported on the impacts of specific types of agriculture on rivers and streams, attributing 20 percent of the agricultural impairment to intensive animal operations. In addition, NOAA reports that feedlots were a contributing factor in 110 of the 3,404 impaired shellfish areas in 1995. These findings, as well as incidents of waste spills, excessive runoff, leaking storage lagoons, and odor problems, have heightened public awareness of environmental impacts from AFOs.

Manure is the primary source of pollution from AFOs. It is much more abundant than human waste. Estimates indicate that U.S. animal waste production in 1992 was 13 times greater (on a dry-weight basis) than human sanitary waste production. Sources of manure pollution include direct discharges, open feedlots, pastures, treatment and storage lagoons, manure stockpiles, and land application fields. Oxygen-demanding substances, ammonia, nutrients (particularly nitrogen and phosphorus), solids, pathogens, and odorous compounds are the pollutants most commonly associated with manure. Manure is also a source of salts and trace metals, and to a lesser extent, antibiotics, pesticides, and hormones. Animal waste can be a valuable fertilizer and soil conditioner, but in many cases it is applied in excess of crop nutrient requirements due to manure nutrient ratios that differ from crop needs, and/or lack of available nearby land. This problem has been magnified as the industry has become more concentrated.

AFO pollutants can impact surface water, groundwater, air, and soil. In surface water, the waste's oxygen demand and ammonia content can result in fish kills and reduced biodiversity. Solids can increase turbidity and smother benthic organisms. Nitrogen and phosphorus can contribute to eutrophication and associated algae blooms. These blooms can produce negative aesthetic impacts and increase drinking water treatment costs. Turbidity from the blooms can reduce penetration of sunlight in the water column and thereby limit growth of seagrass beds and other submerged aquatic vegetation, which serve as critical habitat for fish, crabs, and other aquatic organisms. Decay of the algae (as well as night-time algal respiration) can lead to depressed oxygen levels, which can result in fish kills and reduced biodiversity. Eutrophication is also a factor in blooms of toxic algae and other toxic estuarine microorganisms, such as *Pfiesteria piscicida*. These organisms can impact human health as well as animal health. Human and animal health can also be impacted by pathogens and nitrogen in animal waste. Nitrogen in manure is easily transformed into nitrate form; transport to drinking water sources can result in potentially fatal health risks to infants. Trace elements in manure may also present human and ecological risks. Salts can contribute to salinization and disruption of the ecosystem. Antibiotics, pesticides, and hormones may have low-level, long-term ecosystem effects.

In groundwater, pathogens and nitrates from manure can impact human health via drinking water. Additionally, leaching salts may cause groundwaters to become unsuitable for human consumption. Nitrate contamination is more prevalent in groundwaters than surface waters.

EPA found that nitrate is the most widespread agricultural contaminant in drinking water wells, and estimates that 4.5 million people are exposed to elevated nitrate levels from drinking water wells.

In soils, trace elements and salts from land-applied manure can accumulate and become toxic to plants. Salts can deteriorate soil quality by leading to reduced permeability and poor tilth. Crop uptake may provide a human and animal exposure pathway for trace elements and pathogens.

Air emissions from AFOs also produce environmental impacts. Odors from anaerobic waste decomposition are particularly offensive. Odors can produce mental health impacts, and many odor-causing substances (e.g., ammonia, hydrogen sulfide, and organic dusts) can also cause physical impacts. Furthermore, volatilized ammonia can be redeposited on the earth and contribute to eutrophication of surface waters. Methane emissions from anaerobic waste lagoons are a concern because they contribute to global warming.

Nutrients are a major source of impairment of U.S. waters. Several studies have focused on nutrient contribution from animal waste and other sources (e.g., point sources, commercial fertilizers, atmospheric deposition, and urban runoff). In many watersheds, animal waste represents a significant portion of the total nutrients added. In several counties, nutrients from confined animals exceed the uptake potential of non-legume harvested cropland and hayland, according to a USDA analysis of 1992 conditions. USDA found that recoverable manure nitrogen exceeds crop system needs in 266 of 3,141 counties, and that recoverable manure phosphorus exceeds crop system needs in 485 counties. The USDA analysis is not intended to represent actual manure management practices or transport of applied nutrients, and cannot be used to indicate the presence or absence of water quality problems. However, it is useful as a general indicator of excess nutrients on a broad-scale basis.

Transport factors were considered in a national modeling effort by the USGS. Modeling of 1987 conditions indicates that animal manure (from all livestock, not just confined animals) is a significant contributor to in-stream nutrient concentrations in watershed outlets. Per the estimates, manure is a greater contributor than point sources to in-stream total nitrogen in 1,802 (88%) of the 2,056 watershed outlets in the U.S. Additionally, manure is the single largest contributor to total nitrogen in 113 watersheds. USGS also found that manure is a significant contributor to in-stream total phosphorus concentrations, noting that livestock waste is a greater contributor than commercial fertilizer.

1. INTRODUCTION

1.1 Background - A National Perspective

Agricultural operations, including animal feeding operations (AFOs), are a significant source of water pollution in the United States. The latest *National Water Quality Inventory* (EPA, 1997) indicates that agriculture (including crop production, pastures, rangeland, feedlots, animal holding areas, and other animal feeding operations) is the leading contributor to water quality impairments in the Nation's rivers and lakes, and the fifth leading contributor to water quality impairments in the Nation's estuaries. Table 1-1 presents the leading sources of impairment in waters that have been identified as impaired. Table 1-2 presents a summary of the water body quantities that have been surveyed, identified as impaired by any source, and impaired specifically by agriculture. The portion of impairment attributable to animal agriculture nationwide is unknown, though twenty-two states did report on the impacts of specific types of agriculture on rivers and streams. These states reported that 20 percent of the agricultural impairment to rivers and streams is from intensive animal operations (including feedlots, animal holding areas, and other animal operations), and that 23 percent of the agricultural impairment is from rangeland and pastureland. The impairment due to land application of manure was not estimated. These findings indicate that AFOs (as well as grazing and range animals) are a significant environmental concern across the U.S. Many effects of livestock in pasture and range settings are not addressed in this report. Such effects include physical damage to stream channels and riparian vegetation, compaction and reduced infiltration of soils, and imbalance in terrestrial plant communities due to selective grazing.

Table 1-1
Five Leading Sources of Water Quality Impairment in the U.S.
(Percent impairment attributed to each source is shown in parentheses. For example, agriculture is listed as a source of impairment in 70% of impaired river miles.)

Rank	Rivers	Lakes	Estuaries
1	**Agriculture** (70%)	**Agriculture** (49%)	Industrial Point Sources (56%)
2	Municipal Point Sources (14%)	Other/Unspecified Nonpoint Sources (24%)	Urban Runoff/ Storm Sewers (46%)
3	Hydromodification (14%)	Atmospheric Deposition (21%)	Municipal Point Sources (44%)
4	Habitat Modification (14%)	Urban Runoff/ Storm Sewers (21%)	Upstream Sources (30%)
5	Resource Extraction (13%)	Municipal Point Sources (18%)	**Agriculture** (27%)

Reference: *National Water Quality Inventory: 1996 Report to Congress*(EPA, 1997a). Agriculture, including animal feeding operations, is among the leading causes of water quality impairment in U.S. waters. Figure totals exceed 100 percent because water bodies may be impaired by more than one source. The portion of "agricultural" impairment attributable to animal waste (as compared to commercial fertilizers, pesticides, and other pollutant sources) is unknown nationwide.

Table 1-2
Summary of U.S. Water Quality Impairment Survey

Total Quantity in U.S.	Waters Surveyed	Quantity Impaired by All Sources	**Quantity Impaired by Agriculture**
Rivers 3,634,152 miles	19% of total 693,905 miles	36% of surveyed 248,028 miles	**70% of impaired 173,629 miles**
Lakes, Ponds, and Reservoirs 41,684,902 acres	40% of total 16,819,769 acres	39% of surveyed 6,541,060 acres	**49% of impaired 3,183,159 acres**
Estuaries 39,839 square miles	72% of total 28,819 square miles	38% of surveyed 11,025 square miles	**27% of impaired 2,971 square miles**

Reference: *National Water Quality Inventory: 1996 Report to Congress*(EPA, 1997a). AFOs are a subset of the agriculture category. Summaries of impairment by other sources are not presented here.

Table 1-3 lists the leading pollutants impairing surface water quality in the U.S. AFOs are a potential source of all of these. Nutrients, pathogens, oxygen-depleting substances, and solids (which can contribute to siltation) are the pollutants most commonly associated with AFOs (as well as other sources). AFOs are also a potential source of the other leading causes of water quality impairment, such as metals and pesticides, and can contribute to the growth of noxious aquatic plants due to the discharge of excess nutrients. AFOs may also contribute loadings of priority toxic organic chemicals and oil and grease, but probably to a lesser extent than the other leading pollutants.

Table 1-3
Five Leading Pollutants Causing Water Quality Impairment in the U.S.
(Percent impairment attributed to each pollutant is shown in parentheses. For example, siltation is listed as a cause of impairment in 51% of impaired river miles.)

Rank	Rivers	Lakes	Estuaries
1	**Siltation** (51%)	**Nutrients** (51%)	**Nutrients** (57%)
2	**Nutrients** (40%)	Metals (51%)	**Pathogens** (42%)
3	**Pathogens** (32%)	**Siltation** (25%)	Priority Toxic Organic Chemicals (40%)
4	**Oxygen-Depleting Substances** (29%)	**Oxygen-Depleting Substances** (21%)	**Oxygen-Depleting Substances** (33%)
5	Pesticides (21%)	Noxious Aquatic Plants (16%)	Oil and Grease (20%)

Reference: *National Water Quality Inventory: 1996 Report to Congress*(EPA, 1997a). Items in bold print are those most commonly associated with animal feeding operations (as well as other sources). AFOs are also potential contributors of each of the other leading pollutants. Figure totals exceed 100 percent because water bodies may be impaired by more than one source.

Other reports have also indicated that AFOs pose a threat to U.S. marine and estuarine resources. The National Oceanic and Atmospheric Administration (NOAA) estimated that feedlots contributed to the impairment of 110 shellfish beds in 1995 (NOAA, 1995). In the Gulf of Mexico, an oxygen-depleted "dead zone" covering up to 7,000 square miles has been attributed to excess nutrients delivered primarily by the Mississippi River system (Montgomery, 1996). Animal waste is one of several significant sources of nutrients in surface waters (other anthropogenic sources include point sources, commercial fertilizers, atmospheric deposition, urban runoff, and contaminated groundwater). Excess nutrients stimulate algae blooms, which can lead to dissolved oxygen depletion during night-time respiration and during decomposition by other organisms. The problem in the Gulf demonstrates that water quality degradation is not always limited to the pollutant discharge location. The nutrient loadings to the Gulf originate from sources over a large land area, with approximately 41 percent of the U.S. ultimately draining to the Gulf (Montgomery, 1996).

Another significant concern is the potential for AFOs to contribute to nitrate contamination of drinking water, particularly groundwater. Nitrate poisoning is a potentially fatal condition which affects infants by reducing the oxygen-carrying capacity of the blood. According to EPA's *National Survey of Pesticides in Drinking Water Wells* (1990), nitrate (a form of nitrogen) is the most widespread agricultural contaminant in drinking water wells. EPA estimates that 4.5 million people are exposed to elevated nitrate levels (i.e., levels greater than the drinking water Maximum Contaminant Level of 10 mg/l nitrate-nitrogen) in groundwater (EPA, 1990). Animal wastes, commercial fertilizers, septic systems, and leaking sewers can all be significant sources of contamination.

1.2 Pollutant Sources

Pollution from AFOs can arise from several sources, including manure, animal carcasses, process waters (e.g., milkhouse waste), feed, bedding, eroded soil, and emissions from confinement buildings. Manure is the primary origin of AFO pollutants, and is the main focus of this chapter. Sources of manure pollution include direct discharges (from grazing animals or from pipes or other waste conveyances), open feedlots, pastures, treatment and storage lagoons, stockpiles, and land application. Animal manure is much more abundant than human waste. It is estimated that in 1992, approximately 133 million dry tons of animal manure were produced, compared to 10 million dry tons of human sanitary waste (See Appendix A). Yet while the disposal of human waste is highly regulated, the disposal of animal waste has been largely unregulated. Manure can have valuable use as a fertilizer and soil conditioner, but in many cases it is applied in excess of crop nutrient requirements due to manure nutrient ratios that differ from crop needs, and/or lack of available nearby land. This problem has been magnified as the industry has become more concentrated, with a trend toward more animals on fewer farms and less land. Incidents of waste spills, excessive runoff, leaking storage lagoons, and odor problems have heightened public awareness and concerns (See Appendix B for a list of documented impacts from animal operations).

1.3 Multi-media Impacts

Animal feeding operations are associated with a variety of pollutants, including oxygen-demanding substances, ammonia, solids, nutrients (specifically nitrogen and phosphorus), pathogens, salts, trace elements, antibiotics, pesticides, hormones, and odor and other airborne emissions. AFO pollutants can produce multimedia impacts. The general categories of impacts are:

1) Surface water impacts. Impacts are associated with waste spills, as well as surface runoff and subsurface flow. The waste's oxygen demand and ammonia content can result in fish kills and reduced biodiversity. Solids can increase turbidity and impact benthic organisms. Nutrients contribute to eutrophication and associated algae blooms. Algal decay and night-time respiration can lead to depressed dissolved oxygen levels, which can result in fish kills and reduced biodiversity. Eutrophication is also a factor in blooms of toxic algae and other toxic microorganisms, such as *Pfiesteria piscicida*. Human and animal health impacts are associated with drinking contaminated water (pathogens and

nitrates), contact with contaminated water (pathogens and *Pfiesteria*), and consuming contaminated shellfish (pathogens and toxic algae). Trace elements (e.g., arsenic, copper, selenium, and zinc) may also present human health and ecological risks. Salts contribute to salinization and disruption of ecosystem balance. Antibiotics, pesticides, and hormones may have low-level, long-term ecosystem effects.

2) Groundwater impacts. Human and animal health impacts are associated with pathogens and nitrates in drinking water. Leaching salts may cause underlying groundwater to become unsuitable for human consumption.

3) Air impacts. Impacts include human health impacts (from ammonia, hydrogen sulfide, other odor-causing compounds, and particulates), and contribution to global warming (due to methane emissions resulting from anaerobic decomposition of manure). Additionally, volatilized ammonia can be redeposited on the earth and contribute to eutrophication.

4) Soil impacts. Trace elements and salts in animal manure can accumulate in the soil and become toxic to plants. Salts deteriorate soil quality by leading to reduced permeability and poor tilth. Crop uptake may provide a human and animal exposure pathway for trace elements and pathogens.

The impacts of specific pollutants are discussed in more detail in the following section.

2. POLLUTANTS OF CONCERN AND ASSOCIATED IMPACTS

2.1 Oxygen-Demanding Substances

Origin and Impacts:
This pollutant category refers to the biodegradable content of manure. When discharged to surface water, the material is decomposed by aquatic bacteria and other microorganisms. During this decay process, dissolved oxygen is consumed, reducing the amount available for aquatic animals. Severe depressions in dissolved oxygen levels can result in fish kills. There are numerous examples nationwide of fish kills resulting from manure discharges and runoff from various types of AFOs (See Appendix B).

More moderate depressions in dissolved oxygen levels are associated with reduced biodiversity (i.e., reduction in desirable species). In a study of three Indiana stream systems, researcher James R. Gammon (1995) found that waters downstream from animal feedlots (mainly hog and dairy operations) contained fewer fish and a limited number of species of fish in comparison with reference sites. Gammon also found excessive algal growth, altered oxygen content, and increased levels of ammonia, turbidity, pH, and total dissolved solids.

Transport:
Grazing animals may deposit manure directly into surface waters. Collected manure may be introduced directly into surface waters either intentionally (via pipe, ditch, or other conveyance)

or unintentionally (via storage structure failure, overflow, operator error, etc.). While severe rainfall conditions have been a causative factor in many waste spills, a review of Indiana Department of Environmental Management records showed that the most common causes of waste releases were intentional discharge and lack of operator knowledge (Hoosier Environmental Council, 1997).

Manure can also be introduced to surface waters via runoff if it is over-applied or misapplied to land. For example, manure application to saturated or frozen soils may result in a discharge to surface waters. Other factors that promote runoff to surface waters are steep land slope, high rainfall, low soil porosity, and proximity to surface waters.

2.2 Solids

Origin and Impacts:

AFOs can be a source of manure solids and soil solids in surface waters. Suspended solids can clog fish gills and increase turbidity. Increased turbidity reduces penetration of light through the water column, thereby limiting the growth of desirable aquatic plants which serve as critical habitat for fish, crabs, and other aquatic organisms. Solids that settle out as bottom deposits can alter or destroy habitat for fish and benthic organisms. Additionally, solids provide a medium for the accumulation, transport, and storage of other pollutants, including nutrients, pathogens, and trace elements. Sediment-bound pollutants often have a long history of interaction with the water column through cycles of deposition, resuspension, and redeposition.

Transport:

As described previously, manure solids can be introduced into surface waters either directly or via runoff. Soil solids can be introduced into surface waters due to erosion caused by grazing animals or poor cropland management.

2.3 Nitrogen

Nitrogen (N) is an essential nutrient required by all living organisms. It is ubiquitous in the environment, accounting for 78 percent of the atmosphere as elemental nitrogen (N_2). This form of nitrogen is inert and does not impact environmental quality. It is also not bioavailable to most organisms and therefore has no fertilizer value. Nitrogen also forms other compounds which are bioavailable, mobile, and potentially harmful to the environment. The nitrogen cycle (Figure 2-1) shows the various forms of nitrogen and the processes by which they are transformed and lost to the environment.

Manure nitrogen is primarily in the form of organic nitrogen and ammonia nitrogen compounds. In organic form, nitrogen is unavailable to plants. However, via microbial processes, the organic nitrogen is transformed into ammonium (NH_4^+) and nitrate (NO_3^-) forms, which are bioavailable and therefore have fertilizer value. These forms can also produce negative environmental impacts when they are transported in the environment. The impacts and general transport processes are described in the following subsections.

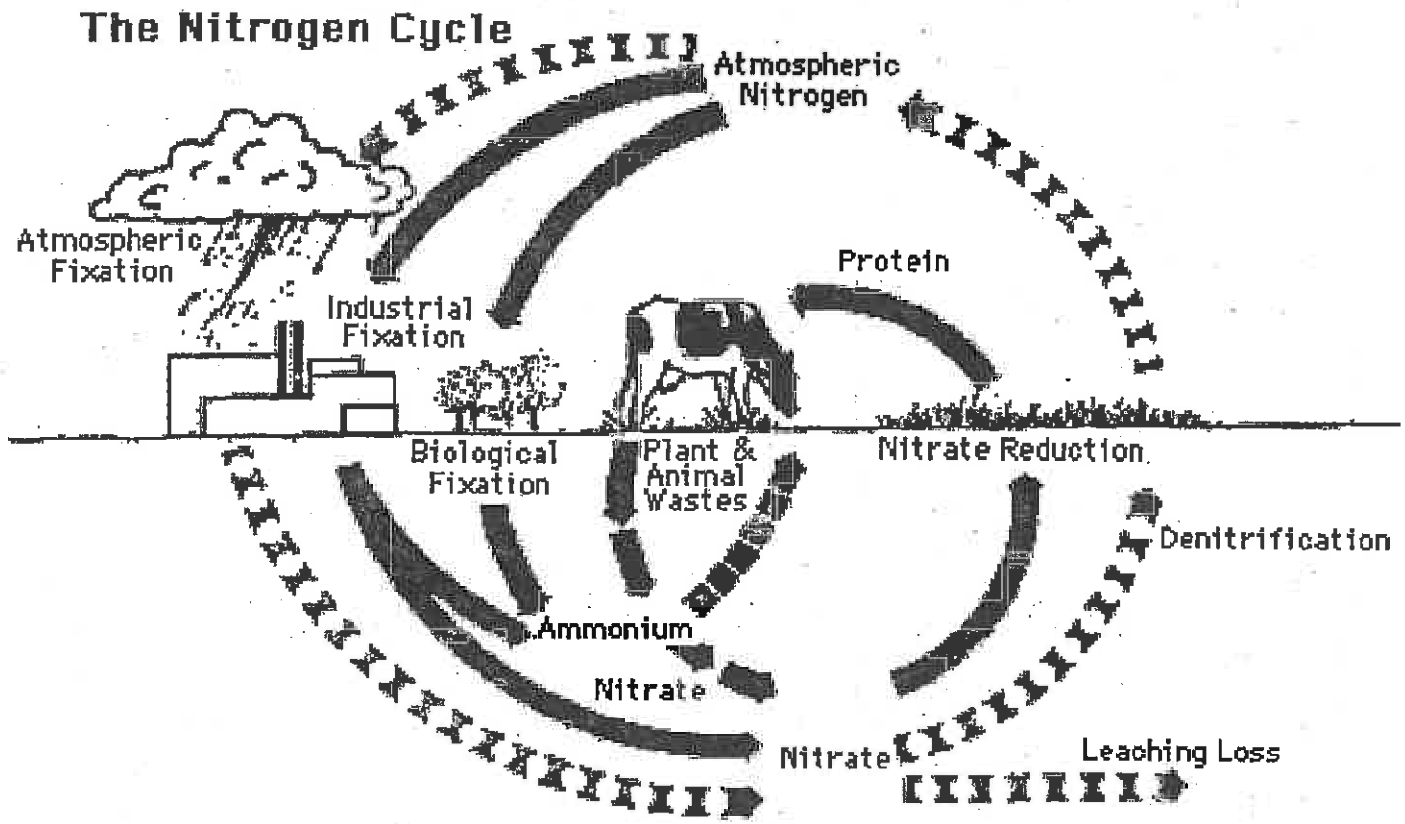

FIGURE 2-1

Source: O'Leary et al., 1997.

2.3.1 Ammonia

Origin and Impacts:

"Ammonia-nitrogen" includes the ionized form (ammonium, NH_4^+) and the un-ionized form (ammonia, NH_3). Ammonium is produced when microorganisms break down organic nitrogen products such as urea and proteins in manure. This decomposition can occur in either aerobic or anaerobic environments. In solution, ammonium enters into an equilibrium reaction with ammonia, as shown in the following equation:

$$NH_4^+ \text{ W } NH_3 + H^+.$$

As the equation indicates, higher pH levels (lower H^+ concentrations) favor the formation of ammonia, while lower pH levels (higher H^+ concentrations) favor the formation of ammonium. Both forms are toxic to aquatic life, although the un-ionized form (ammonia) is much more toxic. Fish kills due to ammonia toxicity are a potential consequence of the direct discharge of animal wastes to surface waters. This is illustrated by a May 1997 incident in Wabasha County, Minnesota, in which ammonia in a dairy manure release killed 16,500 minnows and white suckers (Clean Water Action Alliance, 1998).

Ammonia is also of environmental concern because it exerts a direct biochemical oxygen demand (BOD) on the receiving water. As ammonia is oxidized, dissolved oxygen is consumed. Moderate depressions of dissolved oxygen are associated with reduced species diversity, while more severe depressions can produce fish kills.

Additionally, ammonia can lead to eutrophication, or nutrient over-enrichment, of surface waters. Ammonia itself is a nutrient, and it is also easily transformed to nitrate (another nutrient form of nitrogen) in the presence of oxygen. While nutrients are necessary for a healthy ecosystem, the overabundance of nutrients (particularly nitrogen and phosphorus) can lead to nuisance algae blooms. Nitrogen is typically the limiting nutrient in estuaries and coastal marine waters. That is, if all nitrogen is used, plant growth will cease. This is in contrast to freshwaters, where phosphorus is typically the limiting nutrient. There can be exceptions to this generalization, however, particularly in water bodies with heavy pollutant loads. For example, in a typical (nitrogen-limited) estuary, excess nitrogen levels would be expected to produce algal blooms. However, estuarine systems may become phosphorus-limited when nitrogen concentrations are high. In such cases, excess phosphorus will produce algal blooms (Bartenhagen et al., 1994). Thus, both nitrogen and phosphorus loads can contribute to eutrophication in either water type.

In addition to producing negative aesthetic impacts, algal blooms can produce significant ecological and human health impacts. The blooms reduce the penetration of light through the water column (and thereby limit the growth of desirable aquatic plants), and reduce night-time levels of dissolved oxygen via respiration. Decay of dead algae also results in dissolved oxygen depressions. These depressions may reduce biodiversity, or may be severe enough to produce fish kills. Algae can affect drinking water by clogging treatment plant intakes, producing objectionable tastes and odors, and increasing production of carcinogenic chlorinated byproducts such as trihalomethanes. These impacts result in increased drinking water treatment costs.

Blooms of toxic estuarine algae, such as red tides, have been associated with eutrophication in coastal regions, and can result in shellfish poisoning (Mueller and Thomann, 1987).

Blooms of other toxic estuarine organisms, such as the dinoflagellate *Pfiesteria piscicida*, are also associated with nutrient over-enrichment. *Pfiesteria* has been implicated as the primary causative agent of many major fish kills and fish disease events in North Carolina estuaries and coastal areas (NCSU, 1998), as well as in Maryland and Virginia tributaries to the Chesapeake Bay (EPA, 1997b). The organism has also been linked with human health impacts through dermal or inhalation exposure. Researchers working with dilute toxic cultures of *Pfiesteria* exhibited symptoms such as skin sores, severe headaches, blurred vision, nausea/vomiting, sustained difficulty breathing, kidney and liver dysfunction, acute short-term memory loss, and severe cognitive impairment (NCSU, 1998). People with heavy environmental exposure have exhibited symptoms, as well. In a recent study, such environmental exposure was definitively linked with cognitive impairment, whereas physical symptoms were less consistent (Morris et al., 1998).

Pfiesteria often lives as a nontoxic predatory animal, becoming toxic in response to fish excretions or secretions (NCSU, 1998). While nutrient-enriched conditions are not required for toxic outbreaks to occur, excessive nutrient loadings are a concern because they help create an environment rich in microbial prey and organic matter that *Pfiesteria* uses as a food supply. By increasing the concentration of *Pfiesteria*, nutrient loads increase the likelihood of a toxic outbreak when adequate numbers of fish are present (Citizens *Pfiesteria* Action Commission, 1997). Researchers have documented stimulation of *Pfiesteria* by human sewage and swine effluent spills, and have shown that the organism can be highly stimulated by both inorganic and organic nitrogen and phosphorus enrichments (NCSU, 1998).

Transport

Ammonia can reach surface waters in a number of ways, including direct discharge, leaching, dissolution in surface runoff, erosion, and atmospheric deposition. Leaching and runoff are generally not significant transport mechanisms for ammonia compounds, because ammonium can be sorbed to soils (particularly those with high cation exchange capacity, or CEC), incorporated (fixed) into clay or other soil complexes, or transformed into organic form by soil microbes (Follett, 1995). However, in these forms, nitrogen can be transported to surface waters by erosion.

Atmospheric deposition can be a significant mechanism of nitrogen transport to surface waters. Ammonia in solution is subject to gaseous loss to the atmosphere. It can then be redeposited on the earth (or directly into surface waters), either in dry form or dissolved in precipitation ("acid rain"). Losses from animal feeding operations can be significant, arising from sources such as manure piles, storage lagoons, and land application fields. In North Carolina, animal agriculture is responsible for over 90 percent of all ammonia emissions; in turn, ammonia comprises more than 40 percent of the total estimated nitrogen emissions from all sources (Aneja et al., 1998). Data from Sampson County, North Carolina show that "ammonia rain" has increased as the hog industry has grown, with ammonia levels in rain more than doubling between 1985 and 1995 (Aneja et al., 1998).

The degree of ammonia volatilization is dependent on the manure management system. For example, losses are greater when manure remains on the land surface rather than being incorporated into the soil, and are particularly high when spray application is performed. Environmental conditions also affect the extent of volatilization. For example, losses are greater at higher pH levels, at higher temperatures and drier conditions, and in soils with low cation exchange capacity, such as sands. Losses are decreased by the presence of growing plants. (Follett, 1995)

Volatilization of ammonia is of concern not only because of atmospheric deposition, but because of direct localized impacts on air quality. Ammonia produces an objectionable odor, and can cause nasal and respiratory irritation.

2.3.2 Nitrate

Origin and Impacts

In the biochemical process of nitrification, aerobic bacteria oxidize ammonium to nitrite (NO_2^-) and then to nitrate (NO_3^-). Nitrite is toxic to most fish and other aquatic species, but it typically does not accumulate in the environment because it is rapidly transformed to nitrate in an aerobic environment. Alternatively, nitrite (and nitrate) can undergo bacterial denitrification in an anoxic environment. In denitrification, nitrate is converted to nitrite, and then further converted to gaseous forms of nitrogen - elemental nitrogen (N_2), nitrous oxide (N_2O), nitric oxide (NO), and/or other nitrogen oxide (NO_x) compounds. Nitrification occurs readily in the typically aerobic conditions of receiving streams and dry soils; denitrification can be significant in anoxic bottom waters and saturated soils.

Nitrate is a useful form of nitrogen because it is biologically available to plants and is therefore a valuable fertilizer. However, excessive levels of nitrate in drinking water can produce negative health impacts on infant humans and animals. Nitrate poisoning affects infants by reducing the oxygen-carrying capacity of the blood. The resulting oxygen starvation can be fatal. Nitrate poisoning, or methemoglobinemia, is commonly referred to as "blue baby syndrome" because the lack of oxygen can cause the skin to appear bluish in color. To protect human health, EPA has set a drinking water Maximum Contaminant Level (MCL) of 10 mg/l for nitrate-nitrogen. Once a water source is contaminated, the costs of protecting consumers from nitrate exposure can be significant. Nitrate is not removed by conventional drinking water treatment processes; its removal requires additional, relatively expensive treatment units.

In a national survey by EPA, nitrate was found to be the most widespread agricultural contaminant in drinking water wells (EPA, 1990). In a separate assessment of historical, nationwide water quality data, the U.S. Geological Survey (USGS) found that nitrate levels exceeded the MCL in 12 percent of the domestic-supply wells in agricultural areas (Mueller and Helsel, 1997). Studies of smaller geographical areas have also revealed evidence of nitrate contamination in groundwater. As of 1988, 40 percent of wells in the Chino Basin, California, had nitrate levels in excess of the MCL; dairy operations were identified as the major source of contamination (Anton et al., 1988). This presents potentially widespread impacts, since water from the Chino Basin is used to recharge the primary source of drinking water for residents of heavily populated Orange County. In southeastern Delaware and the Eastern Shore of Maryland, where poultry production is prominent, over twenty percent of wells were found to have nitrate levels exceeding the MCL (Ritter et al., 1989). Measured nitrate levels in groundwater beneath Delaware poultry houses have been as high as 100 mg/l (Ritter et al., 1989). Generally, people drawing water from domestic wells are at greater risk of nitrate poisoning than those drawing from public wells (Nolan and Ruddy, 1996), since the wells are typically shallower and monitoring is not required. People served by public systems are better protected even if the water becomes contaminated, due to water quality monitoring and treatment requirements.

Elevated nitrate levels can also be been found in surface waters, although the impacts are typically less severe than groundwater impacts. This is because typical flat farmland conditions tend to promote infiltration over runoff, and because surface waters provide for greater mixing and more rapid dilution. Additionally, anoxic bottom waters of lakes and streams provide greater opportunity for nitrate removal via denitrification. In the USGS historical assessment, analysts found that nitrate levels in streams in agricultural areas were elevated compared to undeveloped areas. However, they were generally less than those for groundwater in similar locations, and the drinking water MCL was rarely exceeded. The primary exception to this pattern was in the Midwest, where poorly drained soils restrict water percolation and artificial drainage provides a quick path for nutrient-rich runoff to reach streams (Mueller and Helsel, 1997).

While nitrate levels in many drinking water sources across the country are excessive, reported cases of methemoglobinemia are rare. This does not necessarily mean that cases are not occurring, however. Methemoglobinemia can be difficult to detect in infants because its symptoms are similar to other conditions (Michel et al., 1996). Also, doctors are not always required to report it (Cohen et al, 1996). Studies in South Dakota and Nebraska have indicated that most cases of methemoglobinemia are not reported (Grant, 1981 and Meyer, 1994). For example, in South Dakota during the time period 1950 - 1980, only two cases were reported while at least 80 were estimated to have occurred.

As discussed in Section 2.3.1, nitrate is also a nutrient which can lead to eutrophication of surface waters. Eutrophication can lead to negative aesthetic impacts, fish kills, reduced biodiversity, objectionable tastes and odors, increased drinking water treatment costs, and growth of toxic organisms.

Transport

Nitrate can reach surface waters via direct discharge of animal wastes. Lagoon leachate and land-applied manure can also be significant contributors of nitrate to both surface and groundwaters. Nitrate is water soluble and moves freely through most soils. Overland runoff can carry dissolved nitrate to surface waters. Percolating water and lagoon leachate can transport nitrate to groundwater, as well as to surface waters via subsurface flows. Nitrate can also be introduced into surface waters from interflow and groundwater via hydrologic connections. It is believed that the nitrate contributions to surface water from agriculture are primarily from groundwater connections and other subsurface flows rather than overland runoff (Follett, 1995). In the Chesapeake Bay watershed, for example, USGS estimates that about half of the nitrogen loads from all sources to nontidal streams and rivers originate from groundwater (ASCE, 1998).

Since the groundwaters there take an average of ten to twenty years to reach the bay, it may take several decades to realize the full effect of pollutant additions or reductions (ASCE, 1998). Nationally, about 40 percent of the average annual stream flow is from groundwater (U.S. EPA, 1993b), so groundwater contamination can have significant impacts on surface water quality.

It has been asserted that manure solids effectively "self-seal" lagoons and prevent groundwater contamination, however some studies have shown otherwise. For example, when researchers analyzed samples from the vadose zone (the unsaturated zone above the water table) downgradient of unlined waste lagoons at five Texas dairies, they found that three of the five sites exhibited nitrate levels in excess of the MCL (Frarey et al., 1994). Even clay-lined lagoons have the potential to leak, since they can crack or break as they age, and can be susceptible to burrowing worms. In a three-year study of clay-lined swine lagoons on the Delmarva Peninsula, researchers found that leachate from lagoons located in well-drained loamy sand had a severe impact on groundwater quality (Ritter and Chirnside, 1990). Artificial liners are preferable to clay liners because they are less permeable. Puncture risk can be minimized by installing the liner between clay layers. (Agricultural Animal Waste Task Force, 1996) Concrete liners are another alternative; they should be properly designed and constructed to help prevent cracking. Glass-lined steel tanks are also being used by some producers to reduce leaching potential.

Nitrate transport is affected by local conditions. For example, potential transport of nitrate to groundwater is greater in areas of high soil permeability and shallow water tables. Direct transport to surface water is greater in areas with low soil permeability and steep slopes. Other factors affecting nitrate transport include surface depressions, soil roughness, and vegetative cover, which decrease runoff potential by promoting water infiltration. Drainage from tile drains may be directed to surface waters or into groundwater wells. Risk of nitrate pollution generally increases at higher rates of nitrogen application. While application of manure and commercial fertilizers are essentially unregulated by EPA, EPA does regulate application of biosolids (municipal sewage sludge). To reduce the risk of nitrate contamination from biosolids, EPA's Part 503 Rule requires that land application be limited to agronomic rates for nitrogen (i.e., the nitrogen applied may not exceed the cover crop's nitrogen requirements).

Application of manure at agronomic rates should not be expected to completely eliminate nitrogen transport to surface and groundwaters, for the following reasons: 1) nitrate is extremely mobile, and may move below the plant root zone before being taken up; 2) ammonia may volatilize (from the storage lagoon or the application field) before being taken up; 3) it may be difficult to distribute the waste evenly, resulting in local "hot spots;" 4) it may be difficult to obtain a representative sample of the waste to determine the amount of mineralized (plant-available) nitrogen; 5) there are uncertainties associated with the estimated rate of nitrogen mineralization in the applied waste; 6) transport is affected by the manure application method (e.g., drip irrigation, spray irrigation, knifing, etc.); and 7) transport is affected by uncontrollable environmental factors such as rainfall.

2.4 Phosphorus

Origin and Impacts

Animal wastes contain both organic and inorganic forms of phosphorus (P). As with nitrogen, the organic form must mineralize to inorganic form to become available to plants. This occurs as the manure ages and the organic P hydrolyzes to inorganic phosphate-containing compounds. The phosphorus cycle (Figure 2-2) is much simpler than the nitrogen cycle because phosphorus lacks an atmospheric connection and is less subject to biological transformation.

Phosphorus is of concern in surface waters because it is a nutrient which can lead to eutrophication. As discussed in Section 2.3.1, eutrophication can lead to negative aesthetic impacts, fish kills, reduced biodiversity, objectionable tastes and odors, increased drinking water treatment costs, and growth of toxic organisms. Phosphorus is also a concern because phosphate levels greater than 1.0 mg/l may interfere with coagulation in drinking water treatment plants (Bartenhagen et al., 1994).

Phosphorus is of particular concern in freshwaters, where plant growth is typically limited by phosphorus levels. Under high pollutant loads, however, freshwaters may become nitrogen-limited (Bartenhagen et al., 1994). Thus, both nitrogen and phosphorus loads may contribute to eutrophication.

Lake Okeechobee, Florida is one of the Nation's resources that have been impacted by phosphorus loadings from AFOs. Lake Okeechobee is the second largest lake entirely within U.S boundaries, and serves as a drinking water supply for millions of people. In the summer of 1986, blue-green algae spread across more than 120 square miles of the lake surface. Significant algal blooms also occurred in the fall of 1986 and 1987. These blooms have been associated with steadily increasing phosphorus concentrations and phosphorus-to-nitrogen ratios; dairy and beef operations were identified as the main source of phosphorus loadings (Swift et al., 1987).

Transport

Phosphorus can reach surface waters via direct discharge and runoff from land application of animal wastes. The organic P compounds in manure are generally water soluble and subject to leaching and dissolution in runoff (Gerritse, 1977). Once in receiving waters, these organic compounds can undergo transformation and become available to aquatic plants. Overall, land-applied phosphorus is considered much less mobile than nitrogen, since the mineralized (inorganic phosphate) form is easily adsorbed to soil particles. For this reason, most agricultural phosphorus control measures have focused on soil erosion control to limit transport of particulate phosphorus. However, soils do not have infinite phosphate adsorption capacity, and dissolved inorganic phosphates can enter waterways via runoff even if soil erosion is controlled. Animal wastes typically have lower N:P ratios than crop N:P ratios, such that application of manure at a nitrogen-based agronomic rate can result in application of phosphorus at several times the agronomic rate (Sims, 1995). Summaries of soil test data in the U.S. confirm that many soils in areas dominated by animal-based agriculture have excessive levels of phosphorus (Sims, 1994). Research also indicates that there is a potential for phosphorus to leach into groundwater through sandy soils with high phosphorus content (Citizens *Pfiesteria* Action Commission, 1997).

THE PHOSPHORUS CYCLE

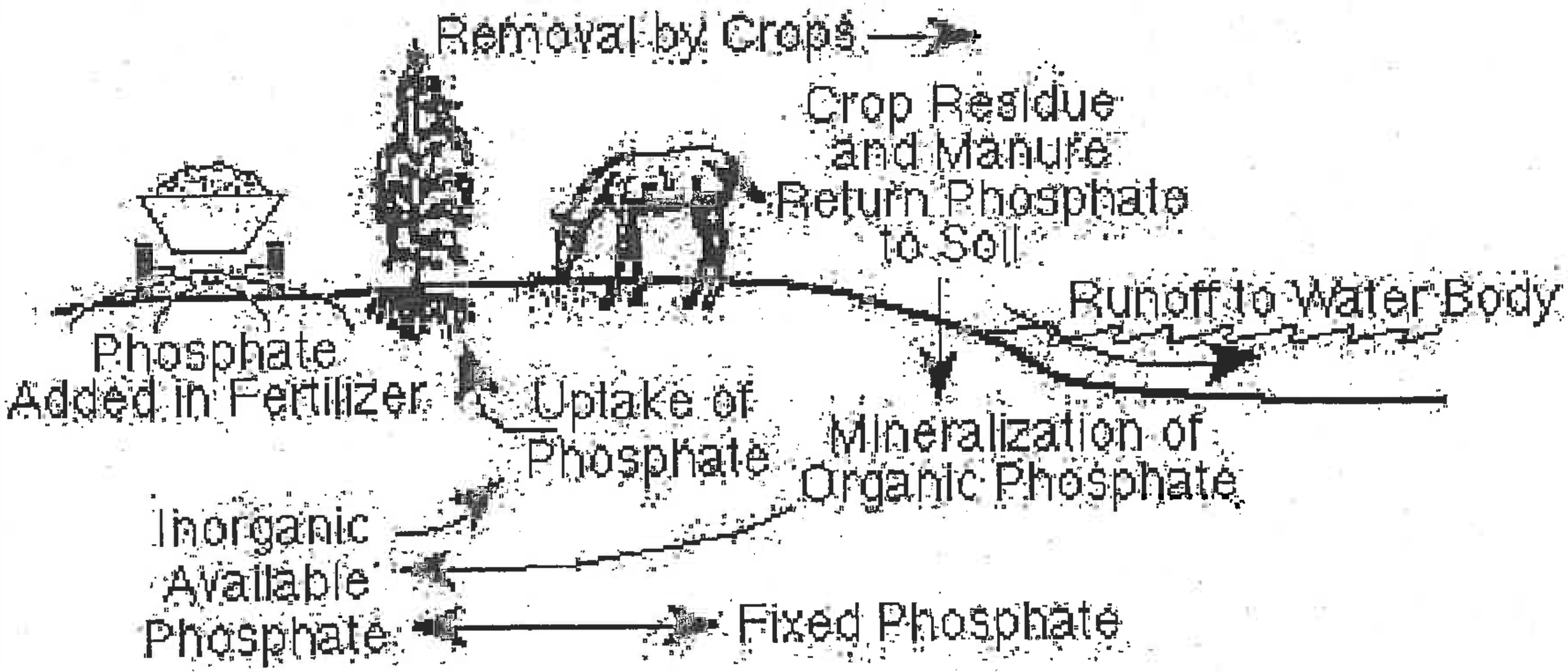

FIGURE 2-2

Source: Busman et al., 1997.

2.5 Pathogens

Origins and Impacts
Both manure and animal carcasses can contain pathogens (disease-causing organisms) which can impact human health, other livestock, aquatic life, and wildlife when introduced into the environment. Many pathogenic organisms found in manure can infect humans. A list of several potential manure-related human diseases and pathogens is presented in Table 2-1.

Table 2-1
Some Diseases and Parasites Transmittable to Humans from Animal Manure

DISEASE	RESPONSIBLE ORGANISM	SYMPTOMS
Bacteria		
Anthrax	*Bacillus anthracis*	Skin sores, fever, chills, lethargy, headache, nausea, vomiting, shortness of breath, cough, nose/throat congestion, pneumonia, joint stiffness, joint pain
Brucellosis	*Brucella abortus, Brucella melitensis, Brucella suis*	Weakness, lethargy, fever, chills, sweating, headache
Colibaciliosis	*Escherichia coli* (some serotypes)	Diarrhea, abdominal gas
Coliform mastitis-metritis	*Escherichia coli* (some serotypes)	Diarrhea, abdominal gas
Erysipelas	*Erysipelothrix rhusiopathiae*	Skin inflammation, rash, facial swelling, fever, chills, sweating, joint stiffness, muscle aches, headache, nausea, vomiting
Leptospirosis	*Leptospira pomona*	Abdominal pain, muscle pain, vomiting, fever
Listeriosis	*Listeria monocytogenes*	Fever, fatigue, nausea, vomiting, diarrhea
Salmonellosis	*Salmonella* species	Abdominal pain, diarrhea, nausea, chills, fever, headache

DISEASE	RESPONSIBLE ORGANISM	SYMPTOMS
Tetanus	*Clostridium tetani*	Violent muscle spasms, "lockjaw" spasms of jaw muscles, difficulty breathing
Tuberculosis	*Mycobacterium tuberculosis, Mycobacterium avium*	Cough, fatigue, fever, pain in chest, back, and/or kidneys
Rickettsia		
Q fever	*Coxiella burneti*	Fever, headache, muscle pains, joint pain, dry cough, chest pain, abdominal pain, jaundice
Viruses		
Foot and Mouth	virus	Rash, sore throat, fever
Hog Cholera	virus	
New Castle	virus	
Psittacosis	virus	Pneumonia
Fungi		
Coccidioidomycosis	*Coccidioides immitus*	Cough, chest pain, fever, chills, sweating, headache, muscle stiffness, joint stiffness, rash, wheezing
Histoplasmosis	*Histoplasma capsulatum*	Fever, chills, muscle ache, muscle stiffness, cough, rash, joint pain, joint stiffness
Ringworm	Various *microsporum* and *trichophyton*	Itching, rash
Protozoa		
Balantidiasis	*Balatidium coli*	
Coccidiosis	*Eimeria* species	Diarrhea, abdominal gas

DISEASE	RESPONSIBLE ORGANISM	SYMPTOMS
Cryptosporidiosis	*Cryptosporidium* species	Watery diarrhea, dehydration, weakness, abdominal cramping
Giardiasis	*Giardia lamblia*	Diarrhea, abdominal pain, abdominal gas, nausea, vomiting, headache, fever
Toxoplasmosis	*Toxoplasma* species	Headache, lethargy, seizures, reduced cognitive function
Parasites/Metazoa		
Ascariasis	*Ascaris lumbricoides*	Worms in stool or vomit, fever, cough, abdominal pain, bloody sputum, wheezing, skin rash, shortness of breath
Sarcocystiasis	*Sarcosystis* species	Fever, diarrhea, abdominal pain

References: USDA, 1992 (for diseases and responsible organisms). Symptom descriptions were obtained from various medical and public health service Internet websites. Pathogens in animal manure are a potential source of disease in humans and other animals. This list represents a sampling of diseases that may be transmittable to humans.

Many of these pathogens are transmitted via the fecal-oral route. Others may be transmitted through inhalation. In the water environment, humans may be exposed to pathogens via consumption of contaminated drinking water, or by incidental ingestion during contact recreation in contaminated waters. Contact recreation can also result in other miscellaneous infections of the skin, eye, ear, nose, and throat. Many of the listed pathogens could conceivably be transmitted through a shellfish vector (Stelma and McCabe, 1992). Shellfish are filter feeders which are prone to accumulating bacteria and viruses. Flies and other vectors also present potential pathways for disease transmission.

Fecal coliform counts are often used as a surrogate measurement for gastroenteric pathogens, since the presence of fecal coliform bacteria is an indication of contamination by human and/or animal wastes. To help protect human health, EPA has recommended an ambient water quality standard of 200 CFU/ml for fecal coliforms in contact-recreational waters. Fecal coliform pollution from various sources is often cited in beach closures and shellfish restrictions. Cow manure has specifically been implicated as a causative factor in the high bacteria levels and ensuing swimming restrictions on Tainter Lake, Wisconsin (Behm (2)). Fecal coliform counts of 3,000 CFU/100 ml and fecal streptococci counts over 30,000 CFU/100 ml have been reported downstream from a hog waste lagoon site (Paul, pers. comm., 1997). Bacteria discharged to the water column can subsequently adsorb to sediments, presenting a long-term health hazard. When the bottom stream is disturbed, the sediment releases bacteria back into the water column (Sherer et al., 1988, 1992).

The mandated treatment of public water supplies helps reduce the risk of infection via drinking water. However, protecting source water is the first step in providing safe drinking water. *Cryptosporidium parvum* is of particular concern, since it is resistant to conventional treatment. *Cryptosporidium* is a protozoan that can produce gastrointestinal illness, with symptoms such as severe diarrhea. Healthy people typically recover relatively quickly (within two to ten days) from gastrointestinal illnesses such as cryptosporidiosis. However, such diseases can be fatal in people with weakened immune systems. This subpopulation includes children, the elderly, people with HIV infection, chemotherapy patients, and those taking medications that suppress the immune system.

In Milwaukee, Wisconsin in 1993, *Cryptosporidium* contamination of a public water supply caused more than 100 deaths and an estimated 403,000 illnesses (Casman, 1996). The source of the oocysts was not identified, but speculated sources include runoff from cow manure application sites, wastewater from a slaughterhouse and meat packing plant, and municipal wastewater treatment plant effluent.

There is concern that pathogens may be introduced to the air directly from animal feeding houses (see Section 2.8) or during spray application of wastes. Another concern is exposure to pathogens through the food chain. There is evidence that a 1993 *E. coli* outbreak in Maine was the result of manure applications to a vegetable garden (Cieslak et al., 1993). Additionally, three *E. coli* outbreaks (one in Montana in 1995, one in Illinois in 1996, and one in Connecticut in 1996) were traced to organic lettuce growers. It is suspected that the lettuces were contaminated by infected cow manure (Nelson, 1997). In another incident in Maine, a few hundred children were sickened by *Cryptosporidum*. The source was fresh-pressed apple cider made from apples gathered from a cow pasture (Millard et al., 1994).

Wildlife impacts have also been documented. The U.S. Fish and Wildlife Service estimates that thousands of migratory waterfowl have died each year from avian botulism and avian cholera caused by bacteria in livestock waste (USFWS, 1991).

Transport

Sources of pathogen contamination from livestock operations include direct discharges and leaching lagoons. Surface runoff from land application fields can also be a source of pathogen contamination, particularly if a rainfall event occurs soon after application. The natural filtering and adsorption action of soils typically causes a majority of the microorganisms in land-applied manure to be stranded at the soil surface (Crane et al., 1980). This helps protect underlying groundwater, but increases the likelihood of runoff losses to surface waters. Depending on weather, site, and operating conditions, subsurface flows may also be a significant mechanism for pathogen transport.

The survivability and transport of land-applied manure pathogens are not well-characterized.

Several researchers (Dazzo et al., 1973; Ellis and McCalla, 1976; Morrison and Martin, 1977; Van Donsel et al., 1967) have found that soil type, manure application rate, and soil pH are dominating factors in bacteria survival. Experiments on land-applied poultry manure (Crane et al., 1980) have indicated that the population of fecal organisms decreases rapidly as the manure is heated, dried, and exposed to sunlight on the soil surface. Regrowth of fecal organisms was also seen in these experiments, however.

The continued application of waste on a particular area could lead to extended pathogen survival and buildup (Dazzo et al., 1973). Additionally, repeated applications and/or high application rates would be expected to increase the likelihood of runoff to surface water and transport to groundwater. While surface waters are typically expected to be more prone than groundwaters to pathogen contamination, groundwaters in areas of sandy soils, limestone formations, or sinkholes are particularly vulnerable. For example, in cow pasture areas of Door County, Wisconsin, where a thin topsoil layer is underlain by fractured limestone bedrock, groundwater wells have commonly been shut down due to high bacteria levels (Behm (1)). At one rural household, a well produced brown, manure-laden water (Behm (1)). Private wells are more prone than public wells to contamination, since they tend to be shallower and therefore more susceptible to contaminants leaching from the surface. In a survey of drinking water standard violations in six states over a four-year period, the U.S. General Accounting Office (GAO, 1997) found that bacterial standard violations occurred in three to six percent of community water systems each year. By contrast, GAO reported that bacterial contamination occurred in 15 to 42 percent of private wells, according to statistically representative assessments performed by others.

2.6 Salts and Trace Elements

Origin and Impacts

The salinity of animal manure is due to the presence of dissolved mineral salts. The major cations contributing to salinity are sodium, calcium, magnesium, and potassium; the major anions are chloride, sulfate, bicarbonate, carbonate, and nitrate (National Research Council, 1993). In land-applied wastes, salinity is a concern because salts can accumulate in the soil and become toxic to plants, and can deteriorate soil quality by reducing permeability and contributing to poor tilth. Direct discharges and salt runoff to fresh surface waters contribute to salinization and can disrupt the balance of the ecosystem. Leaching salts can deteriorate groundwater quality, making it unsuitable for human consumption.

Trace elements such as arsenic, copper, selenium, and zinc are often added to animal feed as growth stimulants or biocides (Sims, 1995). When land-applied, these elements can accumulate in soils and become toxic to plants. These elements are also of concern because they can impact human and ecological health. Arsenic and selenium, for example, are toxicants. Copper and zinc can cause gastrointestinal irritation.

The trace elements listed herein (as well as cadmium, mercury, molybdenum, nickel, and lead) are regulated in municipal sewage sludge by EPA's Part 503 Rule. Total concentrations of trace elements in animal manures have been reported as comparable to those in some municipal sludges, with typical values well below the maximum concentrations allowed by Part 503 for land-applied sewage sludge (Sims, 1995). Metals in agronomically-applied manures should pose little risk to human health and the environment. However, repeated application of manures above agronomic rates could result in exceedances of the cumulative metal loading rates established in Part 503, thereby potentially impacting human health and the environment. Documented cases of trace element contamination from animal wastes suggest that control measures may be required to reduce environmental risks. For example, elevated levels of zinc, principally derived from livestock waste, have been found in a Texas Wildlife Refuge (USFWS, 1991).

Transport
More research is needed to better characterize the environmental fate and transport of trace metals in manure. Both salts and trace elements may reach surface waters via direct discharges and runoff from land-application sites. Groundwaters (and subsequently surface waters) may be impacted by leachate from waste lagoons and land application sites. Crop uptake is another potential exposure pathway for humans and wildlife.

2.7 Antibiotics, Pesticides, and Hormones

Origin and Impacts
Antibiotics, pesticides, and hormones are organic compounds which are used in animal feeding operations and can be expected to appear in animal wastes. These compounds may pose risks to the environment. For example, chronic toxicity may result from low-level discharges of antibiotics and pesticides. Estrogen hormones have been implicated in the drastic reduction in sperm counts among Western men (Sharpe and Skakkebaek, 1993) and reproductive disorders in a variety of wildlife (Colburn et al., 1993). Other environmental sources of antibiotics and hormones include municipal wastewaters, septic tank leachate, and runoff from land-applied sewage sludge. Other sources of pesticides include crop runoff and urban runoff.

Transport
Little information is available regarding the concentrations of these compounds in animal wastes, or on their fate/transport behavior and bioavailability in waste-amended soils. These compounds may reach surface waters via direct discharges and runoff from land-application sites. Groundwaters (and subsequently surface waters) may be impacted by leachate from waste lagoons and land application sites.

2.8 Odor and Other Airborne Emissions

Animal waste lagoons are typically not aerated. Under these conditions, the dissolved oxygen in the lagoon is quickly consumed by biological processes, and anaerobic decomposition takes over. In anaerobic decomposition, the wastes are converted biologically to simpler end-products, principally methane and carbon dioxide. Water, ammonia, hydrogen sulfide, phenol, volatile fatty acids, mercaptans, and other compounds are also produced. The decomposition process is desirable because it reduces the biochemical oxygen demand and pathogen content of the waste. However, many of the end-products can produce negative impacts, including strong odors. Heavy odors are the most common complaint from neighbors of swine farms, in particular

(Agricultural Animal Waste Task Force, 1996).

Odor sources include animal confinement buildings, waste lagoons, and land application sites. Odor itself is a significant concern because of its documented effect on mental health (Schiffman et al., 1995), potential for vector attraction, and impact on property values. Additionally, many of the odor-causing compounds can cause physical health impacts. For example, hydrogen sulfide is toxic, and ammonia gas is a nasal and respiratory irritant. (Ammonia can also be redeposited on the earth and subsequently contribute to water quality problems. See Section 2.3.1.) In 1996, the Minnesota Department of Health found that levels of hydrogen sulfide gas at residences near CAFOs were high enough to cause symptoms such as headaches, nausea, vomiting, eye irritation, respiratory problems, achy joints, dizziness, fatigue, sore throats, swollen glands, tightness in the chest, irritability, insomnia, and blackouts (Hoosier Environmental Council, 1997). In an Iowa study, neighbors within two miles of a 4,000-sow swine facility reported more physical and mental health symptoms than a control group (Thu, 1998). These symptoms included chronic bronchitis, hyperactive airways, mucus membrane irritation, headache, nausea, tension, anger, fatigue, and confusion.

Methane and carbon dioxide are "greenhouse gases" which trap heat in the atmosphere and thus contribute to global warming. With respect to animal wastes, control efforts have focused on methane, since methane is extremely effective at trapping heat in the atmosphere, and is a precursor to the formation of tropospheric ozone (a component of photochemical smog). Additionally, methane is a flammable gas which can be captured and utilized for energy recovery. Less attention has been given to controlling animal waste emissions of carbon dioxide, since it is an otherwise benign compound which would also be produced by many other treatment alternatives (such as aerobic biological treatment and incineration).

It is estimated that methane accounts for about 20 percent of the anticipated global warming from the greenhouse effect (U.S. EPA, 1989). An estimated six to ten percent of total global anthropogenic methane emissions arises from animal waste; approximately 14 percent of the global animal waste emissions is from U.S. animals (EPA, 1992). The amount of methane emitted from manure management systems is projected to increase from about ten percent of total U.S. emissions in 1990 to nearly 15 percent by the end of the century (U.S. EPA, 1993a).

Particulates and airborne pathogens are other contaminants associated with animal operations. Particulate emissions from AFOs may include dried manure, feed, epithelial cells, hair, and feathers. The airborne particles make up an organic dust, which includes endotoxin (the toxic protoplasm liberated when a microorganism dies and disintegrates), adsorbed gases, and possibly steroids. The main impact downwind appears to be respiratory irritation due to the inhalation of organic dusts. Studies indicate that the associated microbes generally are not infectious, but may induce inflammation (Thu, 1995).

3. NATIONAL ANALYSES OF ANIMAL WASTE

3.1 Nitrogen Production Relative to Other Sources

As discussed in Section 1.1, excess nutrients (specifically nitrogen and phosphorus) are significant contributors to water quality impairment in the U.S. There are many anthropogenic sources of nitrogen and phosphorus, including municipal and industrial point sources, commercial fertilizer, animal manure, and urban runoff. Atmospheric deposition can also be a significant source of nitrogen.

In an analysis of nitrogen sources in 107 U.S. watersheds, USGS found that proportions of nitrogen originating from various sources differ according to climate, hydrologic conditions, land use, population, and physical geography (Puckett, 1994). While the analysis does not provide estimates of the amount of nitrogen that reaches waterways, it does provide insight into the magnitude of various nitrogen sources (including manure, fertilizers, point sources, and atmospheric deposition). The "manure" source estimates include waste from both confined and unconfined animals. CAFOs were included with "manure" sources rather than point sources, since permitted CAFOs are presumably "zero discharge" facilities and it is difficult to obtain representative discharge data from these facilities. Figure 3-1 displays results of the analysis for selected watersheds (1987 base year). As shown, the production of manure nitrogen relative to other sources varies by watershed. In some instances, manure nitrogen is a large portion of the total nitrogen added to the watershed. For example, in the Susquehanna River watershed in Pennsylvania and the White River watershed in Arkansas, animal manure was estimated to contribute 54 and 56 percent, respectively, of the total added nitrogen. Note that this analysis does not include other potentially significant sources of nitrate, such as urban runoff, sewer overflows, septic systems, and contaminated groundwater.

Proportions of Nonpoint and Po... Sources of Nitrogen in Selected National Water Quality Assessment Program Watersheds (1987 Base Year)

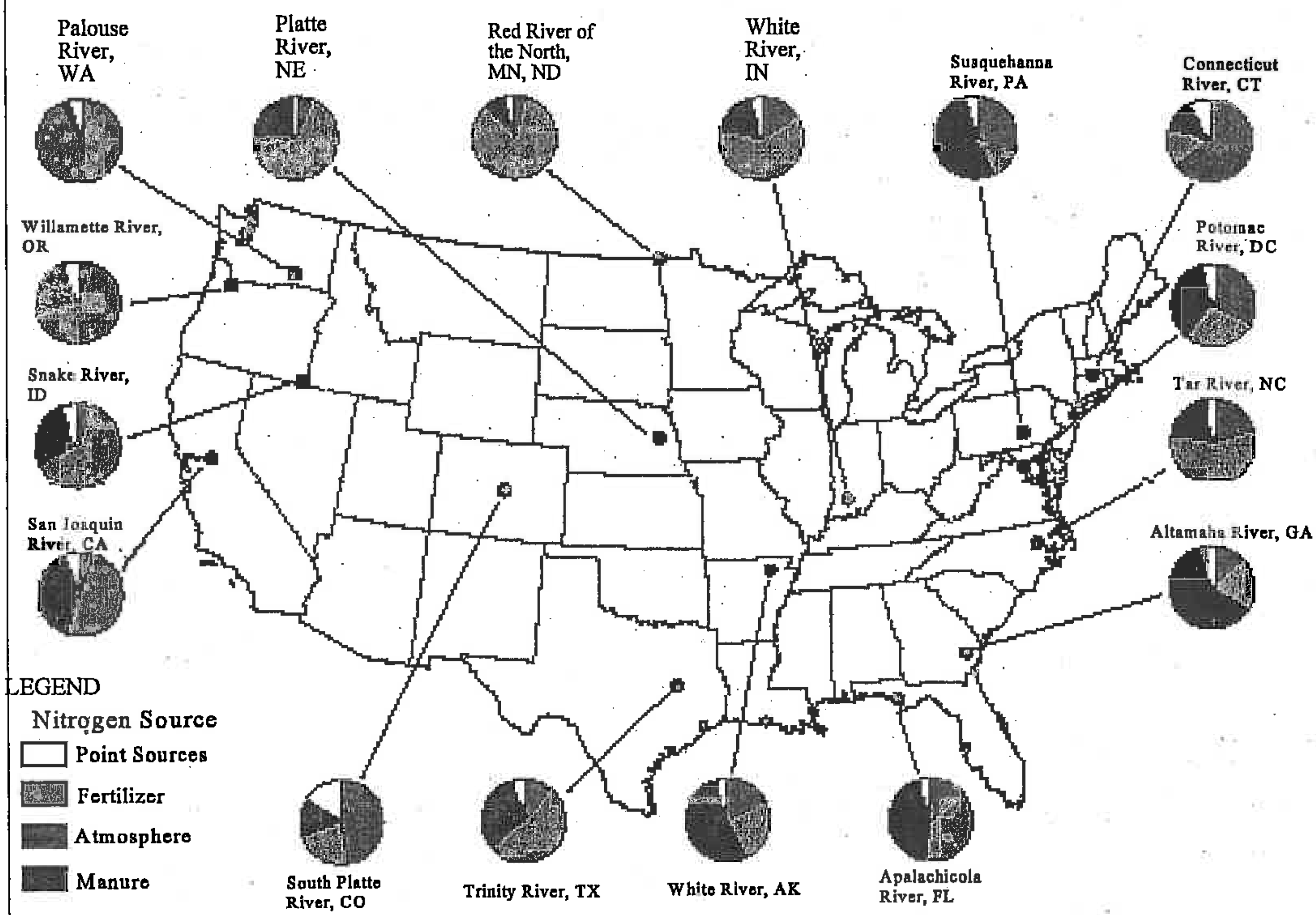

FIGURE 3-1 Source: Puckett, 1994. Note: CAFO point sources are included in the "manure" category.

3.2 Nitrogen and Phosphorus Production Relative to Crop Uptake Potential

One of the main mechanisms for removal of nitrogen and phosphorus from land-applied manure is crop uptake. The U.S. Department of Agriculture (USDA) has performed analyses to determine the quantity of nutrients available from confined livestock manure relative to crop growth requirements, by county, based on data from the 1992 Census of Agriculture (Lander et al, 1998). The analyses are intended to reflect the amount of manure that can be recovered and utilized, and therefore do not consider manure from unconfined animals. Figures 3-2 and 3-3 show the estimated manure nitrogen and phosphorus production from confined livestock, including cows, hogs, chickens, and turkeys. The figures account for the inability to completely recover manure, as well as for typical nutrient losses during storage and treatment. These losses can be significant, particularly for nitrogen, due to its high volatilization potential. Considering typical management systems, average manure nitrogen losses range from 31 to 50 percent for poultry, 60 to 70 percent for cattle, and 75 percent for swine. By contrast, the typical phosphorus loss is 15 percent. (Lander, et al., 1998) As discussed in Section 2.3.1, volatilized ammonia can have significant impacts on air quality and water quality (via atmospheric deposition). If ammonia volatilization were reduced, the nitrogen production presented in Figure 3-2 would represent an underestimation.

Figures 3-4 and 3-5 present the potential for manure nitrogen and phosphorus to meet or exceed plant uptake and removal in each of the 3,141 counties, considering non-legume harvested cropland and hayland. Based on this analysis of 1992 conditions, recoverable manure nitrogen exceeds crop system needs in 266 counties, and recoverable manure phosphorus exceeds crop system needs in 485 counties. The relative excess of phosphorus in comparison to nitrogen is not surprising, since manure is typically nitrogen-deficient relative to crop needs. Therefore, when manure is applied to meet a crop's nitrogen requirement, phosphorus is typically over-applied with respect to the crop requirement (Sims, 1995). County-wide nutrient balances likely understate occurrences of local nutrient excesses, as it appears that most manure remains on the farm where it was generated (Shortle et al., 1993; Meek et al., 1975), and confined animal production farms often do not have enough land to accommodate the manure (Letson and Gollehon, 1998). Large, specialized animal production farms typically have a relatively high animal/acre ratio when compared to smaller, integrated farms. For example, an analysis of beef feedlots (Letson and Gollehon, 1996) indicated that one percent of the operations produce 71 percent of the beef but have only two percent of the cropland. By contrast, 92 percent of the operations produce only ten percent of the beef but have 75 percent of the cropland. Information was not provided on how many operations lease land for manure disposal or give the manure away to others.

The USDA analyses presented here do not account for legume crops (which can "fix" atmospheric nitrogen by helping transform N_2 to ammonia), vegetable/citrus/nut crops, or pastureland, all of which could potentially be used for nutrient uptake. The analyses are not intended to reflect actual manure management practices, but rather the *potential* for manure nutrient usage, without consideration of economic and land ownership limitations, and without consideration of other nutrient sources such as commercial fertilizers. Additionally, the analyses do not account for the transport of applied manure nutrients. Therefore, an excess of nutrients does not necessarily indicate that a water quality problem exists; likewise, a lack of excess nutrients does not imply the absence of water quality problems. Nevertheless, the analyses are useful as a general indicator of excess nutrients on a broad-scale basis. The reader is referred to the original report for a complete list of assumptions and limitations.

3.3 Nitrogen and Phosphorus Loadings to Surface Waters Relative to Other Sources

The abovementioned analyses are useful in comparing manure nutrient production relative to other sources and relative to crop uptake potential. However, they do not account for fate and transport of manure nutrients, and therefore cannot provide an estimate of the quantity of nutrients that reach water bodies. Delivery of nutrients to surface water is affected by many watershed characteristics, such as soil permeability, stream density, and temperature. Variability among watersheds, in addition to sparse water quality sampling data and sampling bias, can make regional water quality assessments difficult. To address these concerns, the USGS developed a model known as SPARROW (SPAtially Referenced Regressions On Watershed attributes). The SPARROW method uses spatially referenced regressions of contaminant transport on watershed attributes. The model equations express in-stream nutrient loads as a function of stream and land-surface characteristics. They incorporate point and nonpoint pollutant sources, as well as factors associated with material transport through the watershed (e.g., soil permeability and stream velocity). The model is used to describe spatial and temporal patterns in water quality and to identify factors and processes that influence those conditions. (Smith, et al., 1997)

USGS (Smith, et al., 1997) has applied the model nationally to the 2,056 hydrologic cataloging units, or watersheds, in the contiguous U.S. to estimate total nitrogen (TN) and total phosphorus (TP) export from various point and nonpoint sources (including commercial fertilizers, livestock waste, atmospheric deposition (for nitrogen), and nonagricultural land). "Livestock waste" estimates include waste from both confined and unconfined animals, based on data from the 1987 Census of Agriculture. CAFOs were assumed to be nonpoint "livestock waste" sources rather than point sources, since permitted CAFOs are presumably "zero discharge" facilities and it is difficult to obtain representative discharge data from these facilities. The estimates represent annual average values for the year 1987 (although point source data were obtained from a 1977 - 1981 inventory).

Nitrogen Modeling:
Figure 3-6 presents the predicted local total nitrogen yield, independent of upstream sources. The presentation is in terms of yield per unit of watershed area. In the analysis, USGS found that commercial fertilizer contributes significantly more than livestock waste to TN yield. This is not surprising, since commercial fertilizers account for the majority of nutrients used in most agricultural production systems (Lander and Moffitt, 1996).

The availability of detailed model results allowed for additional observations with respect to animal waste loadings. To get a sense of the significance of animal waste loadings, EPA compared the predicted nitrogen contribution from manure to that from point sources. Per the

SPARROW estimates, manure is a greater contributor than point sources to in-stream TN throughout the U.S., specifically in 1,802 (88%) of the 2,056 watershed outlets (Figure 3-7). The model also predicts that in 113 watersheds, animal manure is the single largest contributor to nitrogen transport. Many of these watersheds, shown in Figure 3-8, correspond to areas identified by USDA as having county-wide manure nitrogen from confined animals in excess of crop uptake potential. These include areas of Oklahoma, Arkansas, Mississippi, Georgia, Alabama, Delaware, Maryland, Virginia, and North Carolina.

Typically, nutrient loadings originate from a number of sources in a watershed, rather than being dominated by one particular source. SPARROW model results show that animal waste is a significant source of in-stream nitrogen concentrations in many watershed outlets. Figure 3-9 shows the predicted percent contribution of animal waste to in-stream nitrogen. Many of the watersheds with higher values are in areas identified by USDA as having relatively high manure nitrogen production. It is notable that animal waste is estimated to be a significant contributor to TN transport in the Midwest, despite having sufficient crops county-wide to take up confined manure nitrogen. This could be due to additional waste loadings from unconfined animals, inadequate distribution of the waste, and the common use of tile drains on crop fields in the Midwest. Tile drains carry excess water (and dissolved pollutants) from beneath the crops directly to surface waters (although some farmers direct the drainage into groundwater wells).

Phosphorus Modeling:
Figure 3-10 presents the predicted local total phosphorus yield, independent of upstream sources. Interestingly, USGS estimated that livestock waste contributes more than commercial fertilizer application to TP transport. This may be because manure is typically nitrogen-deficient with respect to crop needs, and therefore, applying manure to meet crop nitrogen requirements results in over-application of phosphorus (Sims, 1995).

Similar to the TN analysis, EPA used the model results to make additional observations with respect to phosphorus loadings from animal waste. Per the SPARROW estimates, manure is a greater contributor than point sources to in-stream TP in approximately 1,220 (59%) of the 2,056 watersheds (Figure 3-11), and is the single largest contributor to in-stream TP in 391 watersheds (Figure 3-12). The predicted percent contribution of animal waste to in-stream phosphorus is significant in many watersheds, particularly in the central U.S. and Mid-Atlantic regions (Figure 3-13).

3.4 Contribution to Shellfish Bed Impairment

In August 1997, the National Oceanic and Atmospheric Administration (NOAA) released *The 1995 National Shellfish Register of Classified Growing Waters*. In this report, NOAA characterizes the status of 4,230 shellfish-growing water areas in 21 coastal states, reflecting an assessment of nearly 25 million acres of estuarine and non-estuarine waters. Over 77 million pounds (meat weight) were harvested from these waters in 1995, with a commercial value of $200 million (NOAA, 1997). In the register, NOAA classifies the water areas with respect to harvest limitations. The classifications include "approved" [for harvest], "conditionally approved," "conditionally restricted,""restricted," "prohibited," and "unclassified." NOAA also reports the types of pollution sources contributing to harvest limitations.

NOAA found that 3,404 shellfish areas had some level of impairment (i.e., a classification other than "approved" or "unclassified"). Of these, 110 (3%) were impaired to varying degrees by feedlots, and 280 (8%) were impaired by "other agriculture" (which could include land where manure is applied). Table 3-1 lists the number of shellfish beds impaired by feedlots, distributed according to impairment classifications and estimated level of contribution.

Table 3-1
Number of Shellfish Beds Impaired by Feedlots

Estimated Level of Contribution	Level of Impairment (Harvest Classification)				Total Impaired by Feedlots
	Conditionally Approved	Conditionally Restricted	Restricted	Prohibited	
Actual Contributor (High)	6	0	12	22	40
Actual Contributor (Medium)	3	1	16	23	43
Actual Contributor (Low)	2	1	2	9	14
Potential Contributor	1	0	8	4	13
TOTAL	12	2	38	58	110

Reference: *The 1995 National Shellfish Register of Classified Growing Waters*(NOAA, 1997). Feedlots were estimated to contribute to the impairment of 110 shellfish beds. This does not include other agricultural operations where manure is land-applied.

4. BENEFITS OF MANAGING ANIMAL WASTE

As discussed throughout this chapter, animal waste can have significant impacts on human health and the environment. Treatment and management options can help reduce or prevent these impacts, and also maximize the waste's use as a fertilizer. Table 4-1 presents the major benefits that could arise from treatment/management of animal wastes.

Table 4-1
Potential Benefits of Treating/Managing Animal Waste

Category	Benefit
Human Health Benefits	Reduce incidence of "blue baby syndrome" (associated with high nitrate concentrations in drinking water supplies (surface water and particularly groundwater)).
	Reduce risks associated with pathogens, i.e. consumption of contaminated drinking water (surface water and groundwater), contact recreation in contaminated surface water, consumption of contaminated shellfish, inhalation of airborne pathogens, and consumption of contaminated food.
	Reduce risks associated with odors and odor-causing compounds.
	Reduce risks associated with metals and other compounds present in animal waste.
	Reduce risks associated with toxic organisms (e.g., *Pfiesteria*) whose growth is encouraged by eutrophication.
Ecological/Recreational Benefits	Reduce the number of fish kills and other environmental damage caused by catastrophic waste spills.
	Reduce risks to aquatic and wildlife species associated with non-catastrophic release of animal waste pollutants, including fish kills, fish disease, habitat destruction, reduced biodiversity, and impaired ecosystem function.

Category	Benefit
	Reduce the incidence of impaired use and aesthetic degradation of recreational waterways. Avoid damage to recreational fisheries and tourism industry.
	Reduce contribution to global warming.
Other Benefits	Avoid costs associated with treatment or replacement of nitrate-contaminated drinking water (surface water and groundwater).
	Avoid damage to commercial fishing and shellfishing industry.
	Avoid costs associated with removing algae, odors, and trihalomethanes from drinking water (surface water).
	Stem reduction in property values near animal feeding operations by reducing odors and/or water quality degradation.

In some cases, direct monetary costs have been documented due to impacts from animal wastes. Many of these costs are associated with additional drinking water treatment requirements. For example, in California's Chino Basin, it has been estimated that it would cost over $1 million per year to remove the nitrates from drinking water due to loadings from local dairies (U.S. EPA, 1993c). In Iowa, Des Moines Water Works planned to spend approximately $5 million to install a treatment system to remove nitrates from their main sources of drinking water, the Raccoon and Des Moines Rivers (Hubert, 1991). Agriculture was cited as a major source of the nitrate contamination, although the portion attributable to animal waste is unknown. In Wisconsin, the City of Oshkosh has spent an extra $30,000 per year on copper sulfate to kill the algae in the water it draws from the Lake Winnebago (Behm (2)). The thick mats of algae in the lake have been attributed to excess nutrients from manure, commercial fertilizers, and soil.

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8P

OPEN FEEDLOT OR COMBINED OPERATION
Construction Permit Application Form

RECEIVED AUG 2 2010 IOWA DNR FIELD OFFICE

INSTRUCTIONS:

Prior to construction, complete Section 1 to determine if a construction permit is required. If a construction permit is required, complete the rest of the form. Then, sign it and mail it as instructed in the submittal checklist No. 1 (pages 3 to 7). See page 7 for information regarding additional permits that may be required to your open feedlot.

SECTION 1 - Is a construction permit required?

If any of the following criteria are met, a construction permit is required prior to constructing, expanding or modifying the manure control system at an open feedlot or a combined operation or prior to repopulating an open feedlot operation. Check all boxes that apply:

Criteria

☐ A) An open feedlot or a combined operation required to be issued a National Pollutant Discharge Elimination System (NPDES)[1] permit. This includes (check one box):

- x A large CAFO[2], as defined in 567 Iowa Administrative Code (IAC) 65.100(455b, 459A). You must combine same type of animals in confinement buildings and open lot pens that are under common ownership or management. See page 8 for CAFO definitions.
- ☐ A medium CAFO[2], as defined in 567 IAC 65.100(455B,459,459A). You must combine same type of animals in confinement buildings and open lot pens that are under common ownership or management. See page 8 for CAFO definitions.
- ☐ A designated CAFO[2], as defined in 567 IAC 65.100(455B,459,459A). See page 8 for CAFO definitions.

And any of following is planned (check one box):

- x Construction or expansion of a settled open feedlot effluent basin.
- ☐ Construction or expansion of an Alternative Technology (AT) system.
- ☐ Installation of a settled open feedlot effluent transfer piping system.

☐ B) The animal unit capacity (AUC)[3] of the open feedlot operation will be increased to more than the AUC[3] approved by the department in a previous construction permit. To calculate the AUC[3], use Table 1 (page 2.)

☐ C) The volume of settled open feedlot effluent, settleable solids or open feedlot effluent stored at the open feedlot operation will be increased to more than the volume approved by the department in a previous construction permit.

☐ D) Repopulation of an open feedlot operation if it was discontinued for 24 months or more and the AUC[3] would be 1,000 AU or more. To calculate the AUC[3], use Table 1 (page 2.)

SECTION 2 - General Information

A) Name of operation: Moran Feedlot #2

Location:

(1/4 1/4)	(1/4)	(Section)	(Tier & Range)	(Name of Township)	(County)
	SE 1/4	17	T76N,R42W	Norwalk	Pottawattamie

B) Owner information:

Name: Moran Beef, Inc Title:
Address: 25843 Old Lincoln Highway, Honey Creek, IA 51542
Telephone: Fax: e-mail: honeycreekmoran@msn.com

C) Person to contact with questions about this application (if different than owner):

Name: Frank Moran Title:
Address: 25843 Old Lincoln Highway, Honey Creek, IA 51542
Telephone: 712-545-3512 Fax: e-mail: honeycreekmoran@msn.com

D) Adjacency criteria: do you own another open feedlot operation, or do you manage another open feedlot operation that is located within 1,250 feet of the open feedlot operation that is applying for a construction permit?

NPDES permit as defined in rule 567 IAC 65.100(455B,459,459A). See page 7 for instructions on how to download the open feedlot operation rules.

CAFO = Concentrated Animal Feeding Operation as defined in rule 567 IAC 65.100(455B,459,459A). You must combine same type of animals, in confinement buildings and open lot pens that are under common ownership or management. To calculate the animal capacity of the operation or combined operation, use Table 1 (on page 2.) If the combined animal capacity meets the large CAFO or medium CAFO definitions, your operation is a CAFO. A CAFO also includes a designated CAFO. See page 7 for instructions on how to download the open feedlot operation rules and page 8 for a CAFO description.

3. AUC = Animal Unit Capacity as defined in rule 567 IAC 65.100(455B, 459,459A). You must combine animals in confinement buildings and open lot pens that are under common management or ownership. See page 7 for instructions on how to download the rules.) To calculate the AUC of the operation use Table 1 (on page 2.).

Complainant's Ex. No. 10

☐ Yes. Include the animals from the adjacent feedlot(s) in Table 1 (below). x No.

E) This construction permit application is for:
☐ A new open feedlot operation
x Expansion of an existing open feedlot operation
☐ Modification of the manure control system at an existing open feedlot operation
☐ Reopening an open feedlot operation that was discontinued for 24 months or more
☐ An Alternative Technology (AT) manure control system at an open feedlot operation
x An animal feeding operation that after combining the same type of animals in confinement buildings and open feedlot pens, under common ownership or management, meets the definition of large CAFO[2], medium CAFO[2] or designated CAFO[2], that is proposing to install manure and runoff controls

F) Animal capacity and AUC[3] of the animal feeding operation:

- If the operation has animals housed in confinement buildings and open lot pens that are under common ownership or management, for each animal type enter the current and proposed number of head in columns [1] and [2]. Add the number of head entered in columns [1] and [2], for each animal type. For each row, look at the Total No. of Head (combined operations) and determine if it meets of exceeds the large CAFO[2] or medium CAFO[2] definitions.
- If this is only an open feedlot operation, for each row enter the current and proposed number of head in column [2] and determine if it meets or exceeds the large CAFO[2] or medium CAFO[2] definitions. If the open feedlot maintains more than one animal type, add all animal units in open lots and determine if the Total AUC[3] is 1,000 AU or more. Also, if you answered "Yes" in SECTION 1, D) (adjacency), include the animals of the adjacent open feedlot operation(s).
- If the Total number of head for each animal type at an open feedlot or at a combined CAFO[2], meets or exceeds the large CAFO[2] or medium CAFO[2] definitions, or if the Total AUC[3] at the open feedlot operation meets or exceeds 1,000 AU, your operation is a CAFO[2]. See page 8 for CAFO[2] definitions.

Table 1: Animal Capacity and Animal Unit Capacity (AUC[3])

Animal Type	Confinements		Open Lots				Combined
	Current No. Head	Proposed No. Head [1]	Current No. Head	Proposed No. Head [2]	x Factor	= AUC[3]	Total No. Head [1] + [2]
Cattle (other than veal calves or mature dairy cows) which includes beef cattle, steers, cow-calf pairs, dairy heifers or immature dairy	990	990	990	1400	1.0	1400	2390
Veal calves					1.0		
Mature dairy cows (milked or dry)					1.4		
Swine, 55 lbs. or more					0.4		
Swine nursery, 15 to 55 lbs.					0.1		
Sheep and goats, including lambs					0.1		
Chicken broilers, 3 lbs. or more					0.01		
Chicken broilers, less than 3 lbs.					0.0025		
Chicken layers, 3 lbs. or more					0.01		
Chicken layers, less than 3 lbs.					0.0025		
Turkeys, 7lbs or more					0.018		
Turkeys, less than 7 lbs.					0.0085		
Horses					2.0		

Total AUC[3]: 2390

My animal feeding operation is:
x An open feedlot that is a large CAFO[2]
☐ An open feedlot that is a medium CAFO[2]
☐ A combined CAFO[2] that is also a large or medium CAFO[2]
☐ A designated CAFO[2]

I hereby certify that the information contained in this application is complete and accurate.

Signature of owner(s) X Frank Moran Date: 7-30-10

CAVEAT: This form is only a summary of Iowa Code chapter 459A and the DNR's amended administrative rules. It is a guidance document and should not be used as replacement for the statutory provisions and administrative rules (collectively, the law). While every effort has been made to assure the accuracy of this information, the law will prevail in the event of a conflict between this document and the law.

Open Feedlot and Confinement

Application for Individual NPDES[1] Operation Permit

DNR

A. Facility information:

Name of operation: Moran Feedlot #2 Facility ID No. ______

Location of the operation: ____________________ (911 Address)

25794 Magnolia Road

(City) (State) (Zip Code)

Underwood IA 51576-3751

Latitude (entrance to production area) Longitude (entrance to production area)

	SE 1/4	17	T76N, R42W	Norwalk	Pottawattamie
(Quarter/Quarter)	(Quarter)	(Section)	(Tier & Range)	(Township Name)	(County)

B. Owner and Contacts of the animal feeding operation:

Owner: **Moran Beef, Inc** Phone: **(712) 545-3512**

Address: **25843 Old Lincoln Highway, Honey Creek, IA 51542**

Email address (optional): **honeycreekmoran@msn.com** Cell (optional): ______

Contact person (if different than owner): **Frank Moran**

Address: **25843 Old Lincoln Highway, Honey Creek, IA 51542**

Phone: 712) 545-3512 Fax: ______

Email address (optional): **honeycreekmoran@msn.com** Cell (optional): **(402) 681-3871**

C. Ownership Status: Do you own or rent the facility? If renting, please provide the name and address of the owner:

______

D. If contract operation (optional): Name of Integrator: ______

Address of Integrator: ______

E. Briefly describe the nature of your business and the activities conducted that require an NPDES permit:
We own and operate two open feedlots in Pottawattamie County. The original lot has a current NPDES permit. This is an application for the second open lot which has been designated as a CAFO because of our nearby dry bedded confinement beef building. The open lot did not require a runoff control system when the confinement building was constructed in 2006. Since then, the IDNR has changed the way that they classify open lot and confinement facilities.

F. List all other State and/or Federal environmental permits or construction approvals that you have received or applied for:
NPDES permit for lot one located at our Honey Creek address.

G. Provide a topographic map of the geographic area in which your operation is located showing the specific location of the production area[2], including distances, to scale, between open lots and confinements structures.

1. NPDES stands for National Pollutant Discharge Elimination System.
2. Production area includes open lots, confinement buildings, barnyards, medication pens, animal walkways, stables, manure storage areas, raw material storage areas, etc.

H. This application is for (check one that best describes):

☐	A new operation	☐	An existing operation which is only expanding number of animals
	An existing operation not expanding	x	An existing operation which is expanding number of animals and making structural changes/modifications

For (must check one): An open feedlot ☐ A confinement operation x A combined CAFO[3]

I. Type and number of animals confined in the operation:

- Enter both current and proposed number of all animals housed in confinement buildings and open lot pens that are under common ownership or management:

Animal Type	Confinements		Open Lots				Combined
	Current No. Head	Proposed No. Head [1]	Current No. Head	Proposed No. Head [2]	x Factor	= AUC[3]	Total No. Head [1] + [2]
Cattle (other than veal calves or mature dairy cows) which includes beef cattle, steers, cow-calf pairs, dairy heifers or immature dairy	990	990	990	1400	1.0	2390	2390
Veal calves					1.0		
Mature dairy cows (milked or dry)					1.4		
Swine, 55 lbs. or more					0.4		
Swine nursery, 15 to 55 lbs.					0.1		
Sheep and goats, including lambs					0.1		
Chicken broilers, 3 lbs. or more					0.01		
Chicken broilers, less than 3 lbs.					0.0025		
Chicken layers, 3 lbs. or more					0.01		
Chicken layers, less than 3 lbs.					0.0025		
Turkeys, 7lbs or more					0.018		
Turkeys, less than 7 lbs.					0.0085		
Horses					2.0		
					Total AUC[3]:	2390	

J. Type and the total capacity of manure and process wastewater structure(s):

☐	Formed manure storage structure – under-building deep pits, outside concrete/steel (total capacity in gallons or cubic feet)	
x	Unformed manure or effluent storage structure – earthen basins, lagoons (total capacity in gallons or cubic feet).	387,988 ft3
x	Dry manure stored in a building or hoop (total capacity in gallons or cubic feet)	198,000 ft3
☐	Egg washwater storage structure (total capacity in gallons or cubic feet)	
☐	Alternative Technologies [dimensions of the vegetative treatment areas (VTAs) or vegetative infiltration basins(VIBs) and the capacity of the solids settling basins in gallons or cubic feet]	

K. Name of the receiving watercourse: Mosquito Creek

3. **CAFO or combined CAFO** means a Concentrated Animal Feeding Operation as defined in rule 567 IAC 65.100(455B,459,459A). You must combine same type of animals, in confinement buildings and open lot pens that are under common ownership or management. If the combined animal capacity meets the large CAFO or medium CAFO definitions, your operation is a CAFO. A CAFO also includes a designated CAFO.

Area of Open Feedlot

1. Total feedlot area: 7.9 (acres)
2. Total drainage area: 11.6 (acres)

M. Nutrient Management Plan (NMP) for Open Feedlots or combined CAFOs, Manure Management Plan (MMP) for Confinements, Comprehensive Nutrient Management Plan (CNMP) if applying for EQIP[5]:

1. Enclosed is my (check all that apply) x NMP ☐ MMP or ☐ CNMP
2. Date of last review or revision of the NMP or MMP? 03/06/09
3. If not land applying, describe alternative use(s) of manure, settled effluent and process wastewater: ____________
4. Total number of acres under control of the applicant available for land application of manure and process wastewater: 914 a
5. Estimated amount of manure and process wastewater generated per year? 2503900 gal
6. Estimated amount of manure and process wastewater transferred to other persons per year? 0

N. Land Application Best Management Practices (BMPs): Please check any of the following