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File SUP-1995-165
Date 9/28/99

Present	Scanned	
		A few items are denoted with an asterisk (*), which means they are to be scanned for permanent record on the ISYS retrieval system. In some instances, not all entries designated to be scanned, are present in the file. There are also documents specific to certain files, not found on the standard list. For this reason, a checklist has been included. **Remaining items, (not selected for scanning), will be marked present on the checklist. This index can serve as a quick guide for the contents of each file.** **Files denoted with (**) are to be located using the ISYS Query System. Planning Clearance will need to be typed in full, as well as other entries such as Ordinances, Resolutions, Board of Appeals, and etc.**
X	X	***Summary Sheet – Table of Contents**
X	X	Application form
X	X	Receipts for fees paid for anything
X	X	***Submittal checklist**
X	X	***General project report**
		Reduced copy of final plans or drawings
X		Reduction of assessor's map
		Evidence of title, deeds
X	X	***Mailing list**
		Public notice cards
		Record of certified mail
X	X	Legal description
		Appraisal of raw land
		Reduction of any maps – final copy
		***Final reports for drainage and soils (geotechnical reports)**
		Other bound or nonbound reports
		Traffic studies
		Individual review comments from agencies
X	X	***Consolidated review comments list**
X	X	***Petitioner's response to comments**
X	X	***Staff Reports**
		***Planning Commission staff report and exhibits**
X	X	***City Council staff report and exhibits**
		***Summary sheet of final conditions**
		***Letters and correspondence dated after the date of final approval (pertaining to change in conditions or expiration date)**

DOCUMENTS SPECIFIC TO THIS DEVELOPMENT FILE:

X	X	Planning Commission Minutes - ** - 2/7/95			
X		Letter from William D. Merkel to Kristen Ashbeck re: appeal – 12/11/95			
X	X	Letter to William D. Merkel from Kristen Ashbeck – 12/1/95			
X	X	Letter form Dan and Bonnie Connors – 9/29/95			
X	X	Planning Commission Minutes - **- 1/9/96			
X	X	Letter from Kristen Ashbeck 2/26/96			
X	X	Letter from James Baughman to Larry Timm – 1/11/96			
X	X	Letter from Larry Timm to William Merkel – 1/24/96			
X		Letter from Dan Shaver to Kristen Ashbeck (confidential) – 1/19/96			
X		Letter to William Merkel from Larry Timm – 1/5/96			
X		Telephone Conservation – 9/28/95 – re: Paul Brown concerns of odor			
X	X	Letter from William Merkel to Larry Timm – 12/26/95			
X		Fax to Wiliam Merkel from Kristen Ashbeck re: Planning Commission Minutes – 1/10/96			
X	X	Memo from William Merkel to Comm. Dev. – 1/9/96			
X	X	Letter from Willam Merkel to Jeffrey Vogel – 1/12/96			
X		Warranty Deed			
X	X	Packet from Water Quality Control Commision re: Confined Animal Operation - *((Copies received in the comm. Dev. Dept. were crooked and will remain in this state on permanent record)*			
X	[redacted]	Diagram of animal care site			

C-2 zoning

SUBMITTAL CHECKLIST

SPECIAL USE PERMIT

Location: NE 23 1/2 & G Rd   Project Name: Balanced Rock Ostrich Kennel

Date Received ____________

Receipt # 2943

File # SUP-95-165

ITEMS: DESCRIPTION	SSID REFERENCE	● City Community Development	● City Dev. Eng.	O City Utility Eng.	O City Property Agent	● City Attorney	O City Downtown Dev. Auth.	O City Parks/Recreation	● County Planning	● ~~Walker Field~~ Code Enforcement	TOTAL REQ'D 5
● Application Fee $270 plus $15/acre	VII-1	1									
● Submittal Checklist *	VII-3	1									
● Review Agency Cover Sheet*	VII-3	1	1	1	1	1	1	1	1	1	
● Application Form*	VII-1	1	1	1	1	1	1	1	1	1	
● Reduction of Assessor's Map	VII-1	1	1	1	1	1	1	1	1	1	
● Evidence of Title	VII-2	1			1	1					
● Names and Addresses*	VII-2	1									
● Legal Description*	VII-2	1			1						
O Deed	VII-1	1			1	1					
O Easement	VII-2	1	1	1	1	1					
O Avigation Easement	VII-1	1			1	1					
O ROW	VII-2	1	1	1	1	1					
● General Project Report	X-7	1	1	1	1	1	1	1	1	1	
~~● Location Map~~	IX-21	1									
● Site Plan	IX-29	1	1	1	1	1	1	1	1	1	
O Vicinity Sketch	IX-33	1	1	1	1	1	1	1	1	1	

NOTES: * An asterisk in the item description column indicates that a form is supplied by the City.

DEVELOPMENT APPLICATION

Community Development Department
250 North 5th Street, Grand Junction, CO 81501
(303) 244-1430

Receipt _____
Date _____
Rec'd By RSE
File No. SUP-95-165

We, the undersigned, being the owners of property situated in Mesa County, State of Colorado, as described herein do hereby petition this:

PETITION	PHASE	SIZE	LOCATION	ZONE	LAND USE
☐ Subdivision Plat/Plan	☐ Minor ☐ Major ☐ Resub				
☐ Rezone				From: To:	
☐ Planned Development	☐ ODP ☐ Prelim ☐ Final				
☐ Conditional Use					
☐ Zone of Annex					
☐ Variance					
☒ Special Use			23½ & G Rd	C-2	Commercial
☐ Vacation					☐ Right-of Way ☐ Easement
☐ Revocable Permit					

☒ PROPERTY OWNER	☒ DEVELOPER	☑ REPRESENTATIVE
WDM Corporation	William D. Merkel	William D. Merkel
Name	Name	Name
2525 N. 8th, Suite 203	2525 N. 8th, Suite 203	2525 N. 8th, #203
Address	Address	Address
Grand Jct, CO 81501	Grand Jct, CO 81501	Grand Jct, CO 81501
City/State/Zip	City/State/Zip	City/State/Zip
242-9127	242-9127	242-9127
Business Phone No.	Business Phone No.	Business Phone No.

NOTE: Legal property owner is owner of record on date of submittal.

We hereby acknowledge that we have familiarized ourselves with the rules and regulations with respect to the preparation of this submittal, that the foregoing information is true and complete to the best of our knowledge, and that we assume the responsibility to monitor the status of the application and the review comments. We recognize that we or our representative(s) must be present at all required hearings. In the event that the petitioner is not represented, the item will be dropped from the agenda, and an additional fee charged to cover rescheduling expenses before it can again be placed on the agenda.

X William D. Merkel WD — 9-13-95
Signature of Person Completing Application — Date

X William D. Merkel WD. — 9-13-95
Signature of Property Owner(s) - attach additional sheets if necessary — Date

General Project Report

Balanced Rock Ostrich Kennel

The ostrich kennel would be constructed for the purpose of rearing, boarding and breeding ostriches for three reasons.

A) To produce quality offspring that will eventually become breeder birds to be sold to others, then cared and housed by others off premise. Some selected breeders may also become borders, but the intent is to sell the breeders to others.

B) The second classification of birds would be those that are being boarded for others for grow out & slaughter or breeding purposes.

C) The third classification would be those less than prime birds that would be eventually taken to Fillmore, Utah to the slaughter facility for the production of meat and leather, or if we are so fortunate to have a processing station in Grand Junction, then that would be the end point for those grow out slaughter birds.

My current plan includes using existing buildings constructed by Occidental Petroleum when they occupied the site at 2372 G Road. This site consists of approximately 40 acres, with five acres and several buildings enclosed by a chain link fence (the "fenced in area"). There are two major metal buildings, one of which will become a chick barn and storage building for hay and feed. Another building will become an office, shop and general use building.

The wood modular building on premise, which housed the former administrative offices, will become incubator and hatching rooms where eggs will be hatched.

Chick and juvenile grow-out pens will be erected within Oxy's fenced in area.

Pens for the purpose of breeding will be located west of the fenced in area. The breeder pens will also be located, at least initially, to the more northern part of the land for the purpose of keeping the pens away from G Road, and keeping them in the more secluded area of the property. Presently, the plan is to keep the present foliage and brush in place on the land, as it simulates more African-like terrain, which is home to the ostrich. Plans and provisions are being made for the installation of electrical, water, and irrigation lines to the various pens.

The intention is to create a neat, well design and organized facility. Working with raw land and a greatly neglected site has and will be a challenge. Already the facility has been upgraded and improved over what it was. I think the future will show that the same good planning and construction will prevail as the Balanced Rock Ostrich Kennel expands.

William D. Merkel

William D. Merkel, M.D.

Monument Oil Co.
c/o Monument Oil Co
703 23 1/2 Road
Grand Jct, CO 81505-9689

Basil F Williams
Vinca S
8751 South 40th East
Sandy, UT 84070

Resort Parks, Inc
c/o Larry Beckner
225 N 5th St, Ste 850
Grand Jct, CO 81501-2659

Bud Himes
2687 Continental Dr
Grand Junction, CO 81506-1802

John William Murray
Shirley E
724 23 1/2 Road
Grand Jct, CO 81505-9688

Daniel P Connors
Bonita K
386 1/2 Ridge Circle Dr.
Grand Jct, CO 81503-4613

Fish Farm Inc
P.O. Box 2026
Grand Jct, CO 81502-2026

Warren R Jacobson
1721 Colorado River Rd
Gypsum, CO 81637

Dale Brandon
Sherry Brandon
P.O. Box 1088
Eagle, CO 81631-1088

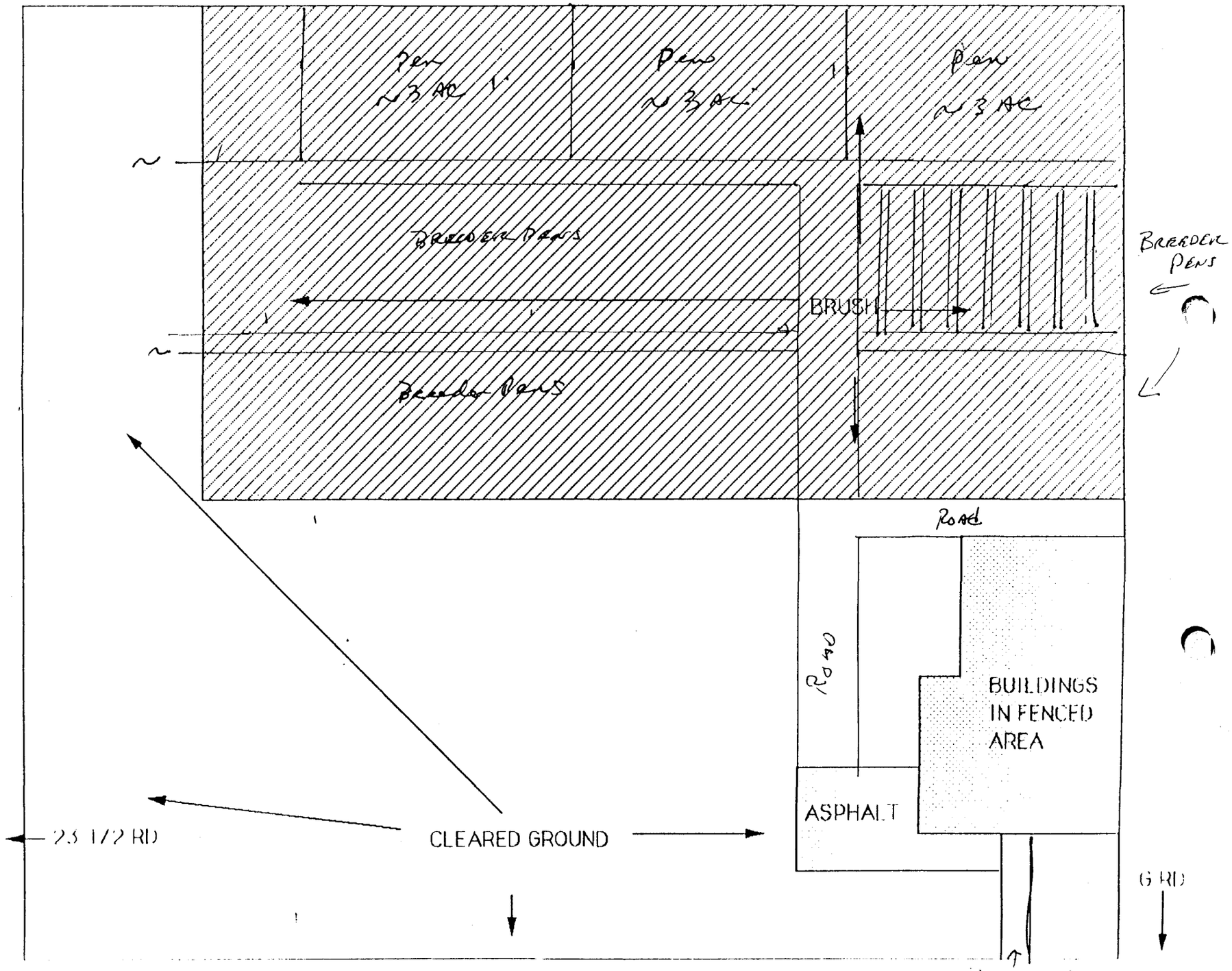
CFP Estate Ltd Etal
P.O. Box 225
Meeker, CO 81641-0225

Chas A Willsea
639 N 7th St
Grand Jct, CO 81501-3301

WDM Corporation
2525 N 8th Street
Grand Junction, CO 81501

City of Grand Junction
Community Development Dept.
250 N 5th Street
Grand Junction, CO 81501

THIS IS CONCEPTUAL, NOT TO SCALE, AND SUBJECT TO CONTINUAL UPDATE AND CHANGE



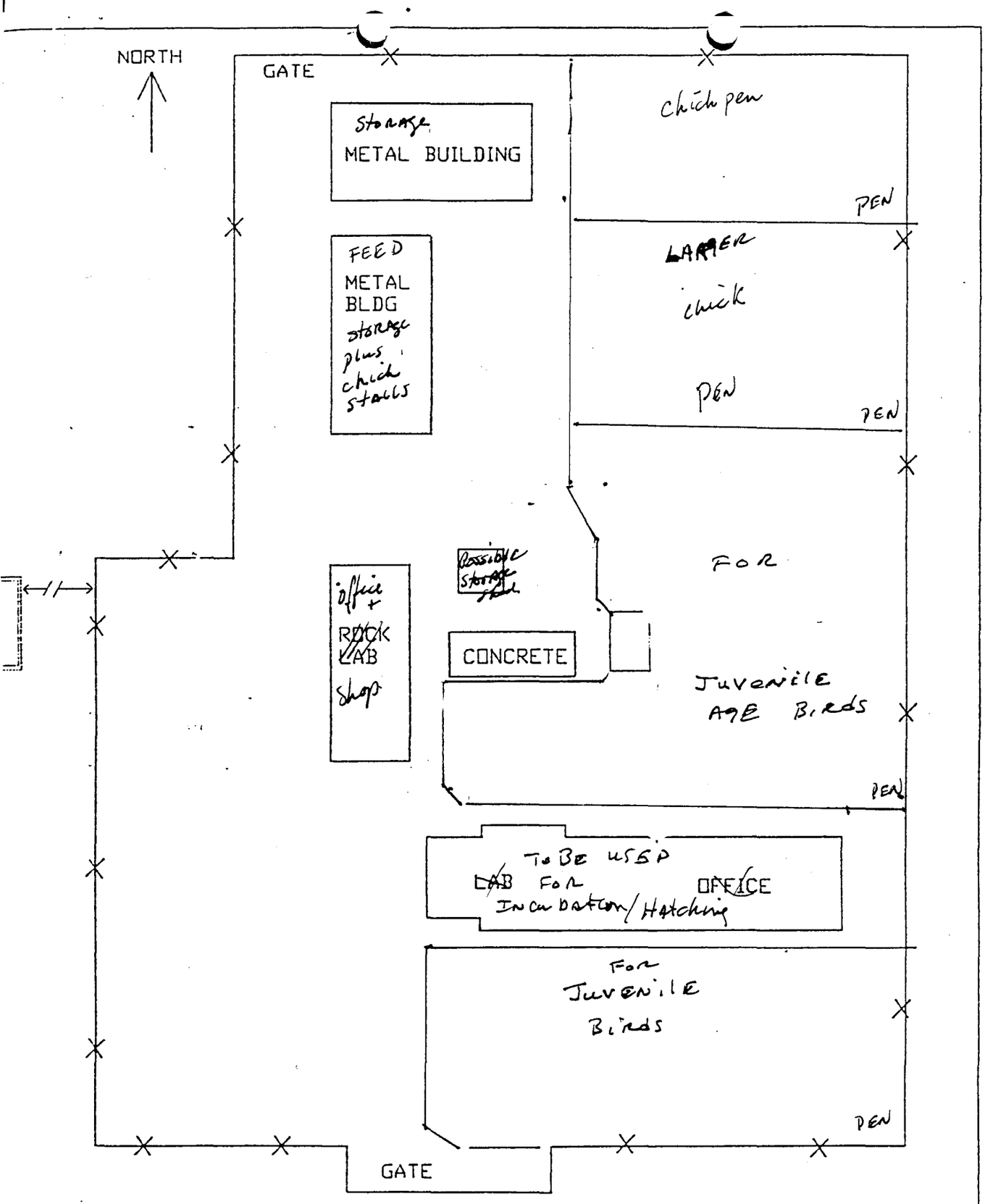
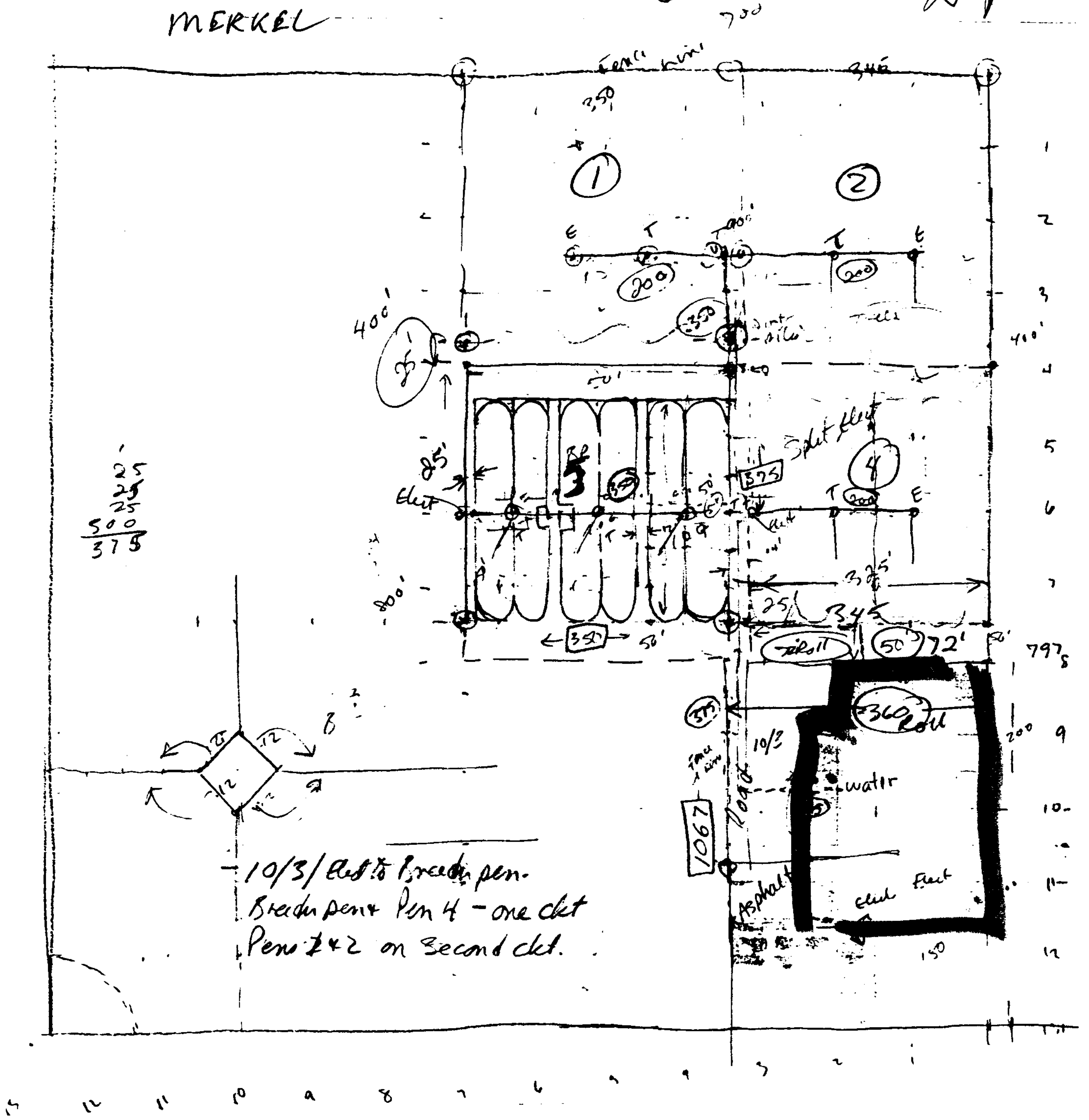


FIGURE 2. 2372 G RD, GRAND JUNCTION, CO, OCCIDENTAL OIL SHALE LAB, 5/6/91.

STTI
Storage Tank Technology, Inc.
1048 Independent Ave. A106
Grand Junction, CO 81505
(303) 243-1642
Fax (303) 243-1959

LAYOUT - Result of Survey.



+ Doris Watson
243-7153

STATE OF COLORADO

WATER QUALITY CONTROL COMMISSION
4210 East 11th Avenue
Denver, Colorado 80220
Phone (303) 331-4525

NOTICE OF FINAL ADOPTION

PURSUANT to the provisions of sections 24-4-103(5) and 24-4-103(11), C.R.S.

NOTICE IS HEREBY GIVEN that the Colorado Water Quality Control Commission, after a public hearing on March 2 and 3, 1992, and complying with the provisions of 24-4-103(3), 25-8-401(1), and 25-8-402(1), C.R.S., amended on July 6, 1992, pursuant to 25-8-202(7), 25-8-205, 25-8-206, and 25-8-308, C.R.S., and Section 2.1.3 of the "Procedural Rules" the regulation entitled:

> "Confined Animal Feeding Operations Control Regulation" 4.8.0 (5 CCR 1002-19).

Providing for various amendments to the existing control regulation.

Also, pursuant to 24-4-103(8)(b), C.R.S., this amended regulation was submitted to the Attorney General for review and was found to be within the authority of the Water Quality Control Commission to promulgate, and further that there are no apparent constitutional deficiencies in its form or substance. Furthermore, the amended regulation incorporates a general Statement of Basis, Specific Statutory Authority, and Purpose in compliance with 24-4-103(4), C.R.S.

This amended regulation will be submitted to the Office of Legislative Legal Services within twenty (20) days after the date of the Attorney General's Opinion, pursuant to 24-4-103(8)(d), C.R.S., and to the Secretary of State in time for August, 1992 publication in the Colorado Register pursuant to 24-4-103(5) and (11)(d), C.R.S., and will become effective August 30, 1992.

A copy of said amended regulation is attached and made a part of this notice.*

Dated this 16th day of July, 1992, at Denver, Colorado.

WATER QUALITY CONTROL COMMISSION

Marla L. Biberstine

Marla L. Biberstine, Staff Assistant

*A copy of this regulation
is available at a charge of $5.00
pursuant to 24-4-103(9), C.R.S.

feedlt.fa

COLORADO DEPARTMENT OF HEALTH
Water Quality Control Commission

As Adopted:	April 16, 1974
Effective:	August 1, 1974
Format Changed:	May 4, 1976
Amended:	July 6, 1992
Effective:	August 30, 1992

CONFINED ANIMAL FEEDING OPERATIONS CONTROL REGULATION

Materials incorporated by reference in this regulation are available for public inspection during regular business hours at the Colorado Department of Health, Water Quality Control Division, 4210 E. 11th Avenue, Room 320, Denver, Colorado. The regulation incorporates the materials as they exist at the date of the promulgation of this regulation and does not include later amendments to or editions of the incorporated materials.

4.8.0 AUTHORITY

Section 25-8-205, C.R.S. 1973, as amended.

4.8.1 PURPOSE

The purposes of this control regulation are:

(1) to insure that there shall be no discharge of manure or process wastewater from concentrated animal feeding operations into waters of the state.

(2) to encourage that these materials be retained and utilized beneficially on agricultural land in a manner which does not cause exceedances of applicable standards or harm to existing or classified uses of state waters.

(3) to insure that animal feeding operations which do not meet any of the criteria which define concentrated animal feeding operations, nevertheless protect surface water, ground water and soil resources through proper application of "best management practices" based upon existing physical conditions and constraints at the facility site.

(4) this regulation is not intended to address public health nuisance conditions or land use controls such as zoning requirements.

4.8.2 DEFINITIONS

(1) "ANIMAL FEEDING OPERATION"

An "animal feeding operation" is a confined animal or poultry growing operation (facility) for meat, milk or egg production or stabling wherein livestock are fed at the place of confinement for 45 days or longer in any 12 month period and crop or forage growth is not maintained in the area of confinement, and the facility does not meet one of the criteria for a concentrated animal feeding operation.

(2) "ANIMAL UNIT"

"Animal Unit" means a unit of measurement used to determine the animal capacity of an animal-feeding operation containing two or more species of animals. The animal unit capacity of an operation is determined by multiplying the number of animals of each species by the appropriate equivalency factor from Table 1, and summing the resulting totals for all animal species contained in the operation.

TABLE I
Animal Unit Equivalency Factors

Animal Species	Equivalency Factor
Slaughter and feed cattle	1.0
Mature dairy cattle	1.4
Swine, butcher and breeding (over 55 lbs.)	0.2
Sheep or lambs	0.2
Horses	1.0
Turkeys	0.02
Chickens broiler or layer	0.01

* Young stock, less than 50% of adult weight, reduces the above equivalency factor by 1/2.

(3) "AVERAGE WORKING CAPACITY "

"Average working capacity" is the average occupancy of the animal feeding operation on a year-round basis defined as the sum of the end-of-month occupancy rates divided by the number of months during a calendar year the facility conducts animal feeding operations.

(4) "CONCENTRATED ANIMAL FEEDING OPERATIONS"

"Concentrated Animal Feeding Operation", means a concentrated, confined animal or poultry growing operation (facility) for meat, milk or egg production

or stabling, in pens or houses wherein the animals or poultry are fed at the place of confinement for 45 days or longer in any 12 month period and crop or forage growth or production is not sustained in the area of confinement. Two or more animal-feeding operations under common ownership or management are deemed to be a single animal-feeding operation if they are adjacent or utilize a common area or system for manure disposal. "Concentrated Animal Feeding Operations" meet one or more of the following criteria:

(a) Average Working Capacity, of 1,000 or more animal units as defined in this regulation, or

(b) Case-by-case designation under one of the following criteria:

i) Pollutants are discharged into waters of the state through a manmade ditch, flushing system or other similar manmade device; or

ii) Pollutants are discharged directly into waters of the state which originate outside of the facility and pass over, across or through the facility or otherwise come into direct contact with the animals confined in the operation; or

(c) The animal feeding operation is in a location which reasonably could be expected to adversely affect a hydrologically sensitive area.

(5) "DIRECTOR"

"Director" refers to the Director of the Water Quality Control Division.

(6) "EXPANDED FACILITY"

An "Expanded Facility" is a concentrated animal feeding operation which is increased in physical area or average working capacity by one third of the existing capacity on or after the effective date of this amendment.

(7) "HOUSED ANIMAL FEEDING OPERATION"

"Housed animal feeding operation" is an operation with totally roofed buildings with open or enclosed sides

wherein livestock or poultry are housed on solid concrete or dirt floors, slotted (partially open) floors over pits or manure collection areas in pens, stalls or cages, with or without bedding materials and mechanical ventilation. For the purposes of this subchapter, the term housed lot includes the terms slotted floor building, barn, stable, or house, for livestock or poultry, as these terms are commonly used in the agriculture industry.

(8) "HYDROLOGICALLY SENSITIVE AREA"

"Hydrologically Sensitive Area" includes: Areas where significant groundwater recharge occurs or where contamination from animal feeding operations could impact existing drinking water withdrawals, classified uses, or reasonably likely future public drinking water system withdrawals; areas where animal feeding operations could impair water bodies subject to antidegradation review or classified for Class 1 Recreation or Class 1 Aquatic Life.

(9) "MAN-MADE DRAINAGE SYSTEM"

"Man-made drainage system" means a drainage ditch, flushing system, or other drainage device which was constructed by man and is used for the purpose of transporting wastes.

(10) "MANURE"

"Manure" is defined as feces, urine, litter, bedding, or feed waste from animal feeding operations.

(11) "NEW FACILITY"

A "new facility" is an operation which was constructed on or after August 30, 1992.

(12) "NO DISCHARGE"

The term "no-discharge" shall be defined as no-discharge of manure or process wastewater to waters of the state except in the event of an applicable design storm event specified in section in 4.8.3(b).

(13) "OPEN ANIMAL FEEDING OPERATION"

"Open animal feeding operation" consists of pens or similar confinement areas with dirt, concrete, or other paved or hard surfaces wherein animals or poultry are substantially or entirely exposed to the outside

environment except for small portions of the total confinement area affording protection by windbreaks or small shed-type shade areas. For the purposes of this regulation, the term open animal feeding operation is synonymous with the terms yard, pasture lot, dirt lot, and dry lot, for livestock or poultry, as these terms are commonly used in the agricultural industry.

(14) "OPERATOR"

"Operator" means any individual, partnership or corporation, or association doing business in this state.

(15) "PROCESS WASTEWATER"

"Process wastewater" means any process-generated wastewater and any precipitation (rain or snow) which comes into contact with any manure or any other raw material or intermediate or final material or product used in or resulting from the production of animals or poultry or their direct products (e.g., milk, eggs).

(16) "PUBLIC DRINKING WATER SYSTEM"

"Public Drinking Water System" means a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or serves an average of at least 25 persons daily at least 60 days out of the year. A public drinking system includes both community and non-community systems.

(17) "REACTIVATED FACILITY"

A "Reactivated Facility" is a concentrated animal feeding operation which has been in a non-operating status for three consecutive years and is reactivated on or after August 30, 1992.

(18) "RECONSTRUCTED FACILITY"

A "Reconstructed Facility" is a concentrated animal feeding operation which is reconstructed on or after August 30, 1992, due to damage from a flood, fire, dilapidation or reconfiguration of the facility.

(19) "SIGNIFICANT GROUNDWATER RECHARGE"

"Significant groundwater recharge" is defined as high or very high seepage rates as determined using the methods described in SCS NENTC-Engineering Geology

Technical Note No. 5 attached as Appendix A or other authoritative document as approved by the Division.

(20) "TEN YEAR TWENTY-FOUR HOUR STORM" AND "TWENTY FIVE-YEAR TWENTY-FOUR HOUR STORM"

"Ten year twenty-four-hour storm" and "twenty-five year twenty-four-hour storm" mean a storm of a 24-hour duration which yields a total precipitation of a magnitude which has a probability of recurring once every ten or twenty-five years, respectively, as shown in Appendix B.

(21) "VADOSE ZONE"

"VADOSE ZONE" means the zone between the land surface and the water table. It includes the area beneath the root zone, intermediate zone, and capillary fringe. Saturated bodies, such as perched ground water, may exist in the vadose zone, also called zone of aeration and unsaturated zone.

(22) "WATERS OF THE STATE"

"Waters of the State" means any and all surface and subsurface waters which are contained in or flow in or through this state, except waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed.

4.8.3 SURFACE WATER PROTECTION REQUIREMENTS-Concentrated Animal Feeding Operations

(A) General Performance Requirements

Concentrated animal feeding operations are required to be operated as no-discharge facilities. Compliance with the no-discharge provision can only be achieved by installation and operation of adequate manure and process wastewater collection, storage and land application facilities.

(1) Open concentrated animal feeding operations shall control all manure and process wastewater including flows from the animal areas and all other flows from an applicable storm event. Control of manure and process wastewater from open concentrated animal feeding operations may be accomplished through use of retention basins, terraces, or other runoff control methods. In

addition, diversions of uncontaminated surface drainage prior to contact with the concentrated animal feeding operation or manure storage areas maybe required by the Division in order to prevent water pollution.

(2) Housed concentrated animal feeding operations shall control manure and process wastewater produced in the confinement enclosures between periods of disposal. Control of manure and process wastewater from housed animal feeding operations may be accomplished through use of earthen storage structures (such as lagoons or earthen basins), formed storage tanks (such as concrete, steel, or wood tanks), or other control methods. Sufficient capacity shall be provided in the control structures to store all manure and process wastewater between periods of disposal. Additional capacity shall be provided if precipitation or discharges from other sources can enter the manure and process wastewater control structures.

(B) Design Criteria

(1) An operator of an existing concentrated animal feeding operation constructed prior to April 16, 1974 and operated continuously since that time shall not discharge manure, process wastewater or stormwater runoff from the facility to state waters except as the result of storms equal to or in excess of the amount resulting from a ten-year 24-hour storm. The 10 year 24-hour storm event design criterion applies to all stormwater diversion structures (e.g. dikes, berms, ditches) as well as manure and process wastewater retention and control structures.

(a) Any discharge to state waters shall be as the result of excess flow or overflow beyond the properly designed and constructed retention capability or hydraulic capacity of the manure or process wastewater control structures. A discharge shall not result from dewatering or lowering of the process wastewater level or solids storage level below the design retention capability of the control structures.

(b) A concentrated animal feeding operation which changes ownership or increases its average working capacity shall not discharge manure and process

wastewater or storm run-off water from the feeding operation to state waters except as the result of storms in excess of a 25-Year 24-Hour storm event.

(2) An operator of a concentrated animal feeding operation constructed after April 16, 1974, or constructed earlier, but inactive for longer than three consecutive years after that date, shall design, construct and operate control structures as necessary to retain and dispose without discharge all manure and process wastewater produced by the facility and all storm run-off which enters the facility as the result of precipitation equal to or less than the amount resulting from a twenty-five-year twenty-four-hour storm.

(3) Runoff volume from the concentrated animal feeding operation surface shall be determined from soil cover complex curve number 90 for unpaved lots, or soil cover complex curve number 97 for paved lots, as defined by the United States Department of Agriculture (U.S.D.A.) Soil Conservation Service and as depicted in Appendix C. The director may approve the use of a different soil cover complex curve number on a case-by-case basis.

(C) Operation and Maintenance Requirements

(1) Manure and Process Wastewater Removal: Accumulations of manure and process wastewater shall be removed from the control retention structures as necessary to prevent overflow or discharge from the structures. Manure and process wastewater stored in earthen storage structures (lagoons or earthen storage basins) shall be removed from the structures as necessary to maintain a minimum of two feet of freeboard in the structure, unless a greater level of freeboard is required to maintain the structural integrity of the structure or to prevent overflow.

(2) To ensure that adequate capacity exists in the control structures to retain all manure and process wastewater produced during periods when land application or disposal operations cannot be conducted (due to inclement weather conditions, lack of available land disposal areas, or other factors), manure and process wastewater shall be removed from the control structures as necessary prior to these periods.

(3) Off-site drainage diversion: When animal confinement areas and manure stockpiles must be isolated from outside surface drainage by ditches, pipes, dikes, berms, terraces or other such structures, these diversion structures shall be maintained to carry peak flows expected at times when the applicable design storm event occurs. All manure stockpile areas shall constructed and be maintained so as to retain all rainfall which comes in contact with the stockpiles.

(4) Adequate equipment shall be available on site or provided for in a written agreement for the removal of accumulations of manure and process wastewater as required for compliance with the provisions of this section.

(5) Process wastewater retention structures shall be equipped with either irrigation or evaporation systems capable of dewatering the retention structures.

(a) For irrigation disposal systems, except as provided in paragraphs (1) and (2) of this subsection, whenever 50% of the design runoff storage capacity is exceeded by accumulated runoff, sediment, manure, or process-generated wastewater, the retention structure shall be dewatered to a level that restores the full runoff storage capacity and the dewatering process shall be completed within a 15-day period. If the irrigation system is not capable of dewatering the retention structures as required herein, sufficient additional storage capacity shall be provided in lieu of dewatering capabilities upon written approval of the director, and under such terms and conditions as the director may specify.

(b) Evaporation systems shall be designed to withstand a 10-year period of maximum recorded rainfall, as determined by a water budget analysis process which includes manure and process wastewater loading during that period and provides sufficient freeboard to retain all rainfall and rainfall runoff from the applicable design storm event without overflow.

4.8.4 GROUND WATER PROTECTION REQUIREMENTS - CONCENTRATED ANIMAL FEEDING OPERATIONS

(A) Manure and Process Wastewater Retention Structures

Except as provided in subsection 4.8.4(B) and (C), below, all process wastewater retention structures shall be constructed of compacted or in-situ earthen materials or other very low permeability materials, and shall be maintained, so as not to exceed a seepage rate of 1/32"/day (1×10^{-6} cm/sec.). The operator shall have available suitable evidence that a completed lining meeting the requirements of this subsection 4.8.4(A) was constructed.

(1) Compacted or in-situ earthen materials shall consist of suitable soils which meet the seepage rate of this section and shall have a minimum compacted thickness of 12";

(2) Very low permeability materials include flexible membrane linings, asphalt sealed fabric liners, and bentonite sealants. Installation of very low permeability materials shall be in accordance with the manufacturer's installation specifications;

(3) Alternative methods of lining, other than those described in subsections (1) and (2) above, require prior written approval of the Director.

(B) Retention structures which collect storm water runoff from open animal feeding operations and no other waters except, if any, water which has not come into contact with manure or process wastewater, such as boiler cooling water or flow-through livestock drinking water, shall be constructed of a material and maintained so as not to exceed a seepage rate of 1/4" per day (1×10^{-5} cm/sec.), provided that the retention structure is dewatered so that the full runoff storage capacity is restored within 15 days of the storm event, consistent with the provisions of Section 4.8.5.

(C) Earthen retention structures in existence as of August 30, 1992, shall be exempt from the requirement to have available suitable evidence that a completed lining meeting the requirements of subsection 4.8.4(A) has been constructed. Whenever the Director makes a determination that seepage of nutrients or other pollutants from manure or process wastewater into ground water occurs at a rate greater than allowed in this section, the Director may require compliance with the provisions of subsections (A)(1), (2), or (3) of this section.

(D) Manure and Process Wastewater Conveyance Structures:

(1) Manure and process wastewater conveyance structures shall be designed and constructed to prevent exceedances of applicable water quality standards or impairment of existing or classified beneficial uses.

(2) Infiltration of process wastewater shall be limited to the maximum extent practicable through the use of very low permeability earthen materials and proper compaction or through the use of synthetic conveyance materials.

4.8.5 BENEFICIAL USE AND DISPOSAL OF MANURE AND PROCESS WASTEWATER - CONCENTRATED ANIMAL FEEDING OPERATIONS

(A) If land application is utilized for disposal of manure or process wastewater, the following requirements shall apply:

(1) Manure and process wastewater shall not be distributed on agricultural lands in a manner that adversely affects the quality of waters of the state by causing exceedances of applicable water quality standards, numerical protection levels or impairment of existing beneficial uses.

(2) When irrigation disposal of process wastewater is employed, the irrigation application rate should not exceed the estimated soil infiltration rate. For flood irrigation, tailwater facilities shall be provided. Irrigation application rates shall be adjusted to avoid significant ponding of concentrated runoff in surface depressions or seasonal drainage ways.

(3) There shall be no discharge to waters of the state resulting from land application activities when the ground is frozen, saturated or during rainfall events.

4) Sprinkler type land application systems shall be equipped with a backflow prevention device or an air gap between the irrigation well pump at the water source and the point of injection of the process wastewater. This equipment shall prevent process wastewater from being pumped, drained or siphoned into the irrigation water source if fresh water is being applied along with the wastewater. Any system which is in compliance with the requirements of the Colorado Chemigation Act Section 35,11-101 et. seq. C.R.S. (Supp. 1990), shall be deemed in compliance with this requirement.

(5) The land application rate for manure and process wastewater shall be limited by the operator as set forth in 4.8.5(A)(5)(a), (b), or (c), below. Subsections (a) and (b) pertain to seasonal land application activities based on sound agronomic practices. Subsection (c) pertains to more continuous and intensive land application activities based on a combination of crop uptake and land treatment techniques.

(a) Operators may avoid the cost and effort associated with a site-specific agronomic analysis as described in subsection (b) below if no supplemental or commercial fertilizers are utilized in addition to the manure and process wastewater generated by the facility, and if the proper land application rate is based on the applicable data presented in Appendices D and E. Crop nitrogen uptake rates shall be computed as shown in Appendix D based on the specified crop yields. In addition, the operator shall rely on the table values for total nitrogen content in manure and process wastewater as shown in Appendix E in computing the proper application rate. The operator shall limit application based on the assumption that all of the total nitrogen applied from manure and process wastewater is plant available during the year following the manure application.

(b) Operators may apply manure and process wastewater on a year to year basis at rates greater than allowed in subsection (a) above based on a site-specific agronomic analysis that includes, all plant available nutrient inputs from manure/process wastewater, irrigation water, legumes, residual soil nutrients, and soil organic matter, based upon site specific soil, water and manure/process wastewater analyses. These data, plus the yield goal for the crop to be grown, will be used to calculate appropriate manure/process wastewater and supplemental fertilizer nutrient additions. Management factors such as manure handling, application method, tillage, irrigation regime, cropping and grazing patterns and site factors such as soil texture, slope, and aspect will be used to modify the manure/process wastewater application rates. The operator shall maintain copies of the agronomic analyses which are being relied upon for the purpose of limiting land application rates of manure and process wastewater. Copies of such analyses shall be

available for inspection at the facility and records shall be maintained for a minimum of three years.

(c) Operations which land apply manure or process wastewater in an amount exceeding the agronomic rates determined under subsection (5)(b) or on a continuous or near continuous basis must comply with this subsection (5) (c).

(i) No later than 180 days following August 30, 1992 for existing facilities and prior to land application for new facilities or facilities planning to calculate their land application rate pursuant to this subsection (c), the operator shall submit for the Division's approval, a land application plan designed to demonstrate that said rate will not result in exceedances of applicable water quality standards or numerical protection levels established pursuant to subsection 4.8.5(A)(5)(c)(iv). The required land application plan must include, at a minimum:

(I) The site-specific agronomic analysis required in subsection 4.8.5(A)(5)(b),

(II) An analysis, based on site-specific conditions, documenting the expected removal of nitrogen and other nutrients or pollutants, beyond that which occurs as a result of plant uptake, through physical, chemical and biological mechanisms such as volatilization, oxidation, adsorption, cation exchange, and denitrification; and

(III) If deemed necessary by the Director, a monitoring plan designed to demonstrate that land application practices will not result in exceedances of applicable water quality standards or numerical protection levels. This monitoring plan may include such procedures as deep soil tests below the root zone, and water quality monitoring in the vadose and saturated zones of groundwater at the site.

(ii) The Division shall review the land application plan described in subsection

4.8.5(A)(5)(c)(i) to determine whether the plan is adequate to demonstrate that the proposed land application rate will not result in exceedances of applicable water quality standards or numerical protection levels. The Division may grant an interim authorization for land application at a rate calculated pursuant to this subsection (c) in cases where it cannot make a determination as to whether exceedances of water quality standards or numerical protection levels will result, provided a monitoring plan as described in subsection 4.8.5 (A) (5) (c) (i) (III) is implemented by the operator. The operator shall submit all monitoring data to the Division. The Division may require the operator to update or modify the land application plan as necessary to address conditions revealed upon implementation of the monitoring plan.

(iii) The operator may be required to demonstrate that land application practices at the facility are not resulting in exceedances of applicable water quality standards or numerical protection levels at a point of compliance established by the Division in accordance with section 3.11.6(D) of the Basic Standards for Ground Water (5 CCR 1002-8). If the site monitoring data obtained through the operator's implementation of the monitoring plan approved by the Division pursuant to subsection 4.8.5 (A) (5) (c) (ii), or obtained otherwise, reveals that nutrients or other pollutants are leaching into the vadose zone beneath or downgradient from any application site, the Division may require the operator to monitor the ground water at a point prior to the point of compliance. Where a modeled attenuation of pollutants in the vadose zone or in the ground water has been used as a basis for determining that applicable water quality standards or numerical protection levels will be met at the point of compliance, the Division may require detection wells or other monitoring along one or more lines parallel with the flow path in order to demonstrate that the predicted attenuation is taking place. Absent such demonstration, the Division may require the operator to alter the land application rate to ensure that no leaching

of nutrients or other pollutants into the vadose zone or ground water takes place.

(iv) Applicable water quality standards for purposes of this regulation includes ground water quality standards adopted by the Commission. Where applicable ground water quality standards have not been adopted by the Commission, the Division will establish numerical protection levels based on the existing and any reasonably probable future beneficial uses of ground water, as outlined in section 3.11.5 (b) of the Basic Standards for Ground Water (5 CCR 1002-8), which need to be protected in the vicinity of the discharge.

(v) The Division's determination of a numeric protection level pursuant to subsection 4.8.5 (A) (5) (c) (iv) above, will not be deemed to constitute a ground water quality classification or standard, and will not be binding on any persons other than the operator in question. If the operator or any other interested person disagrees with the numeric protection level determination made by the Division, the operator or the interested person may petition the Commission to adopt site-specific classification and standards. Any determination made by the Commission during the hearing process would then become binding on the Division and the operator. At the request of the operator or interested person, the Commission will consider such a hearing to be mandatory and de novo.

(vi) Operators which land apply manure and process wastewater at a rate provided in this subsection 4.8.5 (A) (5) (c) shall be required to submit a manure and process wastewater management plan described in section 4.8.7, which shall include the land application plan required under this subsection 4.8.5 (A) (5) (c).

(6) Other process wastewater disposal methods: If the operator proposes to use innovative methods of disposal prior written approval from the director must first be obtained.

(B) Treatment and Discharge:

If treatment other than land application is utilized prior to discharge to state waters a CDPS permit shall be required for the operation.

4.8.6 ANIMAL FEEDING OPERATIONS- BEST MANAGEMENT PRACTICES

The following Best Management Practices (BMPs) shall be utilized by animal feeding operations, as appropriate based upon existing physical conditions, and site constraints. Best management practices means, for purposes of this regulation, activities, procedures, or practices necessary for the reduction of impacts from animal feeding operations, as described in 4.8.6.

The following practices to decrease runoff volume from animal feeding operations are BMPs within the meaning of this regulation:

(1) Operators of animal feeding operations shall divert runoff from uncontaminated areas away from animal confinement areas and manure and process wastewater control facilities to the maximum extent practicable through:

(a) Construction of ditches, terraces or other waterways;

(b) Installation of gutters, downspouts and buried conduits to divert roof drainage;

(c) Construction of roofed areas over animal confinement areas everywhere it is practicable.

(2) Practices to decrease open lot surface area:

(a) Where practicable, operators of animal feeding operations shall:

(i) Reduce lot size;

(ii) Improve lot surfacing to support increased animal density;

(iii) Provide roofed area to the maximum extent practicable.

(iv) Collect manure frequently; and

(v) Eliminate animal confinement areas and manure and process wastewater control facilities in areas

that slope in directions such that wastewater/rainfall cannot be collected.

(3) Practices to decrease water volume:

(a) Operators of animal feeding operations shall repair or adjust waterers and water systems to minimize water wastage.

(b) Operators of animal feeding operations shall use lowest practical amounts of water for manure and process wastewater flushing.

(c) Water used to flush manure from paved surfaces or housed confinement areas shall be recycled if practical and applicable.

(4) Practices to decrease wastewater discharges to watercourses:

(a) Operators of animal feeding operations shall collect and allow wastewater to evaporate.

(b) Operators of animal feeding operations shall collect and evenly apply wastewater to land at proper agronomic rates.

(c) Operators shall not deposit such material which might pollute waters of the state in such locations that storm water run-off or normally expected high stream flow will carry such material into the waters of the state.

(d) Process wastewater retention structures shall not be located within a mapped 100 year flood plain as designated and approved by the Colorado Water Conservation Board (CWCB) unless proper flood proofing measures (structures) are designed and constructed.

(5) Practices to minimize solid manure transport to watercourses:

(a) Manure stockpiles shall be located away from watercourses and above the 100 year flood plain as designated and approved by CWCB unless adequate flood proofing structures are provided.

(b) Operators of animal feeding operations shall provide adequate manure storage capacity based upon manure and wastewater production.

(c) Settleable solids shall be removed by the use of solids-setting basins, terraces, diversions, or other solid removal methods. Construction of solids-settling facilities shall not be required where the division determines existing site conditions provide adequate settleable solids removal.

(d) Removal of settleable manure and process wastewater solids shall be considered adequate when the velocity of waste flows has been reduced to less than 0.5 foot per second for a minimum of five minutes. Sufficient capacity shall be provided in the solids-settling facilities to store settled solids between periods of manure and process wastewater disposal.

(e) Operators of animal feeding operations shall apply solid manure to suitable agricultural land at appropriate times and rates through the following practices:

(i) Adjustment of timing and rate of applications to crop needs, in assuming usual nutrient losses, expected precipitation and soil conditions;

(ii) Avoidance of applications on saturated soils; and

(iii) Avoidance of land subject to excessive erosion.

(f) Operators of animal feeding operations shall use edge-of-field, grassed strips filter fences or straw bales to separate eroded soil and manure particles from the field runoff.

(g) Off-site areas for manure shall be applied in a manner consistent with paragraphs (1) through (4) of this section.

(6) Practices to Protect Groundwater.

(a) Operators of animal feeding operations shall locate manure and process wastewater management facilities hydrologically downgradient and a minimum horizontal distance of 150 feet from all water supply wells.

(b) When applying manure and process wastewater to land, operators of animal feeding operations shall utilize a buffer area around water wells

sufficient to prevent the possibility of waste transport to groundwater via the well or well casing.

4.8.7 MANURE AND PROCESS WASTEWATER MANAGEMENT PLANS

All new, reactivated, reconstructed or expanded concentrated animal feeding operations and existing concentrated animal feeding operations which have been determined by the Director to be in significant noncompliance with these regulations shall submit a manure and process wastewater management plan to the Division. The Division will provide comments on the adequacy of the plan within 45 days of receipt of such submittal, except for the land application plan portion, if required, the review of which is governed by subsection 4.8.5(A) (5)(c). This plan, shall include details demonstrating the facilities' adequacy to comply with these regulations. The plan, at a minimum, shall include the following: legal owner, local contact, legal description of the site, surface area of the site along with a drainage schematic, the design animal unit capacity, storm water and wastewater conveyance facilities, manure and process wastewater containment and treatment facilities, and information on the manure and process wastewater disposal sites. The Division may require additional information characterizing the manure and process wastewater if deemed necessary to insure protection of state waters. Process wastewater retention structures or manure stockpiles shall not be located within a mapped 100-year floodplain as designated and approved by CWCB unless proper flood proofing measures (structures) are designed and constructed. Facility designs as required under this section shall be prepared by a registered professional engineer, the USDA Soil Conservation Service or qualified Agricultural Extension Service Agent or other individual with demonstrated expertise in the design of such facilities.

4.8.8 MONITORING

Existing concentrated animal feeding operations which are in compliance with the provisions of sections 4.8.3, 4.8.4, and 4.8.5 shall not be required to conduct water quality monitoring except as provided under subsection 4.8.5(A)(5)(c). The Division may request the Commission to require an operator of a concentrated animal feeding operation to perform site-specific water quality monitoring whenever the Division determines that the facility poses a significant potential risk to beneficial uses of state waters. In making a determination of whether monitoring should be

required pursuant to this control regulation, the Commission may consider factors which include but are not limited to: the size of the operation, the economic impact of the proposed monitoring activities, whether there is suspected contamination of state waters attributable to the facility, whether early detection of groundwater contamination is essential to protect valuable drinking water sources, and whether there has been a significant failure on the part of the operator to comply with this regulation and such significant noncompliance indicates there is a high probability that applicable water quality standards or numerical protection levels may be violated.

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APPENDIX A

SEEPPAGE: A SYSTEM FOR EARLY EVALUATION OF THE POLLUTION POTENTIAL OF AGRICULTURAL GROUNDWATER ENVIRONMENTS

by

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CONTENTS

SEEPPAGE: A SYSTEM FOR EARLY EVALUATION OF THE POLLUTION POTENTIAL OF AGRICULTURAL GROUNDWATER ENVIRONMENTS

Background

The importance of our nation's ground water resource cannot be overstated. Over 50 percent of the U.S. population (1980 Census) is served by ground water; 97 percent of the rural population depends upon it for domestic supplies (U.S. Geological Survey, 1985). Our reliance upon the ground water resource has been steadily growing. Ground water withdrawals have increased 159 percent between 1950 and 1980 while surface water withdrawals have risen only 107 percent (Solley, et. al., 1983).

Currently, less than one percent of the resource is estimated to be polluted (Lehr, 1982). The most frequently cited sources of contamination of ground water are deficient septic systems, leaking underground storage tanks, and agricultural activities, such as fertilizer and pesticide applications. The most common contaminants affecting the nation's ground water are sewage, nitrates (such as fertilizers), and synthetic organic chemicals, such as those used in the manufacture of pesticides, as well as petroleum hydrocarbons used in gasoline (US EPA, 1987). More than 99 percent of all contamination problems are in the shallow aquifers (LeGrand, 1983).

The problems of air and surface water pollution are being worked on through the legislative process to restrict or discontinue the release of contaminants. However, the problem of ground water degradation is far more difficult to overcome. Ground water contamination is hard to detect because it is hidden from view; it is almost always discovered by detection in someone's well. Moreover, it typically takes a long time for ground water pollution to show itself, and it takes a very long time for an aquifer to flush itself of the pollutant. Since flushing periods are typically in the range of tens, hundreds, or even thousands of years, the result is often a permanently damaged aquifer (Freeze and Cherry, 1979). Defining the extent of aquifer contamination is extremely costly and technically challenging. Restoring polluted ground water to its original quality is nearly impossible.

Scope

The protection of ground water quality is probably best accomplished by prevention of contamination. The U.S. Department of Agriculture (1987) encourages private landowners to use agricultural practices that prevent, minimize, or avoid harmful levels

of contamination in ground water. Although the Soil Conservation Service provides technical assistance on many types of activities that may affect ground water, there is little guidance provided in SCS technical references concerning ground water quality.

Technical Note 5 has been developed to provide guidance on the evaluation of hydrogeologic conditions at proposed sites for such elements of resource management systems that could have the potential to adversely influence ground water quality.

The procedure is based on three recently developed systems (Aller, 1987; LeGrand, 1983; and Wisconsin Geological and Natural History Survey, 1985) and uses quantitative ranking of some of the most important factors affecting a site's susceptibility to ground water contamination. The method makes a systematic evaluation of proposed conservation practice sites. Information used is generally available in field offices: Soil Survey Reports, topographic maps, State and US Geological Survey reports, and simple, on-site observations. The system can be used by those with diverse backgrounds and a basic understanding of ground-water hydrology.

Purposes

* The system serves as a screening tool early in the conservation planning process when sites for practices are being selected. Potential problems that previously may have gone unrecognized are identified early in planning. Sites that have very high pollution potential can be avoided or afforded appropriate defensive design measures.

* The system allows the user to compare the relative risks of ground water contamination among various sites and to select the most favorable site.

* The system identifies when a specialist is needed, or when a more detailed, site-specific evaluation is necessary.

* The system provides insight on how either the site or the practice may need to be modified to provide for protection of ground water.

Discussion of Methodology

The system focuses on two main subsurface zones: the vadose zone where water and leachable contaminants move vertically downward, and the uppermost saturated zone where ground water

moves essentially laterally. The system is best suited for situations where the contaminant is assumed to be introduced at the ground surface, dissolved in water, and has the mobility of water. The system is designed to apply only to the uppermost ground water system (the water table aquifer), and not to deeper, confined aquifers.

There are many hydrogeologic factors which influence the behavior and movement of contaminants in the ground. This system addresses seven of the most important ones that can be evaluated with readily available information. The seven factors include:

1. Horizontal distance between site and point of water use
2. Land slope
3. Depth to water table
4. Vadose zone material
5. Aquifer material
6. Soil depth
7. Attenuation potential of soil

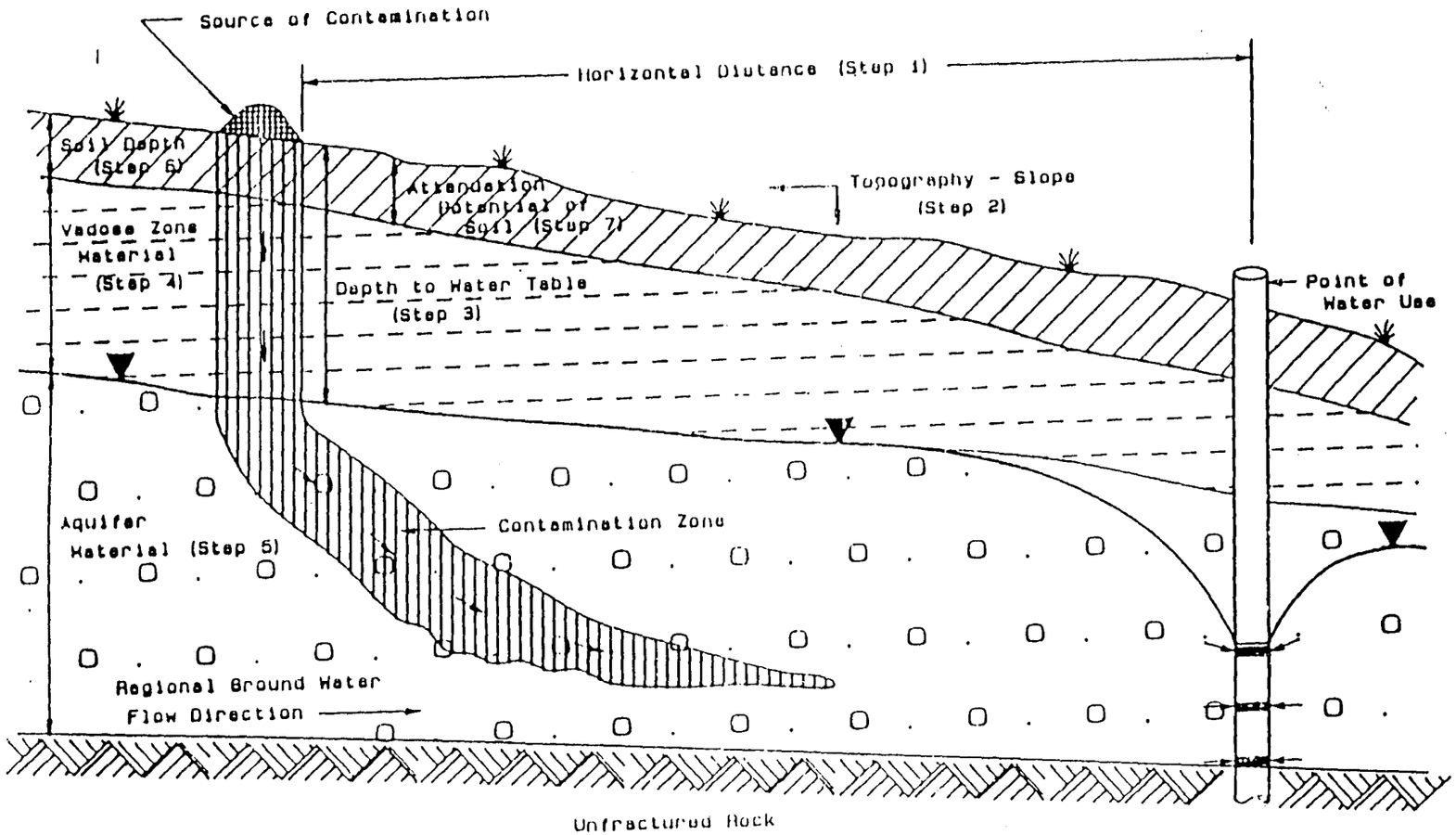
See Figure 1 for a typical setting of the seven steps viewed in cross-section.

Each factor has been assigned a numerical weight ranging from one to five, with the most significant having a weight of five and the least significant a weight of one. The weight is a function of the relative contribution of the factor and whether the contamination is from a concentrated or dispersed source. The weights for each factor are constants; they were determined by a panel of experts for the Aller (1987) system and must not be changed. Dispersed sources of contamination are from nonspecific, diffuse origins; concentrated sources are derived from site-specific, readily observable origins. For example, if the site covers a relatively broad area, such as in the case of application of pesticides on a field, then "dispersed source" weights are used in the analysis. If the site would tend to concentrate pollutants in a relatively small, confined area, such as an animal waste storage pond, then "concentrated source" weights are selected.

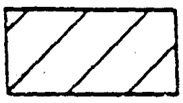
Each factor is divided into numerical ranges with values which vary between one and ten. The ratings for aquifer and vadose zone materials may vary; a rating value can be interpolated and selected according to specific available information, or in the absence thereof, the typical rating can be selected. Scores for each factor are obtained by multiplying the weight by the rating.

Once the scores for the seven factors have been determined, they are summed. The sum of the scores is the Site Index Number (SIN). Site Index Numbers can be used to compare various sites for a proposed conservation practice. The site with the lowest SIN is the least sensitive to ground water contamination. The Site Index Numbers are ranked into Pollution Potential Catego-

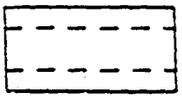
Figure 1: Typical setting for seven steps in SEEPPAGE method, as shown in cross-section.



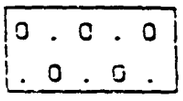
Key to Symbols



Surface Soil (As mapped by U.S.D.A.)

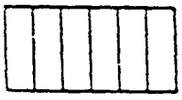


Vadose Zone Material (Unsaturated zone above aquifer and below surface soils; may be soil or rock materials.)



Aquifer Material (Saturated zone capable of yielding useful supplies of water; may be soil or rock materials.)

Unfractured Rock (Non-waterbearing; defines lower limit of aquifer in this case.)



Contaminant Plume (Assumes contaminant has same density and solubility as water, and is dissolved in water.) Arrows denote direction of flow of plume.

ies of LOW, MODERATE, HIGH, and VERY HIGH for both concentrated and dispersed sources of contamination (Table 8). A HIGH or VERY HIGH Pollution Potential Category is a good indication that the site has significant constraints and should be reviewed by a qualified specialist. A ranking of LOW is not necessarily a guarantee that the site will be trouble-free since the procedure addresses only some of the factors that influence ground water contamination. Generally speaking, a site with a ranking of LOW or MODERATE will be superior to one of HIGH or VERY HIGH and is, consequently, more preferable.

An assessment of the scores of the individual factors can provide insight on how the site or the practice may need to be modified to provide for the protection of the ground water. A summary of the score ranges for the seven parameters is given in Table 9. For example, in the case of an animal waste storage pond, high scores in Soil Depth and Aquifer Material (such as thin soil over karst limestone) are indications that the site will need defensive design measures to protect against ground water contamination. Measures may include the use of some type of liner (such as compacted clay, concrete, or plastic) or abandonment of the site for a more favorable location. If all factors are low except Horizontal Distance, then relocating the site further from the water supply well (or point of concern) would be advisable, in addition to lining.

LIMITATIONS OF THE SYSTEM

The ground water pollution potential of a site is a function of many interrelated hydrogeologic, environmental, and cultural factors, and contaminant characteristics. Only a few important hydrogeologic factors are considered in this system. The overriding concern in the development of this system is ease of use. Some information is not readily available or easily developed so such information was excluded. Although the system is simple in concept, it is logical and systematic in its approach, and will achieve the intended purposes.

While recharge is an important climate-related factor, it is not addressed by this system. Recharge is water derived mainly from precipitation or irrigation. It percolates from the ground surface through the soil and vadose zones to an aquifer. Recharge water that originates directly above a source of contamination is responsible for the leaching and movement of pollutants. Generally speaking, the potential for pollution at a site with increases with increasing recharge. Recharge outside the boundaries of a contamination source is generally considered beneficial to the aquifer. The general lack of readily available data and the complexities in its evaluation preclude considering it in this system.

It is important to know whether a contaminant is moving toward or away from a water supply. In humid areas, the frequency of precipitation is usually sufficient to provide recharge to maintain a permanent water table that generally reflects surface topography. Land slope can often be used to ascertain the direction of flow. Unfortunately, radial flow paths, unusual geology, and peculiar contaminant characteristics can too often invalidate this assumption. Hence, the system does not address direction of flow.

The system does not take into account the size and proximity of the population at risk, nor the importance of the aquifer itself to that population.

The system is not designed to apply to specific types of contamination; it does not address contaminant severity (which includes contaminant toxicity, volume, mobility, and persistence), contaminant magnitude (which includes concentration of contaminant, number of contaminants, and plume size), or how the contaminant is released into the environment (as a slug, intermittently, or continuously).

Another point to remember is that some conditions that may be beneficial for ground water protection can be harmful to surface water quality. Consider for example, a large field on steep slopes with freshly applied chemicals. If a heavy rain occurs, the steep slopes promote high erosion rates and rapid runoff of contaminated surface water. Steep slopes are rated favorably in Table 2 (Land Slope) for ground water protection, but of course, they are detrimental to erosion rates and surface water quality. Conversely, the installation of terraces on the slopes would reduce soil erosion and runoff while causing greater infiltration of chemical-laden water into the ground. Conservationists must carefully consider these potentially conflicting effects.

The Pollution Potential Category does not reflect the site's suitability for a particular conservation practice. The suitability of a site depends upon many criteria, including hydrogeologic, environmental, engineering, economic, political, and regulatory. The Category is an indication of the ground-water pollution potential of an area.

This system is intended to be used as a screening tool in the conservation planning process. It must not be utilized as a substitute for a professionally conducted, detailed investigation for design purposes.

Instructions

Use the Worksheets in the back of this Technical Note (pp. 21 and 22) for recording data and calculating the Site Index Number (SIN) and the Pollution Potential Category for each site under consideration. Follow the instructions for each step carefully.

STEP 1. DISTANCE BETWEEN SITE AND POINT OF WATER USE

A. Determine whether the potential source of pollution at the site classifies as Concentrated or Dispersed, then select the appropriate weight given at the bottom of Table 1.
B. Measure the horizontal distance between the site and the point of water use (such as a well) or some designated point of concern (such as a property line).
C. Determine rating for distance using Table 1.
D. Multiply rating times weight to obtain score for Step 1.
E. Record the weight, rating, and score for Step 1 on the Worksheet for Site Index Number, p. 21.

Table 1: Ratings for Distance Between Site and Point of Water Use

Distance (Feet)	Rating
0 - 30	10
30 - 60	9
60 - 100	8
100 - 160	7
160 - 250	6
250 - 500	5
500 - 1000	4
1000 - 3200	3
3200 - 6400	2
> 6400	1

Concentrated Source, Weight: 5	Dispersed Source Weight: 2

Significance of Factor: Distance directly affects the amount of time available for attenuation processes to work. The greater the distance, the greater the time of travel for the pollutant. The longer the pollutant is in contact with the material through which it passes, the greater will be the opportunity for decay, degradation, dilution, and sorption of the pollutant.

STEP 2. LAND SLOPE

A. Measure the slope of the land surface at the site.
B. Determine rating value for slope using Table 2.
C. Select weight for appropriate source given at bottom of Table 2.
D. Multiply rating times weight to obtain score for Step 2.
E. Record the weight, rating, and score for Step 2 on the Worksheet for Site Index Number, p. 21.

Table 2: Ratings for Land Slope

Percent Slope	Rating
0 - 2	10
2 - 6	9
6 - 12	5
12 - 18	3
> 18	1

Concentrated Source, Weight: 1	Dispersed Source, Weight: 3

Significance of Factor: The slope of the land surface at the site influences runoff/infiltration relationships. The flatter the slope, the greater will be infiltration of water (and any dissolved pollutants) into the soil, and therefore, the greater will be the ground-water pollution potential. Steeper slopes tend to induce greater surface water runoff, a condition which can be detrimental from the standpoint of erosion and surface water quality.

Steeper slopes can often indicate higher ground water velocities.

Summary: The flatter the slope of the land surface, the greater the ground-water pollution potential. The steeper the slope, the greater the potential for erosion and surface water pollution.

STEP 3. DEPTH TO WATER TABLE

A. Estimate the shallowest depth to the water table that is below the elevation of the base (or proposed base) of the site more than 5 percent of the year. Use Soil Survey Reports, well logs, or hand auger observations for shallow depths.
B. Determine rating value for depth using Table 3.
C. Select weight for appropriate source given at bottom of Table 3.
D. Multiply rating times weight to obtain score for Step 3.
E. Record the weight, rating, and score for Step 3 on the Worksheet for Site Index Number, p. 21.

Table 3: Ratings for Depth to Water Table

Depth to Water (Feet)	Rating
0	10
0 - 2	9
2 - 5	8
5 - 15	7
15 - 25	6
25 - 35	5
35 - 60	4
60 - 90	3
90 - 200	2
> 200	1

Concentrated Source, Weight: 5	Dispersed Source, Weight: 5

Significance of Factor: The water table can be defined as the boundary between the unsaturated zone and underlying zone of saturation. The depth to the water table determines the vertical distance through which a pollutant must move to reach the top of an aquifer. The greater the depth, the greater the time of travel. The greater the time that the pollutant is in contact with the surrounding material, the greater will be the opportunity for attenuation of the pollutant by processes such as oxidation, decay, and sorption.

Summary: The shallower the water table, the greater the groundwater pollution potential.

STEP 4. VADOSE ZONE MATERIAL

A. Determine type of material in vadose zone (between surface soils and aquifer).
B. Select rating for type of materials in the vadose zone using Table 4.
C. Select weight for appropriate source given at the bottom of Table 4.
D. Multiply the rating times weight to obtain score for Step 4.
E. Record the weight, rating, and score for Step 4 on the Worksheet for Site Index Number, p. 21.

Table 4: Ratings for Type of Material in Vadose Zone

Vadose Zone Material	Rating*	Typical Rating
Silt or Clay	1 - 2	1
Shale, Claystone	2 - 5	3
Limestone	2 - 7	6
Sandstone	4 - 8	6
Limestone, Sandstone, and Shale Sequences	4 - 8	6
"Dirty" Sand and Gravel (having > 12% silt and clay)	4 - 8	6
Metamorphic/Igneous Rocks	2 - 8	4
"Clean" Sand and Gravel (having < 12% silt and clay)	6 - 9	8
Basalt	2 - 10	9
Karst Limestone	8 - 10	10

* Note: Use higher ratings if there are open joints, fractures, or other macro-pores in any of these deposits. Base adjustment on spacing and size of openings.

Concentrated Source, Weight: 5	Dispersed Source, Weight 4

Significance of Factor: The vadose zone can be defined as the unsaturated (or discontinuously unsaturated) material that is above the water table and below the surface soil. The type of material in the vadose zone determines the flow path and rate of flow of the water (and pollutants) percolating downward through it. The rate of flow is a function of the permeability of the vadose zone material; permeability rates are greatly increased by the presence of fractures in the material. Thus the time available for attenuation processes (such as sorption, oxidation, dispersion, mechanical filtration, etc.) to take place is inversely related to permeability. Permeability rates can be inferred from the type of materials.

Summary: The greater the permeability of a material, the lower will be its attenuation capacity, and therefore the higher will be the ground-water pollution potential.

STEP 5. AQUIFER MATERIAL

A. Determine aquifer material using geologic maps of area and on-site inspection.
B. Select the rating for aquifer material from Table 5; use the typical rating unless more specific knowledge justifies modifying it within the given ranges.
C. Select the weight for appropriate source given at the bottom of Table 5.
D. Multiply the rating times the weight to obtain score for Step 5.
E. Record the weight, rating, and score for Step 4 on the Worksheet for Site Index Number, p. 21.

Table 5. Ratings for Aquifer Material

Aquifer Material	Rating*	Typical Rating
Shale, Claystone	1 - 3	2
Unweathered Metamorphic/Igneous Rock	2 - 5	3
Weathered/Fractured Metamorphic/Igneous Rock	3 - 5	4
Glacial Till	3 - 5	4
Sandstone, Limestone, and Shale Sequences (rate higher if fractured)	5 - 9	6
Massive Sandstone	4 - 9	6
Massive Limestone/Dolomite	4 - 9	6
Sand and Gravel	6 - 9	8
Basalt (rate higher if fractured/vesicular)	2 - 10	9
Karst Limestone (highly fractured/cavernous)	9 - 10	10

* Note: Use higher ratings if there are any open joints, fractures, or other macro-pores in any of these materials. Base adjustment on the spacing and size of the openings.

Concentrated Source, Weight: 3	Dispersed Source, Weight: 3

Significance of Factor: An aquifer can be defined as a saturated geologic material which will yield useable quantities of water. Ground water can be transmitted through an aquifer two ways: (1) through the pore spaces between the particles that make up the material (called primary porosity) and, (2) through the fractures and cavities that developed after the material was formed (called secondary porosity). The type of aquifer material controls the flow path and path length which a pollutant must follow; it also influences its permeability, the aquifer's ability to transmit water. Generally speaking, permeability is

lower in fine-grained materials (such as clays or shales) and in materials lacking interconnecting fractures (such as unweathered rocks); permeability tends to be higher in coarse-grained materials, such as clean sands and gravels. The occurrence of secondary fractures in a geologic material greatly increases the paths available for ground water flow and, hence, greatly increases the permeability. Permeability can be inferred from the type of aquifer material. The aquifer materials listed in Table 5 are arranged by increasing permeabilities.

Summary: The greater the permeability of aquifer material, the greater the rate at which a pollutant can spread through the aquifer. The greater the permeability, the less time for attenuation processes to occur. Thus, aquifers comprised of materials with high permeabilities will have high ground-water pollution potential.

STEP 6. SOIL DEPTH

A. Determine depth of soil using information from the local Soil Survey Report or by on-site inspection.
B. Select rating for soil depth using Table 6.
C. Select weight for appropriate source given at bottom of Table 6.
D. Multiply the rating times the weight to obtain score for Step 6.
E. Record the weight, rating, and score for Step 6 on the Worksheet for Site Index Number, p. 21.

Table 6: Ratings for Soil Depth

Soil Depth (inches)	Rating
> 60 (very deep)	1
40 - 60 (deep)	2
20 - 40 (mod. deep)	6
10 - 20 (shallow)	9
< 10 (very shallow)	10

Concentrated Source, Weight: 2	Dispersed Source, Weight: 5

Significance of Factor: Soil depth classes are defined to depths up to 60 inches. These depth classes are based upon depth to restricting or contrasting layers (or bedrock) which influence the downward movement of water and root-penetration. Many important processes attenuate pollutants in the soil zone (see Step 7 for more discussion on significance of attenuation potential of soil). Deeper soils affect the contact time that a pollutant will have with the mineral matter and organic matter of the soil. Very shallow soils (thin to absent) provide little to no protection against ground-water pollution.

STEP 7. ATTENUATION POTENTIAL OF SOIL

Note:
This step is somewhat different from the previous six steps in that two tables must be used to arrive at the attenuation potential of soil. Table 7 is modified from the work of the Wisconsin Geological Survey (1985, p. 35) which assigned factor levels for various physical/chemical soil characteristics that were directly proportional to their attenuation potential. The purpose of Table 7a is to provide a single value for these various characteristics that is inversely proportional to attenuation potential, that is, the higher the numeric rating, the lower the attenuation potential of the soil. Carefully follow the instructions below and use the worksheet (p. 22) to obtain a value for Step 7.

A. Select a factor level for each of the six physical/chemical soil characteristics given in Table 7 using information from the local Soil Survey Report. Use the Step 7 Worksheet (p. 22) to record the selected values.
B. Sum values of the six factor levels.
C. Use this sum to determine the rating for the attenuation potential of the soil from Table 7a.
D. Select the weight for the appropriate source given at the bottom of Table 7a.
E. Multiply the rating for attenuation potential of the soil times the weight to obtain score for Step 7.
F. Record the weight, rating, and score for Step 7 on the worksheet for Site Index Number, p. 21.

Significance of Factor: In the surface soil zone, a great variety of biological, physical, and chemical processes act on a pollutant and tend to lessen its potency or reduce its volume. These processes, collectively referred to as attenuation, prevent or retard the movement of pollutants into deeper subsurface zones. The degree of attenuation depends on the time a pollutant is in contact with the material through which it passes, and the amount of surface area of the particles making up the material. Both the time and the surface area are functions of the grain size of the material and the distance through which the pollutant must pass. Thus, the finer the grain size of the material and the thicker the deposit, the greater will be the attenuation of the pollutant. The eventual fate of most pollutants and the resulting quality of ground water will thus depend on the degree of attenuation that takes place.

The attenuation potential of a soil can be estimated from six physical/chemical characteristics listed in Soil Survey Reports:

(1) Texture of Surface (A) Horizon: The USDA Soil Classification System is used to define soil textures. Medium-textured, well-aerated soils provide optimum conditions for contaminated water to move through the horizon with maximum contact with the

organic and mineral constituents of the soil. Coarse-textured soils and those with large wood fragments tend to be least desirable.

(2) Texture of Subsoil (B) Horizon: Fine-textured soils are desirable in the subsoil horizon to retard the movement of contaminated soil water and allow time for the attenuation processes to work. Shrinking or aggregated types that tend to form macro-pores (fractures in the soil mass itself) are less desirable because such features increase the permeability. Again, coarse-textured soils are the least desirable.

(3) pH of the Surface (A) Horizon: Many attenuation processes in the soil zone function best when the pH of the soil (the degree of acidity or alkalinity) is neutral.

(4) Organic Matter Content: Organic matter is an important constituent in soil because it holds nutrients, water, and heavy metals, and absorbs many types of organic pesticides. It serves as an energy source to microorganisms that break down many types of organic pesticides. Generally speaking, the higher the organic matter content of the soil, the greater will be its attenuation potential.

(5) Permeability of Least Permeable Horizon (below the A): The slower the permeability of the soil, the greater will be the time available for attenuation processes to work in the lower horizons.

(6) Soil Drainage Class: Soil drainage class is an indication of the frequency and duration of periods when the soil is free of saturation or wetness. A well-drained soil is most desirable because the water from all rains can be distributed within the profile and move out by evapotranspiration without disturbing the aeration of the soil. Somewhat poorly to very poorly drained, and excessively drained soils are least desirable. Attenuation potential is lower for the more poorly drained soils which tend to be wet much of the year; it is also lower for excessively drained soils because the movement of the contaminated water is too rapid for the processes to take effect.

In Table 7 below, the following abbreviations are used for Soil Texture Classes (USDA Classification): l = loam, sil = silt loam, scl = sandy clay loam, si = silt, c = clay, sic = silty clay, cl = clay loam, sicl = silty clay loam, sc = sandy clay, lvfs = loamy very fine sand, vfsl = very fine sandy loam, lfs = loamy fine sand, fsl = fine sandy loam, s = sand, ls = loamy sand, sl = sandy loam.

Table 7: **Factor Levels for Characteristics Affecting Attenuation Potential of Soil**

Physical/Chemical Characteristics	Classes	Factor Level
Texture of Surface (A) Horizon (if A is absent, Factor Level equals 0)	l, sil, scl, si	9
	c, sic, cl, sicl, sc	8
	lvfs, vfsl, lfs, fsl	4
	s, ls, sl, > 15 % wood fragments > 3/4 in. across, and all textural classes with coarse fragment class modifiers	1
Texture of Subsoil (B, or if absent, C horizon)	c, sic, sc, si (if clay fraction is a shrinking or aggregated type, subtract 3 points)	10
	scl, l, sil, cl, sicl (if clay fraction is a shrinking or or aggregated type, subtract 3 points)	7
	lvfs, vfsl, lfs, fsl	4
	s, ls, sl, > 15 % wood fragments > 3/4 in. across, and all textural classes with coarse fragment class modifiers	1
pH - Surface (A) Horizon (if absent, use uppermost soil horizon)	6.6 - 7.3 (neutral)	6
	6.1 - 6.5 (slightly acid)	4
	> 7.3 or < 6.1	1
Organic Matter Content (Percent) of Surface Layer of Mineral Soils	4.0 - 10.0 (high)	8
	2.0 - 4.0 (medium)	6
	1.0 - 2.0 (moderately low)	5
	0.5 - 1.0 (low)	3
	< 0.5 (very low)	1
Permeability (in./hr.) of Least Permeable Horizon in Profile (below the A)	< 0.06 (very slow)	10
	0.06 - 0.2 (slow)	8
	0.2 - 0.6 (moderately slow)	7
	0.6 - 2.0 (moderate)	6
	2.0 - 6.0 (moderately rapid)	4
	6.0 - 20.0 (rapid)	2
	> 20.0 (very rapid)	1
Soil Drainage Class	well drained	10
	somewhat excessively drained	7
	moderately well drained	4
	somewhat poorly, poorly, and very poorly drained; and excessively drained	1

Table 7a: **Ratings for Attenuation Potential of Soils**

Range of the Sum of 6 Factor Ratings for Characteristics in Table 8a.	Rating for Attenuation Potential	Verbal Rating
5 - 10	10	Least Potential
11 - 15	9	Least Potential
16 - 20	8	Least Potential
21 - 25	7	Marginal
26 - 30	6	Marginal
31 - 34	5	Good
35 - 40	4	Good
41 - 44	3	Best
45 - 48	2	Best
49 - 53	1	Best
Concentrated Source Weight: 2		Dispersed Source, Weight: 5

STEP 8. DETERMINATION OF SITE INDEX NUMBER AND POLLUTION POTENTIAL CATEGORY

A. After determining the 7 scores in Steps 1 through 7 above, add them up. The sum is the Site Index Number (SIN). The SIN can vary between 23 and 230 for Concentrated Sources, and between 27 and 270 for Dispersed Sources.

B. Use Table 8 to determine the Pollution Potential Category of the SIN.

Table 8: **Pollution Potential Categories of Site Index Numbers**

Source of Pollution	Pollution Potential Category of Site Index Numbers			
	LOW	MODERATE	HIGH	VERY HIGH
Concentrated	23 - 63	64 - 136	137 - 188	189 - 230
Dispersed	27 - 65	66 - 158	159 - 228	229 - 270

Significance of Site Index Number (SIN): The larger the SIN, the greater the pollution potential of the ground water at the site. The number itself has no intrinsic value. Concentrated Source SINs can only be compared to other Concentrated Source SINs (and Dispersed Source SINs only with Dispersed Source SINs); Concentrated Source SINs cannot be compared to Dispersed Source SINs.

Significance of Pollution Potential Category: The Pollution Potential Category provides a basis for ranking the relative magnitude of the SIN. It also provides a rationale for requesting a specialist if the site is not rejected. If the category is HIGH or VERY HIGH, or if the investigator is not confident in some of the values selected in the analysis, a specialist should be requested to provide detailed technical assistance. See "Discussion of Methodology" (p. 3), and "Limitations of System" (p. 7), for additional information.

Table 9: Summary of Score Ranges for Each Step

	CONC. WEIGHT	DISP. WEIGHT	SUMMARY OF SCORE RANGES FOR EACH PARAMETER			
			LOW	MODERATE	HIGH	V. HIGH
STEP 1: DISTANCE	5	2	1 - 3	4 - 5	6 - 7	8 - 10
STEP 2: LAND SLOPE	1	3	1	3	5	9 - 10
STEP 3: WATER DEPTH	5	5	1 - 3	4 - 5	6 - 7	8 - 10
STEP 4: VADOSE ZONE	5	4	1 - 3	4 - 5	6 - 7	8 - 10
STEP 5: AQUIFER	3	3	1 - 3	4 - 5	6 - 7	8 - 10
STEP 6: SOIL DEPTH	2	5	1	2	6 - 9	10
STEP 7: ATTENUATION	2	5	1 - 3	4 - 5	6 - 7	8 - 10

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WORKSHEET FOR SITE INDEX NUMBER

Landowner/Operator: _____

Proposed Practice at Site to Be Evaluated: _____

Site Location and Field Number _____

Evaluator: _____

Date: _____

STEP (use tables 1-7)	VALUE SELECTED	WEIGHT	X	RATING	=	SCORE
STEP 1. DISTANCE	_____	_____		_____		_____
STEP 2. LAND SLOPE	_____	_____		_____		_____
STEP 3. DEPTH TO WATER TABLE . .	_____	_____		_____		_____
STEP 4. VADOSE ZONE MATERIAL . .	_____	_____		_____		_____
STEP 5. AQUIFER MATERIAL	_____	_____		_____		_____
STEP 6. SOIL DEPTH	_____	_____		_____		_____
STEP 7. ATTENUATION POTENTIAL OF SOIL . . . . . (Use Step 7 Worksheet, p. 22)		_____		_____		_____
STEP 8. SITE INDEX NUMBER: Sum of Scores in Steps 1 - 7 . . . . . (Go to Table 8 (p. 18) for Pollution Potential Category of the Site Index Number, then check appropriate box below)						☐ SUM

POLLUTION POTENTIAL CATEGORY (check one box)	Low	Moderate	High	Very High
	☐	☐	☐	☐

WORKSHEET FOR STEP 7

-FACTOR LEVELS FOR CHARACTERISTICS AFFECTING ATTENUATION POTENTIAL OF SOIL-

This worksheet must be filled out to obtain a value for STEP 7 on the Site Index Number Worksheet (p. 21). Select factor levels from Table 7 (p. 17).

Soil Name _____

Map Symbol _____

Physical/Chemical Characteristics	Selected Value	Factor Level
1. Texture of surface (A) horizon	_____	_____
2. Texture of subsoil (B horizon, or if absent, C horizon) . . .	_____	_____
3. pH of surface (A) horizon	_____	_____
4. Organic matter content of surface layer of mineral soils . . .	_____	_____
5. Permeability of least permeable horizon in profile	_____	_____
6. Soil drainage class	_____	_____
Sum of 6 factor levels for characteristics in Table 7. (Use this number to determine the rating for attenuation potential of soil from Table 7a and record the value on Site Index Number Worksheet, Step 7)		☐ SUM

Table 7a: Ratings for Attenuation Potential of Soils

Range of the Sum of 6 Factor Ratings for Characteristics in Table 8a.	Rating for Attenuation Potential	Verbal Rating
6 - 10	10	Least Potential
11 - 15	9	Least Potential
16 - 20	8	Least Potential
21 - 25	7	Marginal
26 - 30	6	Marginal
31 - 34	5	Good
35 - 40	4	Good
41 - 44	3	Best
45 - 48	2	Best
49 - 53	1	Best
Concentrated Source, Weight: 2	Dispersed Source, Weight: 5	

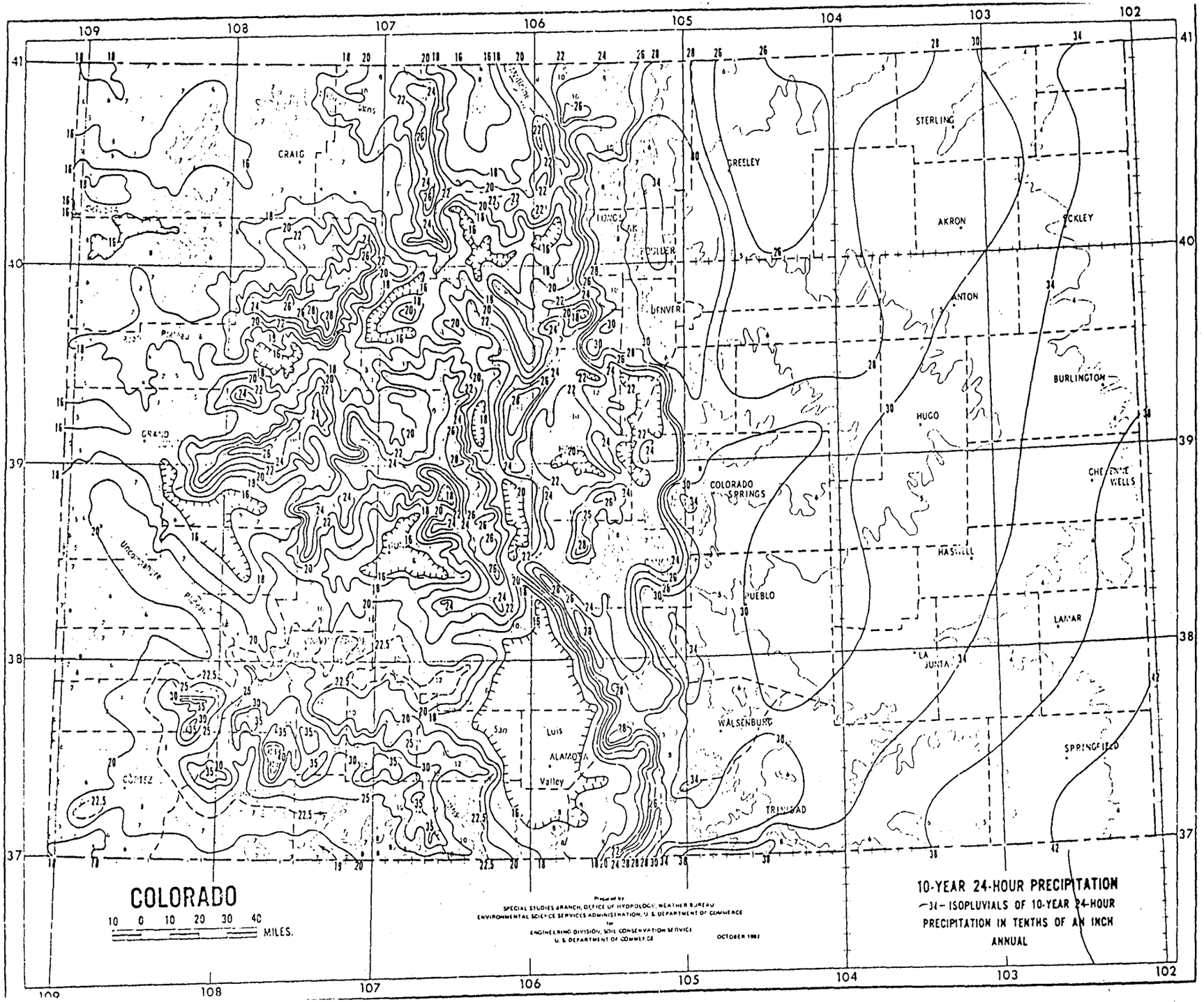
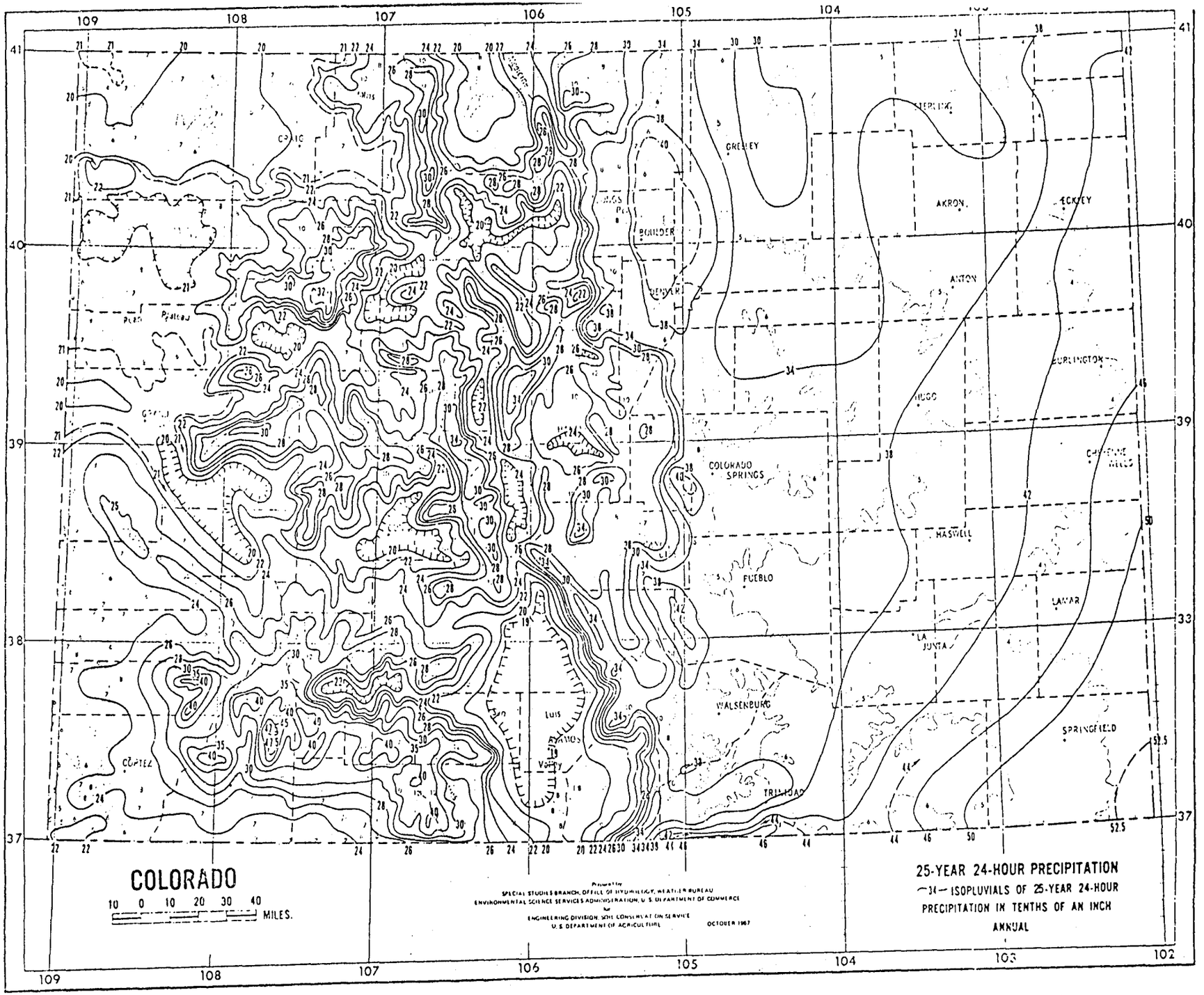

COLORADO
10 0 10 20 30 40
MILES.
10-YEAR 24-HOUR PRECIPITATION
—34— ISOPLUVIALS OF 10-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH
ANNUAL
Prepared by
SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY, WEATHER BUREAU
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION, U. S. DEPARTMENT OF COMMERCE
for
ENGINEERING DIVISION, SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF COMMERCE
OCTOBER 1967
CRAIG
GREELEY
STERLING
AKRON
DENVER
BURLINGTON
HUGO
COLORADO SPRINGS
PUEBLO
LAMAR
LA JUNTA
WALSENBURG
TRINIDAD
SPRINGFIELD
CORTEZ
San Luis Valley
109
108
107
106
105
104
103
102
41
40
39
38
37

Figure 1


COLORADO
10 0 10 20 30 40
MILES.
25-YEAR 24-HOUR PRECIPITATION
—34— ISOPLUVIALS OF 25-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH
ANNUAL
SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY, WEATHER BUREAU
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LA JUNTA
WALSENBURG
SPRINGFIELD
TRINIDAD
CORTEZ
109
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Figure 2

CURVE
90

RUNOFF FOR INCHES OF RAINFALL

Inches \ Tenths	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0				0.01	0.02	0.06	0.10	0.14	0.20	0.26
1	0.32	0.39	0.46	0.53	0.61	0.68	0.76	0.84	0.93	1.01
2	1.09	1.18	1.27	1.35	1.44	1.53	1.62	1.71	1.80	1.89
3	1.98	2.08	2.17	2.26	2.36	2.45	2.54	2.64	2.73	2.83
4	2.92	3.02	3.11	3.21	3.30	3.40	3.49	3.59	3.68	3.78
5	3.88	3.97	4.07	4.17	4.26	4.36	4.46	4.56	4.65	4.75
6	4.85	4.94	5.04	5.14	5.24	5.33	5.43	5.53	5.63	5.73
7	5.82	5.92	6.02	6.12	6.22	6.31	6.41	6.51	6.61	6.71
8	6.81	6.91	7.00	7.10	7.20	7.30	7.40	7.50	7.60	7.69
9	7.79	7.89	7.99	8.09	8.19	8.29	8.39	8.48	8.58	8.68
10	8.78	8.88	8.98	9.08	9.18	9.28	9.38	9.47	9.57	9.67
11	9.77	9.87	9.97	10.07	10.17	10.27	10.37	10.47	10.57	10.66
12	10.76	10.86	10.96	11.06	11.16	11.26	11.36	11.46	11.56	11.66
13	11.76	11.86	11.96	12.05	12.15	12.25	12.35	12.45	12.55	12.65
14	12.75	12.85	12.95	13.05	13.15	13.25	13.35	13.45	13.55	13.65
15	13.75	13.85	13.94	14.04	14.14	14.24	14.34	14.44	14.54	14.64
16	14.74	14.84	14.94	15.04	15.14	15.24	15.34	15.44	15.54	15.64
17	15.74	15.84	15.94	16.04	16.14	16.23	16.33	16.43	16.53	16.63
18	16.73	16.83	16.93	17.03	17.13	17.23	17.33	17.43	17.53	17.63
19	17.73	17.83	17.93	18.03	18.13	18.23	18.33	18.43	18.53	18.63
20	18.73	18.83	18.93	19.03	19.13	19.23	19.33	19.43	19.52	19.62

NOTE: Runoff value determined by equation $Q = \frac{(P-0.2S)^2}{P+0.8S}$

REFERENCE: National Engineering Handbook, Section 4, HYDROLOGY

CURVE
97

RUNOFF FOR INCHES OF RAINFALL

Inches \ Tenths	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0		0.00	0.04	0.10	0.18	0.26	0.34	0.43	0.52	0.61
1	0.71	0.80	0.90	0.99	1.09	1.18	1.28	1.38	1.48	1.57
2	1.67	1.77	1.87	1.97	2.07	2.16	2.26	2.36	2.46	2.56
3	2.66	2.76	2.86	2.96	3.06	3.15	3.25	3.35	3.45	3.55
4	3.65	3.75	3.85	3.95	4.05	4.15	4.25	4.35	4.45	4.55
5	4.65	4.75	4.85	4.95	5.05	5.15	5.25	5.35	5.44	5.54
6	5.64	5.74	5.84	5.94	6.04	6.14	6.24	6.34	6.44	6.54
7	6.64	6.74	6.84	6.94	7.04	7.14	7.24	7.34	7.44	7.54
8	7.64	7.74	7.84	7.94	8.04	8.14	8.24	8.34	8.44	8.54
9	8.64	8.74	8.84	8.94	9.04	9.14	9.24	9.34	9.44	9.54
10	9.64	9.74	9.84	9.94	10.04	10.14	10.24	10.34	10.44	10.54
11	10.64	10.74	10.84	10.94	11.04	11.14	11.24	11.34	11.44	11.54
12	11.64	11.74	11.84	11.94	12.04	12.14	12.24	12.34	12.44	12.54
13	12.64	12.74	12.84	12.94	13.04	13.14	13.24	13.34	13.44	13.54
14	13.64	13.74	13.84	13.94	14.04	14.14	14.24	14.34	14.44	14.54
15	14.64	14.74	14.84	14.94	15.04	15.14	15.24	15.34	15.44	15.54
16	15.64	15.74	15.83	15.93	16.03	16.13	16.23	16.33	16.43	16.53
17	16.63	16.73	16.83	16.93	17.03	17.13	17.23	17.33	17.43	17.53
18	17.63	17.73	17.83	17.93	18.03	18.13	18.23	18.33	18.43	18.53
19	18.63	18.73	18.83	18.93	19.03	19.13	19.23	19.33	19.43	19.53
20	19.63	19.73	19.83	19.93	20.03	20.13	20.23	20.33	20.43	20.53

NOTE: Runoff value determined by equation $Q = \frac{(P-0.2S)^2}{P+0.8S}$

REFERENCE: National Engineering Handbook, Section 4, HYDROLOGY

o.6 Nutrient uptake calculation

Table 6–3 can be used to calculate the approximate nutrient uptake by agricultural crops. Typical crop yields are given only as default values and should be selected according to local information.

1. Select the crop or crops that are to be grown in the cropping sequence.
2. Determine the plant nutrient uptake as a percentage of dry weight from table 6–3.
3. Determine the crop yield in pounds per acre.
4. Multiple the crop yield by the percentage of nutrient contained in the crop.

The solution is pounds per acre of nutrients removed in the harvested crop.

6.7 Nutrient uptake calculation example

Corn and alfalfa are grown in rotation and harvested as high moisture corn and forage. To calculate the nutrient uptake harvested in pounds per acre, follow the above steps.

1. Corn and alfalfa
2. From table 6–3:

corn	= 1.607% nitrogen
	= 0.275% phosphorus
	= 0.486% potassium
alfalfa	= 2.250% nitrogen
	= 0.218% phosphorus
	= 1.868% potassium

3. Yields are taken from local data base:

corn = 130 bu/ac

converting to pounds

130 bu/ac x 56 lb/bu = 7,280 lb/ac

alfalfa = 6 tons/ac

converting to pounds....

6 tons/ac x 2,000 lb/ac = 12,000 lb/ac

4. Multiplying percent nutrients by dry matter yield:

corn	@ 7,280 pounds x 1.607% N = 117 pounds N
	@ 7,280 pounds x 0.275% P = 20 pounds P
	@ 7,280 pounds x 0.395% K = 29 pounds K
alfalfa	@ 12,000 pounds x 2.250% N = 270 pounds N
	@ 12,000 pounds x 0.218% P = 26 pounds P
	@ 12,000 pounds x 1.868% K = 224 pounds K

Note that nutrient values are given as elemental P and K. The conversion factors for phosphates and potash are:

pounds P x 2.3 = pounds P_2O_5

pounds K x 1.2 = pounds K_2O

Table 6–6 Plant nutrient uptake by specified crop and removed in the harvested part of the crop (Kilmer 1982; Morrison 1956; Sanchez 1976; USDA 1985)

Crop	Dry wt. lbs/bu	Typical yield/acre plant part	Average concentration of nutrients (percent) N	P	K	Ca	Mg	S	Cu	Mn	Zn
Grain crops			% of the dry harvested material								
Barley	48	50 bu.	1.82	0.34	0.43	0.05	0.10	0.16	0.0016	0.0016	0.0031
		1 T. straw	0.75	0.11	1.25	0.40	0.10	0.20	0.0005	0.0160	0.0025
Buckwheat	48	30 bu.	1.65	0.31	0.45	0.09			0.0009	0.0034	
		0.5 T. straw	0.78	0.05	2.26	1.40		0.01			
Corn	56	120 bu.	1.61	0.28	0.40	0.02	0.10	0.12	0.0007	0.0011	0.0018
		4.5 T. stover	1.11	0.20	1.34	0.29	0.22	0.16	0.0005	0.0166	0.0033
Oats	32	80 bu.	1.95	0.34	0.49	0.08	0.12	0.20	0.0012	0.0047	0.0020
		2 T. straw	0.63	0.16	1.66	0.20	0.20	0.23	0.0008	0.0030	0.0072
Rice	45	5,500 lbs.	1.39	0.24	0.23	0.08	0.11	0.08	0.0030	0.0022	0.0019
		2.5 T. straw	0.60	0.09	1.16	0.18	0.10			0.0316	
Rye	56	30 bu.	2.08	0.26	0.49	0.12	0.18	0.42	0.0012	0.0131	0.0018
		1.5 T. straw	0.50	0.12	0.69	0.27	0.07	0.10	0.0300	0.0047	0.0023
Sorghum	56	60 bu.	1.67	0.36	0.42	0.13	0.17	0.17	0.0003	0.0013	0.0013
		3 T. stover	1.08	0.15	1.31	0.48	0.30	0.13		0.0116	
Wheat	60	40 bu.	2.08	0.62	0.52	0.04	0.25	0.13	0.0013	0.0038	0.0058
		1.5 T. straw	0.67	0.07	0.97	0.20	0.10	0.17	0.0003	0.0053	0.0017
Oil crops			% of the dry harvested material								
Flax	56	15 bu.	4.09	0.55	0.84	0.23	0.43	0.25		0.0061	
		1.75 T. straw	1.24	0.11	1.75	0.72	0.31	0.27			
Oil palm		22,000 lbs.	1.13	0.26	0.16	0.19	0.09		0.0043	0.0225	
		5 T. fronds, stems	1.07	0.49	1.69		0.36				
Peanuts	22-30	2,800 lbs.	3.60	0.17	0.50	0.04	0.12	0.24	0.0008	0.0040	
		2.2 T. vines	2.33	0.24	1.75	1.00	0.38	0.36		0.0051	
Rapeseed	50	35 bu.	3.60	0.79	0.76		0.66				
		3 T. straw	4.48	0.43	3.37	1.47	0.06	0.68	0.0001	0.0008	
Soybeans	60	35 bu.	6.25	0.64	1.90	0.29	0.29	0.17	0.0017	0.0021	0.0017
		2 T. stover	2.25	0.22	1.04	1.00	0.45	0.25	0.0010	0.0115	0.0038
Sunflower	25	1,100 lbs.	3.57	1.71	1.11	0.18	0.34	0.17		0.0022	
		4 T. stover	1.50	0.18	2.92	1.73	0.09	0.04		0.0241	

.ble 6–6 Plant nutrient uptake by specified crop and removed in the harvested part of the crop—Continued

op	Dry wt. lbs/bu	Typical yield/acre plant part	Average concentration of nutrients (percent) N	P	K	Ca	Mg	S	Cu	Mn	Zn
iber crops			% of the dry harvested material								
;otton		600 lbs. lint & 1,000 lbs. seed stalks	2.67	0.58	0.83	0.13	0.27	0.20	0.0040	0.0073	0.0213
			1.75	0.22	1.45	1.40	0.40	0.75			
?ulpwood		98 cords	0.12	0.02	0.06		0.02				
		bark, branches	0.12	0.02	0.06		0.02				
Forage crops			% of the dry harvested material								
Alfalfa		4 tons	2.25	0.22	1.87	1.40	0.26	0.24	0.0008	0.0055	0.0053
Bahiagrass		3 tons	1.27	0.13	1.73	0.43	0.25	0.19			
Big bluestem		3 tons	0.99	0.85	1.75		0.20				
Birdsfoot trefoil		3 tons	2.49	0.22	1.82	1.75	0.40				
Bluegrass-pastd.		2 tons	2.91	0.43	1.95	0.53	0.23	0.66	0.0014	0.0075	0.0020
Bromegrass		5 tons	1.87	0.21	2.55	0.47	0.19	0.19	0.0008	0.0052	
Clover-grass		6 tons	1.52	0.27	1.69	0.92	0.28	0.15	0.0008	0.0106	
Dallisgrass		3 tons	1.92	0.20	1.72	0.56	0.40				
Guineagrass		10 tons	1.25	0.44	1.89		0.43	0.20			
Bermudagrass		3 tons	1.88	0.19	1.40	0.37	0.15	0.22	0.0013		
Indiangrass		3 tons	1.00	0.85	1.20	0.15					
Lespedeza		3 tons	2.33	0.21	1.06	1.12	0.21	0.33		0.0152	
Little bluestem		3 tons	1.10	0.85	1.45		0.20				
Orchardgrass		6 tons	1.47	0.20	2.16	0.30	0.24	0.26	0.0017	0.0078	
Pangolagrass		10 tons	1.30	0.47	1.87		0.29	0.20			
Paragrass		10.5 tons	0.82	0.39	1.59	0.39	0.33	0.17			
Red clover		2.5 tons	2.00	0.22	1.66	1.38	0.34	0.14	0.0008	0.0108	0.0072
Reed canarygrass		6.5 tons	1.35	0.18		0.36					
Ryegrass		5 tons	1.67	0.27	1.42	0.65	0.35				
Switchgrass		3 tons	1.15	0.10	1.90	0.28	0.25				
Tall fescue		3.5 tons	1.97	0.20	2.00	0.30	0.19				
Timothy		2.5 tons	1.20	0.22	1.58	0.36	0.12	0.10	0.0006	0.0062	0.0040
Wheatgrass		1 ton	1.42	0.27	2.68	0.36	0.24	0.11			
Forest			% of the dry harvested material								
Leaves			0.75	0.06	0.46						
Northern hardwoods		50 tons	0.20	0.02	0.10	0.29					
Douglas fir		76 tons	0.16								

Table 6–6 Plant nutrient uptake by specified crop and removed in the harvested part of the crop—Continued

Crop	Dry wt. lbs/bu	Typical yield/acre plant part	Average concentration of nutrients (percent) N	P	K	Ca	Mg	S	Cu	Mn	Zn
Fruit crops			% of the fresh harvested material								
Apples		12 tons	0.13	0.02	0.16	0.03	0.02	0.04	0.0001	0.0001	0.0001
Bananas		9,900 lbs.	0.19	0.02	0.54	0.23	0.30				
Cantaloupe		17,500 lbs.	0.22	0.09	0.46		0.34				
Coconuts		0.5 tons–dry copra	5.00	0.60	3.33	0.21	0.36	0.34	0.0010		0.0076
Grapes		12 tons	0.28	0.10	0.50		0.04				
Oranges		54,000 lbs.	0.002	0.02	0.21	0.06	0.02	0.02	0.0004	0.0001	0.0040
Peaches		15 tons	0.12	0.03	0.19	0.01	0.03	0.01			0.0010
Pineapple		17 tons	0.43	0.35	1.68	0.02	0.18	0.04			
Silage crops			% of the dry harvested material								
Alfalfa haylage (50% dm)		10 wet/5 dry	2.79	0.33	2.32	0.97	0.33	0.36	0.0009	0.0052	
Corn silage (35% dm)		20 wet/7 dry	1.10	0.25	1.09	0.36	0.18	0.15	0.0005	0.0070	
Forage sorghum (30% dm)		20 wet/6 dry	1.44	0.19	1.02	0.37	0.31	0.11	0.0032	0.0045	
Oat haylage (40% dm)		10 wet/4 dry	1.60	0.28	0.94	0.31	0.24	0.18			
Sorghum-sudan (50% dm)		10 wet/5 dry	1.36	0.16	1.45	0.43	0.34	0.04		0.0091	
Sugar crops			% of the fresh harvested material								
Sugarcane		37 tons	0.16	0.04	0.37	0.05	0.04	0.04			
Sugar beets		20 tons	0.20	0.03	0.14	0.11	0.08	0.03	0.0001	0.0025	
		tops	0.43	0.04	1.03	0.18	0.19	0.10	0.0002	0.0010	
Tobacco			% of the dry harvested material								
All types		2,100 lbs.	3.75	0.33	4.98	3.75	0.90	0.70	0.0015	0.0275	0.0035
Turf grass			% of the dry harvested material								
Bluegrass		2 tons	2.91	0.43	1.95	0.53	0.23	0.66	0.0014	0.0075	0.0020
Bentgrass		2.5 tons	3.10	0.41	2.21	0.65	0.27	0.21			
Bermudagrass		4 tons	1.88	0.19	1.40	0.37	0.15	0.22	0.0013		

-6 Plant nutrient uptake by specified crop and removed in the harvested part of the crop—Continued

	Dry wt. lbs/bu	Typical yield/acre plant part	Average concentration of nutrients (percent) N	P	K	Ca	Mg	S	Cu	Mn	Zn
table crops			% of the fresh harvested material								
peppers		9 tons	0.40	0.12	0.49		0.04				
is, dry		0.5 ton	3.13	0.45	0.86	0.08	0.08	0.21	0.0008	0.0013	0.0025
bage		20 tons	0.33	0.04	0.27	0.05	0.02	0.11	0.0001	0.0003	0.0002
rots		13 tons	0.19	0.04	0.25	0.05	0.02	0.02	0.0001	0.0004	
sava		7 tons	0.40	0.13	0.63	0.26	0.13				
ery		27 tons	0.17	0.09	0.45						
cumbers		10 tons	0.20	0.07	0.33		0.02				
ttuce (heads)		14 tons	0.23	0.08	0.46						
ions		18 tons	0.30	0.06	0.22	0.07	0.01	0.12	0.0002	0.0050	0.0021
ezs		1.5 tons	3.68	0.40	0.90	0.08	0.24	0.24			
otatoes		14.6 tons	0.33	0.06	0.52	0.01	0.03	0.03	0.0002	0.0004	0.0002
nap beans		3 tons	0.88	0.26	0.95	0.05	0.10	0.11	0.0005	0.0009	
Sweet corn		5.5 tons	0.89	0.24	0.58		0.07	0.06			
Sweet potatoes		7 tons	0.30	0.04	0.42	0.03	0.06	0.04	0.0002	0.0004	0.0002
T: ets		15 tons	0.26	0.04	0.28	0.03	0.02	0.02	0.0001	0.0007	
Tc es		22 tons	0.30	0.04	0.33	0.02	0.03	0.04	0.0002	0.0003	0.0001
Wetland plants			% of the dry harvested material								
Cattails		8 tons	1.02	0.18							
Rushes		1 ton	1.67								
Saltgrass		1 ton	1.44	0.27	0.62						
Sedges		0.8 ton	1.79	0.26		0.66					
Water hyacinth			3.65	0.87	3.12						
Duckweed			3.36	1.00	2.13						
Arrowweed			2.74								
Phragmites			1.83	0.10	0.52						

651.67 References

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often receive rates of manure far in excess of maximum-yield requirements. These excessive applications, in some cases, result in an accumulation of nutrients approaching toxic levels and the leaching of nitrate into the groundwater. Manure management is a major problem that faces agriculture. The estimated annual manure production by various types of animals is presented in Table 1.

Table 1: Annual manure production by various animals (wet weight).

Animal	Raw manure production per 1,000 pounds animal weight	
	tons/yr	gal/yr
Dairy cow	15.0	3,614
Beef feeder	11.0	2,738
Beef cow	11.5	2,884
Swine feeder	18.0	4,380
Swine breeding herd	6.5	1,533
Sheep	7.5	1,679
Poultry layer	10.0	2,336
Poultry broiler	13.0	3,139
Turkey	11.0	2,592
Horse	8.5	2,044

NOTE: Raw manure includes feces and urine. The wet weight of animal manures ranges between 8 and 9 pounds per gallon.
SOURCE: Vitosh, et al., 1988.

Manure Composition

The nutrient composition of farm manure varies widely even for the same species of animal. In the past, animal wastes were considered to be largely solids. Disposal was a problem because it required handling a large tonnage of low-analysis material. Today, an increasing amount of the waste is a fluid and the analysis is even lower because of the higher water content. The approximate fertilizer value for various manure handling systems is listed in Tables 2 and 3. These values are not absolute but serve as an aid indicating the amounts of plant nutrients that may be present. Animal wastes should be analyzed prior to land application if reliable local data are not available.

Moisture Content

Manure contains 10 percent to 80 percent water, depending on whether the material is stockpiled or taken directly from the feedlot. A simple method to determine water content is to weigh wet manure and then spread it on a sheet of plastic to air dry. When it dries, weigh it again and calculate its former moisture percentage as follows:

$$\text{Percent Moisture (wet basis)} = \frac{\text{Wet Weight-Dry Weight}}{\text{Wet Weight}} \times 100$$

Table 2: Composition of various solid manures.

Source of Manure	Bedding or litter	Dry matter	Ammonium N	Total N	P_2O_5	K_2O
		%	lb/ton raw waste			
Swine	No	18	6	10	9	8
	Yes	18	5	8	7	7
Beef	No	52	7	21	14	26
	Yes	50	8	21	18	26
Dairy	No	18	4	9	4	10
	Yes	21	5	9	4	10
Sheep	No	28	5	18	11	26
	Yes	28	5	14	9	25
Poultry	No	45	26	33	48	34
	Yes	75	36	56	45	34
Turkey	No	22	17	27	20	17
	Yes	29	13	20	16	13
Horse	Yes	46	4	14	4	14

NOTE: The nutrient value of manure varies with different feed and management systems. For the actual nutrient value of manure on your farm an analysis is necessary.
SOURCE: Vitosh, et al., 1988.

Table 3: Composition of various liquid manures.

Source of Manure	Waste handling	Dry matter	Ammonium N	Total N	P_2O_5	K_2O
		%	lbs/1,000 gal raw waste			
Swine	Liquid pit	4	26	36	27	22
	Lagoon*	1	3	4	2	4
Beef	Liquid pit	11	24	40	27	34
	Lagoon*	1	2	4	9	5
Dairy	Liquid pit	8	12	24	18	29
	Lagoon*	1	3	4	4	5
Poultry	Liquid pit	13	64	80	36	96

**Includes lot runoff water.*
SOURCE: Vitosh, et. al., 1988

STATEMENT OF BASIS, SPECIFIC STATUTORY AUTHORITY, AND PURPOSE
(1992 Confined Animal Feeding Operation Control Regulation Revisions)

The provisions of sections 25-8-202(7), 25-8-205, 25-8-206, and 25-8-308, C.R.S. 1973, as amended provide the specific statutory authority for adoption of this regulation. The Commission also adopted, in accordance with section 24-4-103(4), C.R.S. the following Statement of Basis and Purpose.

Overview

The original Feedlot Control Regulation, 5 C.C.R. 1002-5 et. seq. was adopted by the Commission in 1974. The format of the regulation was changed in 1976 and there have been no further changes to it since then. Several recent developments have indicated the need for the Commission to modify the regulation both in terms of substance and format. Such developments include the establishment of the Basic Standards for Groundwater and the adoption of the groundwater discharge amendments to the Permit Regulations.

A strict interpretation of the previously adopted Feedlot Control Regulation would indicate that discharges of process wastewater from any operation that meets the definition of a feedlot are prohibited. That definition encompasses a wide variety of operations of all sizes. The Commission has determined that it is desirable to improve the focus of the regulation upon water quality in terms of protecting beneficial uses and insuring applicable standards are not violated, while maintaining consistency with federal regulations. Therefore the regulation presently being adopted addresses two different categories of confined animal feeding operations: concentrated animal feeding operations and other animal feeding operations.

Purpose of the Regulation

Based upon the information received into the record during this rulemaking hearing, the Commission has determined that the purposes of this control regulation are to prevent the discharge of manure or process wastewater from concentrated animal feeding operations into waters of the state and to encourage that these materials be retained and utilized beneficially on agricultural land. The Commission recognizes that livestock produce manure and process wastewater which when properly used, supply nutrients and organic matter to soils. The mere presence of livestock manure and process wastewater in a given location does not denote pollution, but may, when improperly stored, transported or disposed of, create adverse impacts upon public health and the environment. A primary concern of the Commission is to ensure that manure and process wastewater associated with confined animal feeding operations is handled in a manner which does not cause exceedances of applicable standards or

harm to existing or classified uses of state waters. While the Commission has drawn a distinction between the regulatory requirements pertaining to concentrated animal feeding operations and other animal feeding operations, it intends that the latter types of operations nevertheless protect surface water, ground water and soil resources, through proper application of "best management practices" based upon existing physical conditions and constraints at the facility site.

The Commission, in adopting this regulation does not intend to address public health nuisance conditions or land use controls such as zoning requirements or policies.

Concentrated Animal Feeding Operations

The Commission has defined concentrated animal feeding operations as those facilities with a larger capacity or which are located in areas where the potential adverse impacts associated with a discharge are particularly severe. For these facilities, the adopted rule establishes specific manure and process wastewater retention and disposal requirements which focus on proper design, construction and operation as the primary means to prevent discharges of pollutants into surface and ground waters.

Concentrated animal feeding operations are confined operations that fall under one of three specific criteria. The first criterion is based on the number and type of animals confined. The second criterion is a case-by-case designation based on certain discharges to surface waters. The last criterion is based on the facility's location in a hydrologically sensitive area. In the noticed proposal, these sensitive areas were described as sensitive environmental areas. The rule adopted by the Commission renames these areas to more accurately reflect the types of potential impacts the regulation addresses (i.e., water quality and human health impacts).

The Commission finds that prevention of process wastewater and manure discharges is particularly important when such discharges may impact areas of significant groundwater recharge, waters which are currently used for drinking water purposes or which could be used for drinking water purposes in the future, and waters subject to antidegradation review. Therefore, operations located within these hydrologically sensitive areas are considered to be concentrated animal feeding operations.

Some parties have expressed concern with the inclusion of facilities in the Concentrated Animal Feeding Operation category, based on their potential impacts on reasonably likely future drinking water supplies. It is the Commission's intent, through this regulation, to protect classified as well as existing but unclassified drinking water uses from the potential impacts of animal feeding operations. In addition, the Commission intends

this regulation to preserve existing drinking water supplies which are not currently used but which may be used for public consumption in the future. For that reason, the rule adopted by the Commission includes within the definition of hydrologically sensitive areas, areas where contamination from animal feeding operations could impact reasonably likely future public drinking water system withdrawals. In order to determine whether these future withdrawals are reasonably likely, the Division must take into account the background quality as well as the decreed or permitted use of the water. A definition of public drinking water systems, consistent with the definition found in the state's safe drinking water regulations, is adopted by the Commission as part of this regulation.

Animal Feeding Operations

For those confined animal feeding operations not included in the concentrated animal feeding operations category the Commission has prescribed best management practices (BMPs) which are aimed at reducing the water quality impacts from these operations. The BMPs provide guidance to the small operations for solids removal, runoff and process water reduction and groundwater protection. The goal of these requirements is the same as that for concentrated animal feeding operations --i.e., preventing discharge of pollutants to ground and surface water. However, considering the lesser likelihood of adverse impacts from these facilities, and the goal of economic reasonableness, the Commission has determined that the establishment of BMPs is the most appropriate control mechanism for these facilities at this time.

Surface and Ground Water Protection Requirements for Concentrated Animal Feeding Operations

The adopted rule preserves the general performance, design, and operation requirements for the protection of surface waters established in the feedlot regulation which it amends. Facilities are required to operate as no-discharge operations by designing and constructing structures to retain contaminated storm and wastewater within an applicable storm event. The adopted rule adds specificity to these requirements.

While the existing feedlot regulation requires no discharge to state waters, including groundwater, from confined animal feeding operations, it provides no direction regarding what is expected from a facility in order to achieve the no discharge to groundwater requirement. The amendment adopted by the Commission fills that void by specifying design and construction requirements for manure and process wastewater retention and conveyance structures. The Commission recognizes that existing facilities may find it difficult to demonstrate that retention structures which have been constructed prior to the effective date of this rule are in compliance with these specific design and construction

requirements. It is not the Commission's intent in adopting this rule to cause operators to be automatically in noncompliance. For this reason, the adopted rule does not require operators to demonstrate that manure and process wastewater retention structures in existence at the time the rule becomes effective meet design and construction requirements. If, however, the Division determines that seepage at a rate greater than allowed is occurring, the operator may be required to redesign and reconstruct existing structures in order to meet the seepage rates required.

The evidence presented at the hearing indicates that process-generated wastewater from animal feeding operations may contain levels of nitrates and other pollutants equivalent to those contained in domestic wastewater treatment facilities. The Commission finds that, in order to comply with the no discharge requirement, structures which retain process-generated wastewater, whether in combination with stormwater or not, must be lined so as not to exceed a seepage rate of 1/32" per day. This approach is consistent with the approach adopted by the Commission in the groundwater amendments to the Regulations for the State Discharge Permit System, (5 CCR 1002-2, Section 6.10).

The Commission recognizes that structures which retain runoff from open animal feeding operations for a short term, which runoff is not combined with process-generated wastewater, do not pose the same potential impacts to groundwater as full-time process-generated wastewater retention structures. The runoff retained in the former type of structures comes into contact with manure or raw, intermediate, or final products of operation and is, therefore, process wastewater. However, given the dilute nature of the waste retained and the short retention time allowed (i.e., they must kept in a dewatered status as defined in subsection 4.8.4(B)), these structures are subject to a more lenient maximum seepage rate requirement. The rule adopted by the Commission requires that these structures be designed, constructed, and maintained, so as not to exceed a seepage rate of 1/4" per day. The Commission also understands that these runoff retention structures often retain, in addition to runoff sources of process wastewater, raw water, such as boiler cooling water and flow-through livestock drinking water. These raw water sources are isolated from areas where manure or raw, intermediate or final products are found. Therefore, while not considered process wastewaters while diverted, they become process wastewaters when commingled with the runoff contained in the retention structures. Structures which retain commingled process wastewater runoff and these raw water sources are subject to the 1/4" per day maximum seepage rate requirement.

Beneficial Use and Disposal of Manure and Process Wastewater

Two primary means of disposal of manure and process wastewater are addressed in the adopted rule: land application and treatment and discharge. Innovative methods of disposal are encouraged and

require the Division's approval. Treatment and discharge of manure and process wastewater into state waters requires a CDPS permit.

The Commission recognizes that proper land application of manure and process wastewater from animal feeding operations may be quite beneficial to agricultural land. The Commission also recognizes, however, that improper land application or land application at a rate greater than that which plants can utilize, may result in adverse impacts to the state's waters. In order to ensure that the maximum benefits of land application are obtained, without impacting the quality of ground and surface waters, the rule adopted specifies land application practices requirements and a tiered approach to maximum land application rates to be allowed.

The adopted rule specifies three alternative methods of calculation of appropriate land application rates. The first two methods contemplate the use of manure and/or process wastewater to supply plant nutrients. Accordingly, land application rates under either method is limited to the amount of nutrients which are plant available at any given time. The first method contemplates a text-book approach to rate calculation, based on a number of preestablished conditions. Because they are preestablished, these conditions are conservative and may result in application rates which are more restrictive than necessary to ensure that all nutrients are plant available at any given site. Operators who want to avoid the cost of site-specific conditions analysis may use this first method, provided that commercial fertilizers are not used in addition to manure and or process wastewater at the land application site. Operators who want to land apply at a rate that takes into account site-specific conditions may do so after performing site-specific agronomic analyses as specified under the second method provided in the adopted rule. The Commission finds that all the elements specified under the second method are necessary to derive an appropriate site-specific application rate. Operators who rely on either method need not obtain the Division's prior approval, but an operator relying on the second method must keep copies of all agronomic analyses and make them available for inspection.

The second method of calculating manure and/or process wastewater application rates requires an agronomic analysis comparable to that which is performed by farmers and ranchers in order to determine appropriate levels of nutrients which must be added to growing crops in a given growing season. This analysis requires a determination of the residual nutrient content of the soil in order to determine the amount of nutrients that can be added through land application or any other nutrient sources, including commercial fertilizers, in order to supply the necessary crop requirements. An operator who utilizes this method may also rely on commonly accepted mineralization rates, i.e., the rates at which organic nitrogen in manure and process wastewater converts to inorganic

forms, such as nitrates, which are available to plants, but which pose a risk of ground water contamination.

The third land application rate calculation method provided in the adopted rule contemplates not only the supply of plant nutrients, but also the disposal of excess manure and process wastewater beyond that which is available for plant uptake. For example, other potential mechanisms for nutrient losses, such as volatilization and denitrification, may be considered. The Commission finds that the combination of plant uptake and land treatment techniques could be an adequate method to remove pollutants in the context of concentrated animal feeding operations. The Commission also finds, however, that reliance on the third method of land application rates calculation poses a significantly increased risk of adverse impacts to state waters. Therefore, an operator who wishes to land apply manure and/or process wastewater at rates allowed under the third calculation method must incur the expense of comprehensive studies and, if deemed necessary by the Division, of monitoring, to ensure that applicable water quality standards and protection levels are not exceeded. In addition, operators relying on the third rate calculation method must obtain interim and/or final approval from the Division prior to land application.

Operators who choose to exceed the rates of application allowed under the second method of calculating application rates must perform a comprehensive analyses required under Section 4.8.5(A)(5)(c). Operators who land apply manure and/or process wastewater on a "continuous or near continuous basis" must also comply with those provisions. The phrase "on a continuous or near continuous basis" is designed to include those facilities which, due to their size and intensity, land apply waste on a regular, year-round basis, rather than on a seasonal or sporadic basis utilized in more common farming operations.

Manure and Process Wastewater Management Plans

The Commission intends this regulation, including the amendment hereby adopted, to be a self-implementing control regulation which requires no permit as a condition for operation of a confined animal feeding facility, whether concentrated or not. The Commission finds, however, that planning is necessary in order to ensure that concentrated animal feeding facilities meet the regulation's requirements. Such planning is necessary whenever an improvement to an existing facility or the construction of a new facility will take place. Planning is also crucial when an existing facility is not performing in accordance with the no discharge parameters established in the regulation, and may be in need of improvement. The Commission further finds that in order to better monitor compliance with this self-implementing regulation, and in order to be more responsive to public inquiries, the Division needs to be informed of the existence and operation of

concentrated animal feeding operations. Therefore, the adopted rule requires new, reactivated, reconstructed, and expanded concentrated animal feeding operations, as well as existing operations which are in significant noncompliance, to submit to the Division a Manure and Process Wastewater Management Plan.

Such plan need not be approved by the Division unless it includes the land application plan which may be required pursuant to section 4.8.5. If a land application plan is included, only the land application plan must be approved. However, the Division will review the plan submitted and may provide comments to the operator within 45 days of receipt. The Commission does not intend the Division's comments to be binding on the operator, nor does the Commission intend the Division's comments or lack thereof to be relied upon as an approval or a denial of the matters addressed in the plan. The Commission finds, however, that the Division's input early in the planning process may help to prevent noncompliance after construction has taken place.

Monitoring

The Commission, in its notice for this rulemaking hearing, specifically requested input from the public regarding the need for water quality monitoring at concentrated animal feeding operations. There was a great deal of concern expressed by the regulated community about the possible imposition of monitoring requirements on top of the mandatory management practices set forth in this regulation. Some parties expressed the view that monitoring is appropriate and should be required by the Division.

The Commission recognizes that this regulation consists, for the most part, of stringent technology-based requirements aimed at achieving no discharge of manure and process wastewater to waters of the state. Where these are complied with, further monitoring is not required. The Commission feels, however, that there are circumstances where the potential risk to beneficial uses of state waters, as reflected, for example, by potential violations of water quality standards and numerical protection levels, posed by a concentrated animal feeding operation may warrant monitoring. Such circumstances and some of the factors which must be considered prior to requiring a facility to monitor are outlined in the adopted rule.

Because there is a potentially significant cost associated with groundwater monitoring, the Commission has decided that it should be involved in each decision to require monitoring from a concentrated animal feeding operation, except as provided in subsection 4.8.5(A)(5)(c) of the regulation. Therefore, except as provided in subsection 4.8.5(A)(5)(c), the Division will be required to bring cases to the Commission where it feels monitoring is needed. Then, upon the request of the Commission, the Division may require monitoring to be conducted by an operator.

An exception to the stringent no discharge requirements set forth in this regulation is the manure and process wastewater land application rate allowed under subsection 4.8.5(A)(5)(c). Given the potential risk of groundwater contamination associated with such practices, the Commission has determined that monitoring may be required directly by the Division when such practices are proposed by the operator.

Statutory Considerations

In adopting this amendment, the Commission has considered several additional statutory provisions beyond the authorities underlying this regulation. Section 25-8-205(5) restricts the Commission from adopting control regulations which require agricultural "nonpoint source dischargers" to utilize treatment techniques which require additional consumptive or evaporative use which would cause material injury to water rights. This section also provides that control regulations related to agricultural practices shall be promulgated only if incentive, grant and cooperative programs are determined by the Commission to be inadequate and such regulations are necessary to meet state law or the federal act. The Commission has determined, that discharges from Confined Animal Feeding Operations are point sources under federal and state law. Moreover, no grant or incentive programs are currently in place to address the water quality impacts which may be associated with confined animal feeding operations. The Commission heard testimony from the Colorado Cattle Feeders Association, to the effect that efforts are underway to develop a program which would offer technical assistance to its membership. The Commission feels that while such program, if developed may prove to be of valuable assistance to the Division in furtherance of the purposes of the amended regulation, such program alone would be inadequate to achieve the regulation's purposes. Given the limited scope of the program and the nature of the regulation and sources affected, the Commission has determined that the self-implementing regulations, as adopted, is the appropriate means to address potential impacts from confined animal feeding operations.

Section 25-8-504(2) restricts the Division from issuing a permit for animal or agricultural waste on farms and ranches except as may be required by the federal act or regulations. The Commission has chosen to regulate the discharge of process wastewater and manure through a control regulation which is "self implementing" rather than through a permit mechanism. The Commission has not made any findings with respect to the question of whether the discharges of pollutants associated with confined animal feeding operations may be subject to permitting requirements.

Section 25-8-202(8) provides that the Commission may promulgate rules more stringent than corresponding enforceable federal requirements only if based on sound scientific evidence in the record and the Commission determines that such rules are necessary

to protect the public health, beneficial use of water, or the environment of the state. The Commission recognizes that certain elements of this regulation go beyond corresponding enforceable federal requirements. For example, the class of facilities which belong to the concentrated animal feeding operation category under this regulation is somewhat broader than would meet the federal criteria for determining a concentrated animal feeding operation. Evidence in the record demonstrates that significant quantities of nitrogenous wastes and oxygen demanding wastes are potentially associated with animal feeding operations which are smaller than 1,000 animal units. Unless proper measures such as best management practices are implemented, these operations may have significant impacts on the quality of ground waters. These potential impacts to the state's groundwater are not addressed by the federal regulations; therefore, there are no corresponding enforceable federal requirements with respect to ground water. The Commission has included facilities located in significant groundwater recharge areas, or where drinking water withdrawals are currently taking place, or where public drinking water system withdrawals are reasonably likely, within the definition of concentrated animal feeding operations, in order to provide such protection.

The Commission adopted requirements affecting animal feeding operations which do not meet the definition of concentrated animal feeding operations. While these requirements also go beyond corresponding enforceable federal requirements for surface water protection, the Commission was persuaded by the written and oral testimony which indicated that given the runoff associated with thunderstorms and large snowmelt events which occur in Colorado and the significant quantities of nitrogen compounds and biochemical oxygen demanding compounds which can accumulate at animal feeding operations, even small facilities should be controlled with accepted best management practices. Given the tendency of most streams in the state to exhibit extremely low flows from late summer to early spring each year, the Commission determined that the mandatory application of best management practices was necessary to protect the beneficial uses of state waters from runoff containing animal wastes. The Commission was also concerned with the need to prevent groundwater pollution, especially where existing or reasonably likely withdrawals for drinking water may occur. As indicated above, there are no corresponding enforceable federal ground water requirements.

Feedlot-SBP.MW4

PARTIES TO THE RULEMAKING HEARING
MARCH 2, 1992

1. Colorado Pork Producers
2. Colorado Cattle Feeders
3. National Hog Farms
4. Equus Farms, Inc.

REVIEW COMMENTS

FILE #SUP-95-165 **TITLE HEADING:** Special Use Permit - Balanced Rock Ostrich Kennel

LOCATION: 2372 G Road

PETITIONER: William Merkel

PETITIONER'S ADDRESS/TELEPHONE: 2525 N 8th Street
Grand Junction, CO 81501
242-9127

STAFF REPRESENTATIVE: Kristen Ashbeck

NOTE: THE PETITIONER IS REQUIRED TO SUBMIT FOUR (4) COPIES OF WRITTEN RESPONSE AND REVISED DRAWINGS ADDRESSING ALL REVIEW COMMENTS .

CITY ATTORNEY **9/25/95**
Dan Wilson **244-1505**
No comment.

CITY CODE ENFORCEMENT **9/29/95**
Jan Koehn **244-1593**
What are the building setbacks and the fenced in area setbacks relataive to the property lines and structures on adjoining parcels. How are odors to be contained and where will the animal waste be disposed of? Are there any noise impacts from the ostrichs?

CITY DEVELOPMENT ENGINEER **10/06/95**
Jody Kliska **244-1591**
Need more specific information on ultimate build-out of the kennel, including the following:

Number of truck trips anticipated
Number of employees
Control of dust & odor
Control of drainage-concern with manure. Will all drainage be contained on site? If so, how?

CITY PARKS & RECREATIONS DEPT. **10/06/95**
Shawn Cooper **244-3869**
The Parks Dept. has some concern regarding this application due to the close proximity to the Canyon View Regional Park site. The petitioner needs to be aware that the noises and lights from the athletic fields on the park site may carry to and interfere with operations that are being proposed. Although we anticipate that the impact should be minor, it could be significant on the breeding and boarding of ostriches.

COMMUNITY DEVELOPMENT DEPT. 10/01/95
Kristen Ashbeck 244-1437

1. The narrative does not suggest ultimate numbers of ostriches to be held in each of the various pens or buildings. This is critical information to assessing potential impacts of the kennel facility.

2. Also provide information addressing odor and dust (e.g. maintenance of facility, proposed upgrade of surface in "fenced in area" - rock, pavement etc.) A major concern of adjacent property owners is odor (see attached letter and note). Please address how any odor and dust can be mitigated.

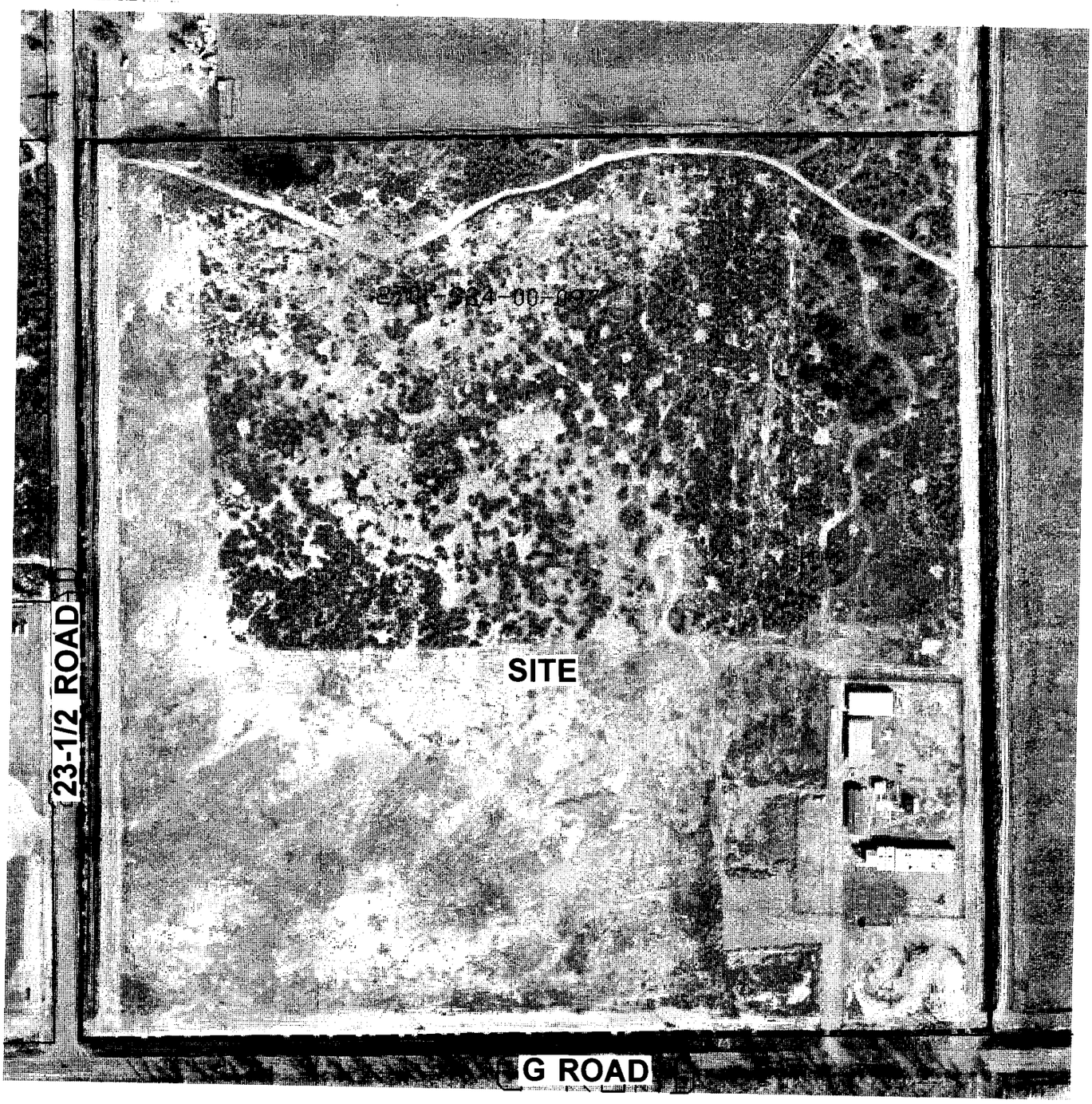
MESA COUNTY PLANNING 10/05/95
Linda Dannenberger 244-1771

Screening and a buffer area should be provided on the boundaries of the site where it adjoins AFT-zoned land.

Telephone Conversation
Date: 9/28/95

Paul Brown, Monument Oil
Mike Pelletier, Community Development Department.

Mr. Brown has concerns and has detected odor from ostriches already on the site.


2701-324-00-027
SITE
23-1/2 ROAD
G ROAD

September 29, 1995

Grand Junction Community Development
250 N. 5th Street
Grand Junction, CO. 81501

RE: Sup-95-165
Special Use Permit
Rock Ostrich Kennel

As adjacent property owners, we object to the above proposed usage for an Ostrich kennel located at 23 1/2 & G Roads. Because of the C-2 zoning we feel that the use of the properties in this area for any type of livestock purposes would hinder the future development of Commercial businesses, and is not consistent with the overall development plans of the area. Expansion for business parks and commercial businesses are then put in jeopardy due to smells and aesthetic values which will impact the immediate and surrounding properties.

We would appreciate being kept advised regarding the progress of this matter.

Sincerely,

Dan and Bonnie Connors
Property Owners
2373 G. Road

STAFF REVIEW -

FILE: SUP 95-165

DATE: January 3, 1995

REQUEST: Appeal of Administrative Decision on Special Use Permit
Balanced Rock Ostrich Kennel

LOCATION: 2372 G Road

APPLICANT: Dr. William D. Merkel

STAFF: Kristen Ashbeck

EXISTING LAND USE: Agricultural - Keeping Ostriches

PROPOSED LAND USE: Ostrich Kennel

SURROUNDING LAND USE:

NORTH: Large parcel single family residential
SOUTH: Undeveloped & Commercial Outdoor Storage
EAST: Undeveloped
WEST: Office (Monument Oil Company) & Undeveloped

EXISTING ZONING: Heavy Commercial (C-2)

SURROUNDING ZONING:

NORTH: C-2
SOUTH: C-2
EAST: Planned Recreational Vehicle Resort (PRVR)
WEST: C-2

STAFF ANALYSIS

Background. The applicant is proposing to utilize the 40-acre parcel located on the northeast corner of 23-1/2 and G Roads to develop an ostrich kennel. The definition of a kennel in the Grand Junction Zoning and Development Code reads: "A facility in which four or more animals of the same species are housed, groomed, bred, boarded, trained in return for compensation, or sold." According to this broad definition, the ostrich proposal seemed to best fit this category in the Use/Zone Matrix of the Code and, thus, was reviewed administratively as a Special Use Permit for a kennel in the C-2 zone. The applicant is presently using the parcel for the purpose of rearing, boarding and breeding a limited number of ostriches which is generally allowed by the animal regulations within the Zoning and Development Code (section 5-10-3 B.2. - One animal per one-half acre of land). The applicant desires to breed more than the 80 ostriches allowed.

Summary of Proposal. The ostrich kennel would be constructed for the purpose of rearing, boarding and breeding ostriches for three reasons: 1) to produce quality offspring to eventually be sold to others as breeding stock; 2) to board ostriches for others; and 3) to raise animals for commercial slaughter. The petitioner has suggested that full build-out of the operation would occur over several years, with ultimately approximately 340 birds. The existing buildings in the southeast corner of the site would be utilized in the operation to hatch and house chicks and for feed storage. The remainder of the property is to be fenced in sections for pens for the various types and ages of birds. No other improvements to the property are proposed.

FINDINGS OF REVIEW

Section 4-8-1 of the Zoning and Development Code outlines the criteria by which a Special Use Permit is evaluated. The proposal must meet all of the criteria in order to be approved. In review of the Balanced Rock Ostrich Kennel proposal, staff made the following findings regarding the criteria most relevant to this project.

Compatible with Adjacent Uses. Staff determined that the ostrich kennel proposal did not meet criterion 4.8.1 A. which reads: "The proposed use must be compatible with adjacent uses. Such compatibility shall be expressed in terms of appearance, site design and scope, as well as the control of adverse impacts including noise, dust, odor, lighting, traffic, etc." The property at 2372 G Road is currently zoned C-2 as are all of the properties adjoining it. Although the surrounding properties are presently undeveloped, there is expectation by the property owners that the area will develop as a commercial center within the northwest part of the community. The undeveloped property to east of the subject site is zoned PRVR. While that site is not likely to develop as a recreational vehicle resort, a commercial, residential, or mixed use development is likely at that location. The materials and information submitted by the petitioner clearly indicate that the ostrich kennel is typically considered to be incompatible with the potential commercial development of the surrounding area. Allowance of the agricultural use at the intensity level of the proposed ostrich kennel at this location could be detrimental to the viability of the adjacent properties. The Community Development Department has received comment from two adjacent property owners that have expressed similar concerns with land use compatibility, aesthetic values and adverse impacts of odor (see attached note from telephone conversation and letter).

Staff also has concerns with the adverse impacts of dust, odor and drainage from an intense agricultural use such as that proposed. The information provided by the petitioner does not adequately address whether such impacts will be or can be satisfactorily mitigated. The petitioner proposes to plant grasses within the pens to control potential impacts from dust and the manure will be left to dry naturally on the ground. No other information was provided that addressed a general maintenance plan for the operation. Given the state of the existing pens on the site which are devoid of any vegetation, it seems likely that any grass would quickly be denuded by grazing and/or trampling and dust from the movement of the birds within the pens could become a problem.

In terms of odor, the petitioner states that there is little to no "objectionable" odor from ostriches or their solid waste. While this may be the case, staff has already received objections from an

adjacent property owner that stated otherwise. This impact is difficult if not impossible to quantify and what may not seem objectionable to one may be to another. The fact that there already appears to be some detectable odor from the existing birds is cause for concern; allowing the operation to increase to the intensity proposed would only seem to worsen the situation. Runoff from the site is also a concern since the proposal is to let the manure remain within the pens and because there are irrigation ditches around the property. According to Colorado Health Department regulations, a confined animal operation such as that proposed is considered a non-point source for contaminated runoff which is not allowed to enter open ditches which actively convey irrigation water. The petitioner has stated that drainage from the site is not a problem "since the property is ringed by ditches, so the excess water would be drained that way". This is not an acceptable solution to the drainage from the site.

Sufficient Site Design Features. No improvements to the site are proposed such as surfacing travelled areas. Although the traffic impacts from the site will be minimal, the site design should accommodate the traffic that will occur without causing additional dust and tracking of mud onto adjacent roadways.

Provisions for Proper Maintenance. As previously discussed, the petitioner did not address an overall maintenance plan for the operation in order to mitigate some of the potential impacts.

Use Conforms to Adopted Guidelines and Site Development Requirements. There is no adopted overall plan for this part of the City. However, the initial recommendations of the Growth Plan that is currently being prepared are that land uses in this area be light industrial/heavy commercial to the west and south, and medium high residential density to the east. Agricultural uses such as the proposed ostrich kennel are not consistent with this intent.

STAFF RECOMMENDATION: Denial of the appeal of administrative decision.

SUGGESTED PLANNING COMMISSION MOTION: Mr. Chairman, on item SUP 95-165, a request for a Special Use Permit for an Ostrich Kennel at 2372 G Road, I move that we deny the petitioner's request to appeal the administrative decision of denial.

STAFF REVIEW - CITY COUNCIL

FILE: SUP 95-165

DATE: January 31, 1996

REQUEST: Review of Planning Commission Decision to Deny Appeal of Administrative Decision on Special Use Permit - Balanced Rock Ostrich Kennel

LOCATION: 2372 G Road

APPLICANT: Dr. William D. Merkel

STAFF: Kristen Ashbeck

EXISTING LAND USE: Agricultural - Keeping Ostriches

PROPOSED LAND USE: Ostrich Kennel

SURROUNDING LAND USE:

NORTH: Large parcel single family residential
SOUTH: Undeveloped & Commercial Outdoor Storage
EAST: Undeveloped
WEST: Office (Monument Oil Company) & Undeveloped

EXISTING ZONING: Heavy Commercial (C-2)

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WEST: C-2

STAFF ANALYSIS

Background. The applicant is proposing to utilize the 40-acre parcel located on the northeast corner of 23-1/2 and G Roads to develop an ostrich kennel. The definition of a kennel in the Grand Junction Zoning and Development Code reads: "A facility in which four or more animals of the same species are housed, groomed, bred, boarded, trained in return for compensation, or sold." According to this broad definition, the ostrich proposal seemed to best fit this category in the Use/Zone Matrix of the Code and, thus, was reviewed administratively as a Special Use Permit for a kennel in the C-2 zone. The applicant is presently using the parcel for the purpose of rearing, boarding and breeding a limited number of ostriches which is generally allowed by the animal regulations within the Zoning and Development Code (section 5-10-3 B.2. - One animal per one-half acre of land). The applicant desires to breed more than the 80 ostriches allowed.

Summary of Proposal. The ostrich kennel would be constructed for the purpose of rearing, boarding and breeding ostriches for three reasons: 1) to produce quality offspring to eventually be sold to others as breeding stock; 2) to board ostriches for others; and 3) to raise animals for commercial slaughter. The petitioner has suggested that full build-out of the operation would occur over several years, with ultimately approximately 340 birds. The existing buildings in the southeast corner of the site would be utilized in the operation to hatch and house chicks and for feed storage. The remainder of the property is to be fenced in sections for pens for the various types and ages of birds. No other improvements to the property are proposed.

FINDINGS OF REVIEW

Section 4-8-1 of the Zoning and Development Code outlines the criteria by which a Special Use Permit is evaluated. The proposal must meet all of the criteria in order to be approved. In review of the Balanced Rock Ostrich Kennel proposal, staff made the following findings regarding the criteria most relevant to this project.

Compatible with Adjacent Uses. Staff determined that the ostrich kennel proposal did not meet criterion 4.8.1 A. which reads: "The proposed use must be compatible with adjacent uses. Such compatibility shall be expressed in terms of appearance, site design and scope, as well as the control of adverse impacts including noise, dust, odor, lighting, traffic, etc." The property at 2372 G Road is currently zoned C-2 as are all of the properties adjoining it. Although the surrounding properties are presently undeveloped, there is expectation by the property owners that the area will develop as a commercial center within the northwest part of the community. The undeveloped property to east of the subject site is zoned PRVR. While that site is not likely to develop as a recreational vehicle resort, a commercial, residential, or mixed use development is likely at that location. The materials and information submitted by the petitioner clearly indicate that the ostrich kennel is typically considered to be incompatible with the potential commercial development of the surrounding area. Allowance of the agricultural use at the intensity level of the proposed ostrich kennel at this location could be detrimental to the viability of the adjacent properties. The Community Development Department has received comment from two adjacent property owners that have expressed similar concerns with land use compatibility, aesthetic values and adverse impacts of odor (see attached note from telephone conversation and letter).

Staff also has concerns with the adverse impacts of dust, odor and drainage from an intense agricultural use such as that proposed. The information provided by the petitioner does not adequately address whether such impacts will be or can be satisfactorily mitigated. The petitioner proposes to plant grasses within the pens to control potential impacts from dust and the manure will be left to dry naturally on the ground. No other information was provided that addressed a general maintenance plan for the operation. Given the state of the existing pens on the site which are devoid of any vegetation, it seems likely that any grass would quickly be denuded by grazing and/or trampling and dust from the movement of the birds within the pens could become a problem.

In terms of odor, the petitioner states that there is little to no "objectionable" odor from ostriches or their solid waste. While this may be the case, staff has already received objections from an

adjacent property owner that stated otherwise. This impact is difficult if not impossible to quantify and what may not seem objectionable to one may be to another. The fact that there already appears to be some detectable odor from the existing birds is cause for concern; allowing the operation to increase to the intensity proposed would only seem to worsen the situation. Runoff from the site is also a concern since the proposal is to let the manure remain within the pens and because there are irrigation ditches around the property. According to Colorado Health Department regulations, a confined animal operation such as that proposed is considered a non-point source for contaminated runoff which is not allowed to enter open ditches which actively convey irrigation water. The petitioner has stated that drainage from the site is not a problem "since the property is ringed by ditches, so the excess water would be drained that way". This is not an acceptable solution to the drainage from the site.

Sufficient Site Design Features. No improvements to the site are proposed such as surfacing travelled areas. Although the traffic impacts from the site will be minimal, the site design should accommodate the traffic that will occur without causing additional dust and tracking of mud onto adjacent roadways.

Provisions for Proper Maintenance. As previously discussed, the petitioner did not address an overall maintenance plan for the operation in order to mitigate some of the potential impacts.

Use Conforms to Adopted Guidelines and Site Development Requirements. There is no adopted overall plan for this part of the City. However, the initial recommendations of the Growth Plan that is currently being prepared are that land uses in this area be light industrial/heavy commercial to the west and south, and medium high residential density to the east. Agricultural uses such as the proposed ostrich kennel are not consistent with this intent.

COMMUNITY DEVELOPMENT DEPARTMENT ACTION: Denial of the Special Use Permit (letter dated December 1, 1995).

PLANNING COMMISSION ACTION: Denial of the appeal of administrative decision (January 9, 1996 hearing; 4-2 vote).

Per the Zoning and Development Code, staff has the ability to request that the Planning Commission consider revoking any Special Use Permit at any time if concerns, problems or violations of the approval arise. Should Council consider approval of this Special Use Permit for the Balanced Rock Ostrich Kennel, staff recommends the following conditions be placed on the approval.

1) Permit expires January 1, 200~~0~~ 2 unless an application for renewal is approved prior to that date.

2) Total number of ostriches (chicks @ 4 mos and adults) limited to 340.

~~3) Pave all on-site vehicular circulation areas.~~

4) The pen areas shall be maintained in a manner such that there is no off-site transported dust. Review at 1 year

5) The facility must meet Water Quality Control Commission requirement concerning runoff from the property into adjacent irrigation (drainage) ditches.

William D. Merkel, MD

2525 North 8th Street, Suite 203
Grand Junction, CO 81501
(303) 242-9127
Fax (303) 242-8304

November 7, 1995

Kristen Ashbeck
Grand Junction Community Development
250 North 5th
Grand Junction, CO 81501

RE: Special Use Permit
Balanced Rock Ostrich Kennel

Dear Ms. Ashbeck:

I am writing this letter in a form through which I can answer concerns about the proposed ostrich kennel. This communication will also act to answer concerns from Mr. Brown and Mr. and Mrs. Conners and any other neighbor that may have a comment or criticism concerning my raising ostriches. I will try and take one category at a time and make comments and then finalize the conclusion at the end of my letter.

Introduction:
The 40 acres containing the ostrich kennel was originally built by the Occidental Petroleum company for their corporate offices and laboratory and research station. When Occidental vacated the property, and eventually sold it, they left the buildings in fairly good conditio, but severed the phone and electrical lines and made inoperable the water line. The drainage system as well as the sewer system were left intact and still are functional today. When I bought the property, it was my intention to rent or lease the buildings to offset the holding costs for the property. Several of the buildings were leased for almost a year, but were left in such poor condition I decided not to rent again. I did, however, want to put the property to use so that it could generate some revenue, even though my ultimate goal would be to resell the property for its commercial value and future use as commercial land.

As I was cleaning up and fixing the mess left by the previous renter, I was also researching and pursuing an interest in raising ostriches. It suddenly seemed natural to convert the property to an ostrich raising facility. The fenced in portion, where the buildings are located, is ready made for creating pens. The buildings can be put to use also, all for the purpose of developing a business to produce birds for meat and hide production. The ostrich industry today is directed at producing very low fat, low cholesterol red meat, plus marketing the hide and feathers.

After I had made my plans and layout for the ostrich kennel, I received notice that the city was annexing my property, and the land would come under city restrictions, namely rezoned as heavy commercial under the planning department rules and regulations. Consequently, that led to my applying for a special use permit for the raising of ostriches, because the number of ostriches that I expect to have on the land exceeds the allowed eighty birds (under the two per acre livestock rule). I currently have 29 ostriches on the property, far from the 80 allowed, but my intention is to breed and raise ostriches in order to sell them for meat production at about 1 year of age.

The proposed maximum number of breeder birds is 36-40 breeder birds which will be divided into individual breeder pens either as pairs or trios for the purpose of laying eggs and hatching chicks. The chicks will be grown to 12-14 months, which is the harvest age. The breeder pens will be located in the northern half of the property, as will the grow out pens, the latter of which are each 2 1/2 to 3 acres. Consequently, the present concentration of birds will be diluted tremendously once the breeder pens are built. The whole construction time table has been severely retarded because of the duration of this special use permit process. Hopefully, the permit process can be concluded soon, so I can continue my present phase of installing water and electrical lines as a prerequisite to installing the breeder pens themselves.

The terrain on the 40 acres is very much like South Africa, where the ostrich comes from. There is plenty of cover, so even when the ostriches are in the larger pens they most likely won't be visible from the road.

I would like to now comment on the various considerations raised concerning my application for a special use permit.

Property and set back lines:
The building set backs within the fenced in area are well within the property lines and properly set back from the property lines. I don't think they are an issue at all.

Odors and dust:
As far as odors are concerned, the odor actually is considered mild as compared to horses, cattle, sheep or hogs, and are pretty well contained within a 30 to 50 foot radius of the ostrich pens. The animal waste gets diluted and dissolved into the ground in which it is dropped. It doesn't tend to build up as manure does from cattle or horses. A lot of the droppings, once they have dried and become dehydrated, are pecked at by the birds, and some are consumed, which restores the normal bacteria to their alimentary tract to facilitate digestion. I know that there have been one or two surrounding property owner comments concerning odor.

Ostrich droppings do have a particular odor which is unique to that particular animal. The odor is worse when there has been rain or moisture, but even at that, the odor cannot usually be smelled beyond an approximately 30 to 50 foot radius of the pens. There might be some mild spreading of odor by prevailing wind, but it is not great at all. I have been on and around many ostrich facilities, both small and large, including my own, and odor has never been a offensive problem. In fact, when one considers raising various different livestock, the low odor coming from the ostrich is one of the main selling points of raising that livestock over other livestock. Other property owners to the north, south, and east all have, or have had livestock, consisting of horses, cows, and sheep. There has not been any concern voiced about these animals. The ostrich produces much less odor and drainage contamination than the cattle, sheep or horses located on nearby sites all around my property.

As far as the odor mentioned by Mr. Brown, I want him and others to know that the odor he smells is not from the ostriches, but rather from other livestock, most probably to the west, northwest, or north of his office site, and is carried by the wind, usually at dusk or very early in the morning. I have smelled that odor myself, while I have been at the ostrich site, when there were no ostriches yet, and also after the ostriches were brought to the site. That odor is from other farms/-ranches and is not an ostrich smell. The odor from the ostriches now cannot be smelled 30 to 50 feet away. I invite anyone to come to the site and I will demonstrate this point if necessary. I will also introduce any visitor to the pros and cons of the ostrich family. It has a great future.

As far as dust is concerned there is natural weed growth on the area where the ostriches are kept. Furthermore, it is my intention to plant fescue grass in and around the pens for that purpose; to solidify the soil and to prevent formation of dust. There is no dust problem now. It is our intention also to plant grass in and around the bare areas of the fenced-in zone, all directed at reducing muddy areas or dusty areas. The grassed areas outside the pens, including the surfaces in the pens, will be sprinkled to water the grass, wet the birds to cool them down in the summer, as well as reduce any possibility of dust.

Noise impacts:
The ostriches make very little to no noise. There is some noise present during breeding season, but it is insignificant. I do not anticipate the noise coming from the Canyon View Regional Park will have any impact upon the ostrich operations.

Number of Truck Trips & Employees:
Currently, I have one part-time employee and he drives a car or, at times, his pickup truck to and from the facility. As far as future "trips" by truck, I would not expect much truck traffic, at most maybe 3-5 truck visits a month to deliver feed or other supplies and building materials, such as fence posts. I may employ a high school student, possibly an ag/tech student from Fruita Monument to help with feeding and other chores. I do not expect more than 2-3 employees at a time, and that won't be for probably another year.

Drainage:
The soil is so porous that there is rarely any standing water. Should drainage become necessary, the property is ringed by ditches, so the excess water would be drained that way; the same as irrigation water draining off cattle or horse pastures.

Screening/Buffer area:
The only area I am aware of where land adjoins AFT land is along the north boundary. There is so much natural growth of trees and brush there, that I doubt any more needs to be planted. Once again, I intend to keep the natural growth on the land to simulate the ostrich's natural environment of South Africa.

Ultimate Number of Ostriches & Build Out of Kennel:
The present plan (see sketch) is to keep the breeder pens and grow out pens located on the north half of the property, so as to minimize their exposure to traffic on G Road. Also by having the birds spread out in 12 pens, (approximately 29 birds-the present number of breeders-distributed into 12 pens), and having the pens located more to the north and protected from noise, this will allow the birds to enjoy the solitude of the land and be less stressed by highway and/or park noise. The larger pens, #2 and #3, are where the 4-6 month old birds will grow to 12-14 months of age before harvesting them. Site #6 could become breeder pens at a future time. As you can see from the site design, most of the birds and land use is to the north, as was suggested to me by the City Planning Department. Sites 1,4,7, & 8 might be put into alfalfa fields in the next growing season, but that has not been decided as yet. Number of breeder birds: 36-40. Number of grow out birds: 100-300 a year, hopefully.

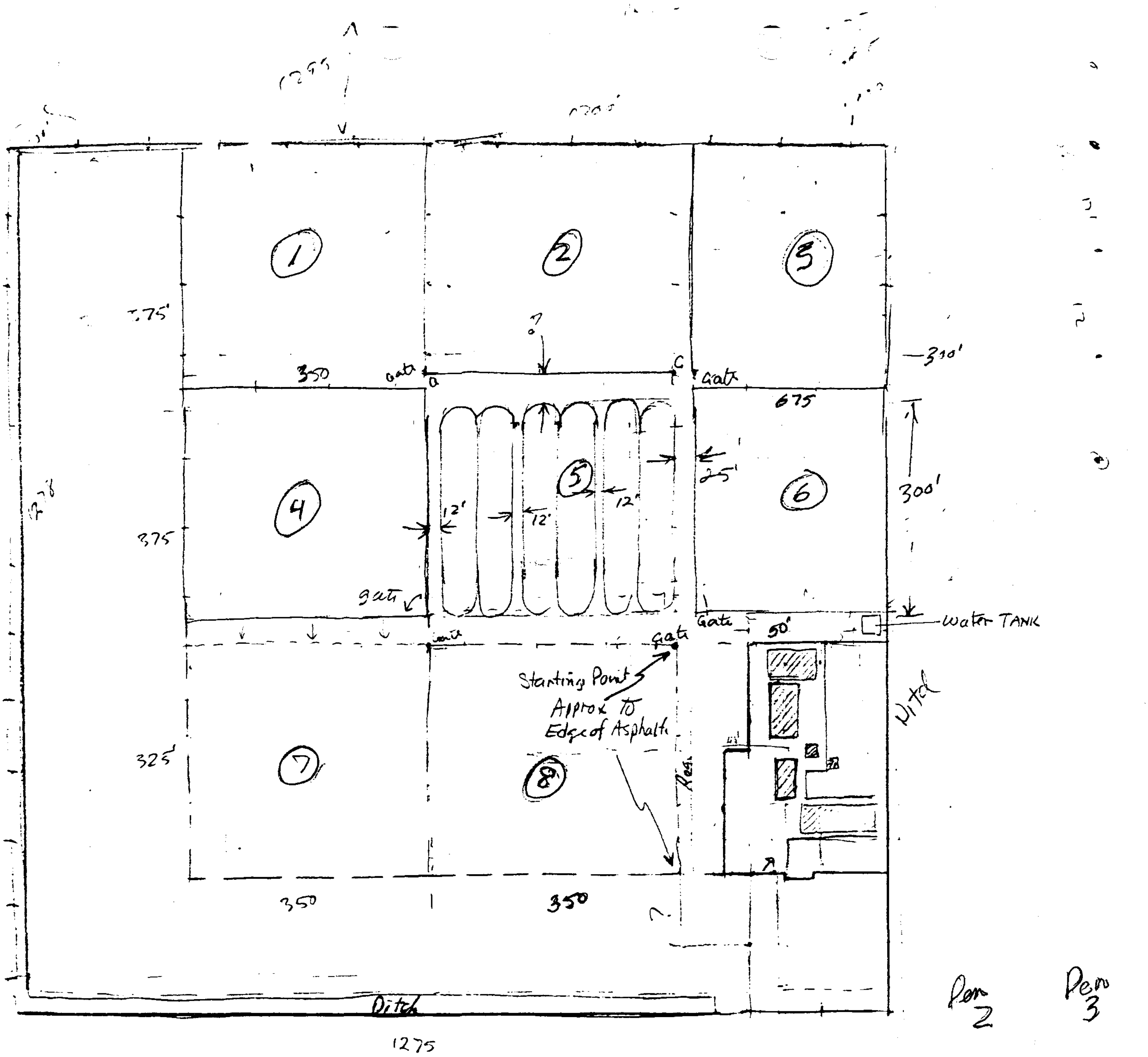
Future Commercial Use of Land:
I bought my land as an investment, and like others hope and expect it to increase in value. I am not going to "shoot myself in the foot" and lose the opportunity to sell the land in the future. Therefore, if a buyer comes along and wants my land, I will move the ostrich operation to another site. In the interim, the bulk of ostriches are going to be located in the more remote areas of the land and won't really be seen from the road due to the weed and tree growth.

Kristen, I hope this answers your concerns. Please let me know how the permitting process will proceed from here. I would encourage anybody wondering about this plan to call me, so I can arrange to take them on a walk through to see how unnoticeable the birds will be in their grow out pens.

Sincerely,

William D. Merkel, MD

WDM/sc



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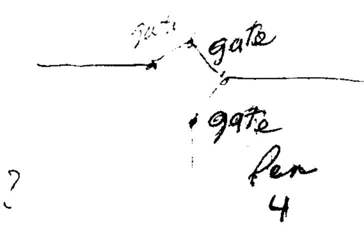

Fence line

① 1100'
② = 745
③ = 650'
④ 1100'
⑤
⑥ 875'
⑦ 1000'
⑧ 1095

Total Fence Line 6995' ≈ Approx 650 posts + ?
1/3 5-6"

* ① Allow pens 4 & 6 - to become breedin pens Like 5

Colorado County Regulations
Ostrich Ranching
6/29/95

Denver County- Denver Vincent - 640-2191
Ostrich can be kept and raised in areas Zoned 02 only. Permitted uses in 02 Zoned area(59-467-(1)(C). Animal Husbandry -59-2(68). Livestock-59-2(82)-Animals of any kind kept or raised for sale or resale, Agricultural field production or pleasure excluding fur-bearing animals. No acreage or number limitations.

Adams County- Brighton Scott Bernhart 287-5249 Ext.314
Ostrich- 15/Acre from ½ to 10 Acres. Not regulated after 10 Acres. Table 4-1 of Agricultural Zoned-Type of Animals. Considered Livestock

Douglas County Neil Starkeybaum 660-7460
Ostrich considered Livestock- Permitted on A1-A2 Zoned areas larger than 10 acres. No limitation on numbers.

Arapahoe County-Littleton- Bob Cloughen 795-4474
Ostrich considered livestock for commercial purposes. Allowed on areas Zoned A-1 (19 acres),A-2 (9 acres) and A-E (35 acres). Not allowed on RA zoned. No limitations on numbers.

Jefferson County Golden- Mary Bumm 271-8700
Ostrich Ranching allowed on A-1 (5acres) and A-2(10 acres or more) Zoned property. 4 animals on one acre- more than one acre has no limitations.

To get information about your county call County Government- Planning and Zoning or Land Use. Ask for Livestock regulations concerning Ostrich ranching. You want to know Zoning requirements and allowed bird density.

William D. Merkel, MD
2525 North 8th Street, Suite 203
Grand Junction, CO 81501
(303) 242-9127
Fax (303) 242-8304

November 15, 1995

Kristen Ashbeck
Grand Junction Community Development
250 North 5th
Grand Junction, CO 81501

Dear Kristen:

After I sent you my answers to the concerns about the special use permit application for the 2372 G Road property, I had the feeling that I had left out a few comments, and consequently, I am writing this letter as an addendum to my earlier letter of November 7th.

I feel as though I didn't answer the questions about the number of truck trips very well. Our operation is very small right now and at most we have an intermittent use of a pickup truck, mainly to help bring supplies in. I am several years away from any big trucks coming in to deliver, or remove birds from the property. Even when we do have truck traffic, it is going to be few and far between visits, because it takes so long to raise these birds. It is not as though we will have trucks in there picking them up on a constant basis. I hope we have the problem, but right now I don't see it for some time to come.

Insofar as the anticipated schedule for growth of the facility, again, it is spread out over a matter of years. As mentioned in an earlier correspondence, I hope to have 10 to 12 breeding pair and each pair placed in its own breeding pen in the center of the 40 acres. Once an egg is laid, it takes approximately 40 days to hatch, and then approximately a year to raise it to an age where it would be sold for production of meat and hide. The birds that are going to be raised in that manner are going to be stored in our larger pens at the North end of the property, and won't be visible from the road. If I choose to raise some additional breeders for sale, those would also be raised in pens, but again would not be obviously apparent from G Road.

Ostriches breed and produce very few eggs in their second and third year, but later on start producing more eggs which can number 40 to 60 eggs a season. Survivability from the hatching process would be somewhere between 50 and 60%. Chicks grow about a foot taller each month until they are of full size at about 14 months. The process of growing out the birds and selling them about a year later, as new chicks are coming on, would cause a fluctuation from season to season and year to year of the number of birds stored on the property.

More thoughts about the odor issue. I can tell you from experience, and others will substantiate the fact, that ostriches do not have much odor. Since many of my birds are intensively stored in one large pen presently until we get the breeder pens built, the odor may be a little more intense now around the one large pen, but once these same birds are distributed into their breeder pens out in the middle of the 40 acres, there is going to be hardly any odor transmitted from these pens. Again, I do not believe odor is a big factor in this endeavor.

I have also attached some information about ostriches that I hope you will find interesting. Finally, as far as the density of birds allowed elsewhere in the state, also find attached the results of some research done in other counties as to what the density of birds are allowed.

A final comment to say to other people in the area that may be objecting to the idea of ostriches being on my property, that should surrounding development overcome the intent of the temporary use of the property, I am going to naturally sell the property for commercial uses, as it is zoned, and I would move the ostriches to some other location. I feel that I am successfully putting the property and buildings to use in the interim.

I would also like to remind the people living around the 40 acres on G Road that there is livestock now, and there has been livestock on properties surrounding my 40 acres. There are horses on the south side of G Road. There are horses and cattle on the North side of my property, and there is livestock to the west and Northwest of the property. On the 35 acres at the corner of 24 and G Road, there have been cows and sheep for a number of years.

I hope this further completes the information that the special use permit process had required. I naturally stand prepared to answer any further questions concerning the raising of ostriches. I would also like to add that you and your staff have a standing invitation to come visit and see the ostriches and you will realize how fun and interesting this group of birds is.

Sincerely,

William D. Merkel

William D. Merkel, M.D.

WDM/sc

enc.

City of Grand Junction, Colorado
250 North Fifth Street
81501-2668
FAX: (303) 244-1599

December 1, 1995

Dr. William D. Merkel
2525 North 8th Street Suite 203
Grand Junction, Colorado 81501

RE: Special Use Permit - Ostrich Kennel
File SUP-95-165

Dear Dr. Merkel,

By this letter, the Grand Junction Community Development Department is denying your application for a Special Use Permit to operate an Ostrich Kennel on the property located at 2372 G Road (tax parcel number 2701-324-00-097). In reviewing the criteria in section 4-8 of the City of Grand Junction Zoning and Development Code by which Special Use Permits are evaluated, staff determined that the ostrich kennel proposal did not meet criterion 4.8.1 A. which reads: "The proposed use must be compatible with adjacent uses. Such compatibility shall be expressed in terms of appearance, site design and scope, as well as the control of adverse impacts including noise, dust, odor, lighting, traffic, etc."

The property at 2372 G Road is currently zoned C-2 (Heavy Commercial) as are all of the properties adjoining it. Although the surrounding properties are presently undeveloped, there is expectation by the property owners that the area will develop as a commercial center within the northwest part of the community. The materials and information submitted by the petitioner clearly indicate that the ostrich kennel is typically considered an agricultural activity. The requested level of agricultural activity is considered to be incompatible with the potential commercial development of the surrounding area. Allowance of an agricultural use at the intensity level of the proposed ostrich kennel at this location could be detrimental to the viability of the adjacent commercial properties. The Community Development Department has received comment from two adjacent property owners that have expressed similar concerns with land use compatibility, aesthetic values and adverse impacts of odor.

Staff also has concerns with the adverse impacts of dust, odor and drainage from an intense agricultural use such as that proposed. The information you provided in this regard does not adequately address whether such impacts will be or can be satisfactorily mitigated.

This administrative decision may be appealed to the Grand Junction Planning Commission per section 4-5-2 D. of the Code: " If the applicant notifies the Administrator, in writing, within ten (10) days of receiving notice of the decision that the decision is not acceptable, the Administrator shall refer the application to the Planning Commission at the next regularly scheduled meeting."

Please do not hesitate to contact me if you have questions regarding this Special Use Permit application.

Sincerely,

Kristen

Kristen Ashbeck
Planner

xc: Paul Brown
Daniel and Bonnie Connors

WILLIAM D. MERKEL, M.D.

December 26, 1995

Larry Timm
Grand Junction Community Development
250 N. 5th
Grand Junction, CO 81501

RE: Ostrich facility on G Road

Dear Mr. Timm:

You and I have met at least twice, and our offices have corresponded back and forth, both verbally and by letter, concerning my raising ostriches on my G Road property between 23 1/2 and 24 Road. This 40 acre tract currently houses approximately 30 ostriches which are my breeding stock for future placement in breeding pens, please refer to the attached copies of my conditional use permit application showing where the breeding pens would be located.

My intended use of the rest of my property is for the purpose of placing 3 pens to accommodate the ostriches while they growing up to the appropriate size for commercial sale.

You and I discussed this personally, and it was your request that I place my additional pens into the north portion of the property to keep them away from G Road. I have done that, as seen on the attached site plan grid showing where the breeder pens are and where the grow up pens are.

I went through the conditional use application and was denied that as stated by Kristen Ashbeck's letter. I am now taking this matter one step further to the Planning Commission, and I am still waiting to hear back as to when the meeting would be and what I need to do to prepare for that meeting. The purpose of this letter is to request from you some basic information that you stated you would send to me, but I haven't received as yet. Basically, I want a letter from you stating that I can put 80 adult ostriches on the property without any conditional use permit. Secondly, I want a determination from you as to at what age an ostrich is counted as an adult. All data to date indicates that an ostrich is fully grown and able to breed at age 3. In my scenario, I want to raise them to age 12 to 14 months.

I am at the brink of putting a lot more money into this facility, and I would like you to take the time to write a determination letter to me to establish the basis on which I am making my decision to move ahead with the construction of breeder pens.

2546 North Eighth Street
Grand Junction, Colorado 81501 (303) 242-9127

My plan, of course, is to keep my neighbors informed and in agreement with my plans. I am fully sensitive to the fact that this region will someday, we hope, develop into a commercial center, but I think that is several years off, and my plan is to utilize the land and the buildings during that interim for the purpose of ostrich production

I would look forward to taking you personally on a tour of this land to show you my intended use to give you comfort to know that the pens, and particularly the grow out pens, are a considerable distance from G Road, and in fact, most of it is not even visible from G Road or 24 Road.

I will be out of town until January 4, 1995. In the interim mode I would appreciate receiving the above described letter from you for my files.

Sincerely,

William D. Merkel M.D.

William D. Merkel, M.D.

WDM/sc

City of Grand Junction, Colorado
250 North Fifth Street
81501-2668
FAX: (303) 244-1599

January 5, 1996

Dr. William D. Merkel
2525 North 8th Street Suite 203
Grand Junction, Colorado 81501

RE: Special Use Permit - Ostrich Kennel
File SUP-95-165

Dear Dr. Merkel,

This letter is in response to your correspondence of December 26, 1995 requesting information regarding the keeping of ostriches on the property located at 2372 G Road. Per Section 5-10-3 B.2. of the Grand Junction Zoning and Development Code (see enclosed excerpt) a maximum of one large agricultural animal shall be allowed per one-half acre of land, regardless of the zoning. Thus, on the 40 acre parcel in question, a maximum of 80 ostriches may be kept without the need for a Conditional Use Permit. The Zoning and Development Code does not distinguish between juvenile or adult animals except in the case of household pets (also see section 5-10-4 enclosed). Therefore, the 80 animals allowed on your parcel is total number of animals, not just adults, breeding age or otherwise.

Please do not hesitate to contact me if you have further questions regarding this information.

Sincerely,

Larry Timm, Director
Community Development Department

MEMO

DATE: January 9, 1996

FROM: William D. Merkel

TO: Planning Commission

RE: Ostrich classification

As a result of research leading to Dr. Church, the Federal avian Veterinarian in charge in the State of Colorado, ostriches are classified under poultry as "they are birds". They are a particular and peculiar type of bird that does not fly, and thus they are called ratites, but they are birds and they are poultry. They are not classified as livestock, nor should they be considered livestock. They are called a non-traditional food animal. They do not come under the same classifications or restrictions that cattle, horses, sheep or hogs would.

In discussing the age of maturity with the American Ostrich Association, the birds are considered counted as an adult at 2 1/2 years for the male, and 20 months for the female.

Dr. Church, also stated that there are no federal regulations, and no state regulations on ostriches in that they do not have any known diseases that affect the USA. The only regulation they have is the importation of ostriches, and that is why imported ostriches are held in quarantine for a specified period of time.

WDM/sc

Japan especially craves low-fat meat

BY REMER TYSON
Free Press Africa Bureau

MUTARE, Zimbabwe — The latest international rage in health food is best known for something it doesn't really do — sticking its head in the sand. It is the world's largest bird — the ostrich.

"Ostrich is the most cholesterol-free red meat in the world," said Hammy Hamilton, chairman of The Ostrich Producers Association of Zimbabwe. "With America and other Western countries so health conscious, it is the menu of the future. The U.S. of A. is going bananas over ostrich meat," Hamilton said.

And with good reason. An ostrich fillet tastes much like a similar choice cut of beef. The big difference is that ostrich is virtually free of the artery-clogging fat that heart specialists warn people against in red meat. The fat content of ostrich meat is only 3 percent compared to beef's 28 percent.

Hamilton said an increasing number of ostrich farmers in the United States are demanding eggs and young birds from southern and eastern Africa. Meat, eggs and birds are exported to the United States, Europe and Asia from Zimbabwe, South Africa, Swaziland, Namibia, Botswana and Kenya.

But the real demand is from Japan. Hamilton said Japan rapidly is becoming a huge export market for ostrich.

"Japan doesn't have room to grow ostriches," he said. "It wants 3,250 tons of deboned ostrich meat a week. That's 40,000 birds a week. We don't have 40,000 birds for slaughter in Zimbabwe."

FIONA McDOUGALL/Special to the Free Press

l hand herd male ostriches on Hamilton's farm in Zimbabwe. He says the er ostrich meat." U.S. farmers want more eggs and ostriches from Africa.

or ostrich meat rises

been unable to agree on a policy that would restrict the export of ostrich eggs, a move that would ensure Africa remains the world's chief supplier of ostrich products.

Zimbabwe favors building up its national ostrich flock in order to export

eight months, feeding and growing conditions must be perfect. For ostrich feed, farmers grind up soya bean stalks, corn stalks and corn on the cob mixed with nutrient concentrates and minerals bought from chemical companies.

City of Grand Junction, Colorado
250 North Fifth Street
81501-2668
FAX: (303) 244-1599

January 11, 1996

Mr. Larry Timm, Director
Community Development Department
250 North 5th Street
Grand Junction, Colorado 81501

Dear Mr. Timm,

As a City Council member, and per section 2-2-2 C.4. of the Grand Junction Zoning and Development Code, I am requesting that item SUP 95-165, Special Use Permit for the Balanced Rock Ostrich Kennel, be forwarded to City Council for its review. I understand that this request was denied by the Planning Commission at its January 9, 1996 hearing and would like for City Council to be given the opportunity to review the proposal.

Sincerely,

James R. Baughman

James R. Baughman
Councilman, District B

RECEIVED GRAND JUNCTION
PLANNING DEPARTMENT

JAN 11 RECD

William D. Merkel, MD
2525 North 8th Street, Suite 203
Grand Junction, CO 81501
(303) 242-9127
Fax (303) 242-8304

KRISTEN ASHBECK

January 12, 1996

Jeffrey Vogel
725 Hemlock Drive
Grand Junction, CO 81506

Dear Mr. Vogel:

Following the planning commission meeting on January 9, 1996, wherein my special use permit was declined, I felt there was not enough explanation given for the no votes. I would appreciate it if you would supply a copy of this letter to the people of the Commission that voted no on the motion to decline my permit.

I am requesting a letter explaining why the no vote was given. I do not want an answer that merely recites criterion 4.841.A, which was read as being the reason that the Special Use Permit was denied by the planning staff in the Community Development Department. I am requesting the specific reasons why the no votes were given, and I would think that each individual may have had his or her own reason. I would like to know those reasons. If those individuals could place their reason in writing and send them to me, I would be most appreciative.

Sincerely,

William D. Merkel MD

William D. Merkel, M.D.

WDM/sc

City of Grand Junction, Colorado
250 North Fifth Street
81501-2668
FAX: (303) 244-1599

January 24, 1996

Dr. William D. Merkel
2525 North 8th Street Suite 203
Grand Junction, Colorado 81501

RE: Special Use Permit - Ostrich Kennel
File SUP-95-165

Dear Dr. Merkel,

I understand that you have requested information from members of the City's Planning Commission regarding their various reasons for denial of the appeal of the project referenced above. While we understand your interest and concern, that information is best obtained by either reviewing the enclosed draft of the minutes (not yet approved by the Commission) of the Planning Commission meeting of January 9, 1996, or listening to the tape of the meeting. Please contact our executive secretary, Bobbie Paulson at 244-1438, if you are interested in reviewing the tape.

May I also remind you that the upcoming appeal scheduled for the February 7, 1996 City Council meeting will be an entirely new review, independent from the decisions previously made by staff and the Planning Commission on this project. In this respect, the reasons for the "no" votes should have no bearing on the decision of the City Council.

Please do not hesitate to contact me if you have further questions regarding this information.

Sincerely,

Larry Timm, Director
Community Development Department

Grand Junction Community Development Department
Planning • Zoning • Code Enforcement
250 North Fifth Street
Grand Junction, Colorado 81501-2668
(970) 244-1430 FAX (970) 244-1599

February 26, 1996

Dr. William D. Merkel
2525 North 8th Street Suite 203
Grand Junction, Colorado 81501

RE: Special Use Permit - Ostrich Kennel
File SUP-95-165

Dear Dr. Merkel,

As you are aware, the Grand Junction City Council approved your application for a Special Use Permit to operate an Ostrich Kennel on the property located at 2372 G Road (tax parcel number 2701-324-00-097). Per the enclosed minutes from the February 7, 1996 City Council meeting, the approval is subject to the following conditions:

1) The Special Use Permit expires January 1, 2002, unless application for renewal is approved prior to that date;

2) The total number of ostriches shall be chicks at 4 months of age, and adults limited to 340;

3) The pen areas shall be maintained in a manner so there is no off-site transported dust. This requirement would be subject to review a 1 year;

4) The facility must meet water quality control commission requirements concerning run-off from the property into adjacent irrigation ditches.

Please do not hesitate to contact me if you have questions regarding this Special Use Permit.

Sincerely,

Kristen

Kristen Ashbeck
Planner