To Guidelines Recipient(s):

Enclosed are revised "Black-Footed Ferret Survey Guidelines" for distribution to your field personnel. These guidelines are currently used by the Fish and Wildlife Service's (Service) Fish and Wildlife Enhancement offices to evaluate surveys conducted for the presence or absence of black-footed ferrets on areas with proposed Federal actions.

These guidelines establish minimum areas of prairie dog habitat (80 acres of black-tailed prairie dog towns and 200 acres of white-tailed prairie dog towns) that the Service believes are needed to support a black-footed ferret. Preactivity ferret surveys will not be required to satisfy the regulations (50 CFR 402) governing interagency cooperation under the Endangered Species Act (Act) if the projects are proposed in areas with less than 80 acres of black-tailed prairie dogs and less than 200 acres of white-tailed prairie dogs.

The guidelines also establish that areas having 1,000 or more acres of white-tailed or black-tailed prairie dog habitat should be evaluated as possible sites for future black-footed ferret reintroduction. Any Federal action proposed on these areas should be preceded by a survey for black-footed ferrets using the 1989 guidelines.

Intermediate areas having 80 to 1,000 acres of black-tailed prairie dog towns or 200 to 1,000 acres of white-tailed prairie dog towns may have importance for black-footed ferret recovery. Until potential black-footed ferret reintroduction sites have been identified, evaluated, and secured through management plans with affected landowners and agencies, any Federal action proposed on areas meeting these criteria shall be surveyed to determine if a ferret or ferret population exists.

Section 7 consultation requirements (50 CFR 402) will be met if one of the following conditions is satisfied for Federal actions effecting black-tailed prairie dog areas of 80 to 1,000 acres and white-tailed prairie dog areas of 200 to 1,000 acres:

1. If no black-footed ferrets or their sign is found as a result of surveys on prairie dog towns affected by the proposed Federal action (action), a "no effect" black-footed ferret situation occurs. However, an updated survey may be required on the prairie dog town(s) affected by the action to address the current "may affect" question if (1) the action will occur at some future date and not shortly after the initial survey, or (2) the surveyed towns are only part of a larger complex.

2. If no black-footed ferret(s) or their sign is found as a result of a survey over an entire prairie dog town or complex of less than 1,000 acres, which includes the prairie dog town(s) affected by the proposed Federal action, a "no effect" black-footed ferret situation occurs. The Service will consider the town or complex permanently cleared of black-footed ferrets and additional surveys for ferrets will not be needed, provided a ferret is not later confirmed in the town or complex.

The Service encourages implementation of these guidelines. These guidelines will be used by the Service for the next few years during which time the Service and cooperating agencies will be working to identify and secure sites with potential for ferret reintroduction, identify those prairie dog towns that do not meet the requirements for ferret survival and recovery, and develop plans for managing prairie dog ecosystems. The ultimate goal of these activities is to identify and secure prairie dog complexes needed for black-footed ferret recovery and to categorize large areas within each State where prairie dogs can be managed without surveys, for the purposes of Section 7.

If you need assistance in interpreting the guideline document or in understanding the manner in which the Service intends that the guidelines be used, please contact the Fish and Wildlife Service in your State (see Appendix I).

BLACK-FOOTED FERRET
SURVEY GUIDELINES
FOR COMPLIANCE WITH
THE ENDANGERED SPECIES ACT

U.S. Fish and Wildlife Service

Denver, Colorado and

Albuquerque, New Mexico

April 1989

Compliance with or disregard for these guidelines does not, of itself, show compliance with or violation of the Endangered Species Act or any derived regulations. It is advisable that the appropriate State wildlife agency; State Supervisor, Fish and Wildlife Enhancement; or Associate Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico, be contacted if there are any questions about an activity to be conducted in prairie dog towns that may be black-footed ferret habitat. A directory of Federal and State personnel to contact in each State is presented in Appendix I.

GUIDELINES FOR BLACK-FOOTED FERRET SURVEYS

INTRODUCTION

The Endangered Species Act (Act), as amended, requires Federal agencies to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of a threatened or endangered species. Regulations implementing Section 7 of the Act require that Federal agencies determine if any action they propose "may affect" any threatened or endangered species. If it is determined that a proposed action "may affect" an endangered or threatened species, then the agency is required to request formal Section 7 consultation with the Fish and Wildlife Service (Service).

The black-footed ferret is a federally listed endangered species that depends upon the prairie dog (Cynomys spp.) as a source of food and uses its burrows for shelter. Ferrets are rare, nocturnal animals whose brief above-ground nighttime activities make them difficult to find and observe. Any actions that kill prairie dogs or alter their habitat could prove detrimental to ferrets occupying the affected prairie dog town(s). This requires that we determine whether ferrets are present in a proposed project area and whether the proposed project activity "may affect" the survival and recovery of this endangered species.

To help detect the presence of ferrets on a prairie dog town, the Service has prepared this set of guidelines. These guidelines should assist agencies or their authorized representatives in designing surveys to "clear" prairie dog towns prior to initiation of construction projects, prairie dog control projects, or other actions that affect prairie dogs. They are intended for use by Service personnel and other State, Federal, or private agencies or organizations interested in conducting surveys for the black-footed ferret. In addition these guidelines should assist individuals in designing surveys to be used in areas suspected of maintaining a ferret population, but without confirmed or recent sightings. If these guidelines are followed by persons conducting black-footed ferret surveys, agency personnel can be reasonably confident in results that show black-footed ferrets are not occupying a proposed project area. A survey for ferrets will supplement the consultation process, but does not relieve any agency of their obligation to consult with the Service as required by Section 7 of the Act.

To determine whether the limits and exclusions apply to an area being proposed for a planned action, the lead agency should consult with the appropriate Service office (see Appendix I). In situations where the limits or exclusions do not apply, each State Supervisor or Associate Regional Director is authorized to determine what precautions must be taken to ensure that ferrets are not adversely affected before a prairie dog town is impacted or destroyed.

SURVEY CRITERIA

Delineation of Survey Areas

Until the time that the Service, States, and other Federal agencies are able to identify reintroduction areas and to classify other areas as being free of ferrets, surveys for black-footed ferrets will usually be recommended. During this interim period the following approach is recommended to determine where surveys are needed.

A black-tailed prairie dog (Cynomys ludovicianus) town or complex of less than 80 acres having no neighboring prairie dog towns may be developed or treated without a ferret survey. A neighboring prairie dog town is defined as one less than 7 kilometers (4.34 miles) distance from the nearest edge of the town being affected by a project.

Black-tailed prairie dog towns or complexes greater than 80 acres but less than 1,000 acres, may be cleared after a survey for black-footed ferrets has been completed, provided that no ferrets or ferret sign have been found.

A white-tailed prairie dog (Cynomys leucurus) town or complex of less than 200 acres having no neighboring prairie dog towns may be cleared without a ferret survey. White-tailed prairie dog towns or complexes greater than 200 acres but less than 1,000 acres, may be cleared after completion of a survey for black-footed ferrets provided that no ferrets or their sign were found during the survey.

A complex consists of two or more neighboring prairie dog towns each less than 7 kilometers (4.34) from the other. Instructions for determining a complex of black-tailed or white-tailed prairie dogs is found in Appendix II.

Before any federally funded or permitted activities are conducted on black-tailed or white-tailed prairie dog towns or complexes greater than 1,000 acres, the appropriate Service office should be contacted to determine the status of the area for future black-footed ferret reintroductions (see Appendix I). That office also will determine whether a survey for black-footed ferrets should be completed.

Defining a Prairie Dog Town

For the purpose of this document a prairie dog town is defined as a group of prairie dog holes whose density meets or exceeds 20 burrows per hectare (8 burrows/acre). Prairie dog holes need not be active to be counted but they should be recognizable and intact; i.e., not caved in or filled with debris.

Timing of Surveys

The Service recommends that surveys for black-footed ferrets be conducted as close to the initiation of a project construction date as possible but not more than 1 year before the start of a proposed action. This is recommended to minimize the chance that a ferret might move into an area during the period between completion of a survey and the start of a project. If the town being affected is part of a complex in which the combined acreage of prairie dog towns total less than 1,000 acres, a survey of all the prairie dog towns within the complex will serve to clear the entire area provided no black-footed ferrets or their sign are found. If this is done, no future surveys for ferrets will be required within the borders of the complex regardless of future project activities unless a ferret is observed and confirmed on the complex at a later date.

An alternative to clearing all of the complex would be to search only the prairie dog town(s) being affected. Assuming that no ferrets or ferret sign is found, this would allow an activity to take place on the prairie dog town. If an activity is proposed in the same area in the future, a survey for ferrets may again be required if the Service cannot justify an exemption based upon the ferret history in the area, survey records, or current status of prairie dog habitat.

In a prairie dog town or complex where the acres of prairie dog towns meet or exceed 1,000 acres, any prairie dog town being affected should be surveyed as close to the initiation of project activity as possible, but not more than 1 year prior to the proposed action. When other projects are planned that will affect different prairie dog towns within the complex, they too will need to be surveyed before the project starts. Towns or complexes of 1,000 or more acres should be given special consideration for their importance to the overall recovery and survival of the black-footed ferret as potential reintroduction areas. The Service would like to minimize disturbances of these areas until black-footed ferret reintroduction sites have been selected. Once reintroduction sites are selected, these large areas of prairie dogs can be cleared from the need for future surveys if the area is surveyed, no ferrets or ferret sign are found, and it is determined that the area is not needed or suitable for ferret recovery.

Project Type

Construction projects - both linear and spatial developments that permanently alter prairie dog towns (buildings, facilities, surface coal mines, transmission lines, major roadways, large pipelines, impoundments, etc.) should be surveyed. The area to be surveyed should include all black-tailed prairie dog towns or complexes greater than 80 acres and white-tailed prairie dog towns or complexes greater than 200 acres occurring on a project right-of-way and the portion of those towns found within one-half mile of the construction site or right-of-way border. Projects of a temporary nature and those that involve only minor disturbance (e.g., fences, some power lines, underground cables, etc.) may be exempted from surveys when project activities are proposed on small prairie dog towns or complexes of less than 1,000 acres, do not impact

those areas where ferret sightings have been frequently reported, or occur on areas where no confirmed sightings have been made in the last 10 years. To determine whether a project qualifies for exemption, the lead agency must contact the appropriate Service Office (see Appendix I)

Pesticide or toxicant use - The Service recommends that before any action involving the use of a toxicant in or near a prairie dog town begins, a survey for ferrets should be conducted. This includes all black-tailed prairie dog towns or complexes greater than 80 acres or white-tailed prairie dog towns or complexes greater than 200 acres proposed for control. If phosphide-treated grain, gas cartridges, or tablets are the proposed toxicants and the town proposed for treatment is in a complex of less than 1,000 acres, the town should be surveyed 30 days or less before treatment using the nocturnal survey technique (see Selection of Survey Method, Method 2). In this situation it is recommended that the entire complex be surveyed and cleared before treatment begins. This would avoid the need for an additional survey if the town needs to be treated again at a later date. Otherwise the town to be treated should be surveyed as described above and surveyed again if a second treatment is needed.

Prairie dog towns or complexes greater than 1,000 acres should not be poisoned without first contacting the appropriate Service office (see Appendix I). Procedures to be followed on large towns or complexes will be the same as for those recommended for construction projects.

If the proposed control agent involves the use of any other compound under registration with the Environmental Protection Agency, then the area to be surveyed for ferrets should include the prairie dog town to be treated and any other town or portion of a town within 1 mile of the town being treated with the toxicant. The survey should be conducted within 30 days or less of the treatment using the nocturnal survey technique. This difference is justified on the basis of potential hazards to ferrets from secondary poisoning. As above, if the town(s) are part of a complex of less than 1,000 acres and the entire complex is surveyed for ferrets, then no future surveys will be required in the affected area if ferrets or their sign are not found.

SELECTION OF SURVEY METHOD

Two methods to survey for black-footed ferrets or their sign are recommended. Either can be used. These methods are based upon the most recent survey research data, and both involve specific time periods. Research has shown a marked decrease in ferret activity and/or sign in November, April, May, and June. For this reason surveys for ferrets during these months are not recommended, since no acceptable confidence can be placed on the results of surveys conducted during this period.

METHOD 1

Diurnal (daylight) surveys for ferrets are recommended if surveys are conducted between December 1 and March 31. This type of survey is used to locate signs left by ferrets. During winter months, ferret scats, prairie dog skulls, and diggings are more abundant because prairie dogs are less active and less likely to disturb or destroy ferret sign. When there is snow cover, both ferret tracks and fresh diggings are more obvious and detectable.

Daylight searches for ferret sign, should meet the following criteria to fulfill the minimum standards of these guidelines:

1. Three searches must be made on each town. Each search should be done when fresh snow has been present for at least 24 hours and after 10 or more days have passed between each search period.

2. Vehicles driven at less than 5 miles per hour may be used to search for tracks or ferret diggings, but complete visual inspections of each part of the town being surveyed is required (i.e., visually overlapping transects).

3. If ferret sign is observed, photograph the sign and make drawings and measurements of diggings before contacting the appropriate Service office (see Appendix I) and State Wildlife Agency.

Aerial surveys for ferrets are considered experimental, but may be allowed in winter using skilled aerial observers when suitable snow conditions exist. Determination of when to use this technique should be made with the appropriate Service office (see Appendix I).

METHOD 2

Nocturnal (nighttime) surveys involve the use of spotlighting techniques for locating ferrets. This survey method is designed to locate ferrets when the maximum population and the longest periods of ferret activity are expected to occur.

Minimum standards have been established by the Service for nocturnal surveys. These should be followed as recommended and include:

1. Surveys should be conducted between July 1 and October 31.

2. The prairie dog town should be continuously surveyed using spotlights. Surveys should begin at dusk and continue until dawn on each of at least three consecutive nights. Large prairie dog colonies should be divided into tracts of 320 acres and each tract systematically searched throughout three consecutive nights. Rough uneven terrain and tall dense vegetation may require smaller tracts to result in effective coverage of a town.

3. Observations on each prairie dog town or tract searched should begin at a different starting point on each successive night to maximize the chance of overlapping the black-footed ferrets' nighttime activity period(s).

4. A survey crew consists of one vehicle and two observers equipped with two 200,000 to 300,000 candle power spotlights. In terrain not suitable for vehicles, a crew will consist of two individuals working on foot with battery-powered 200,000 to 300,000 candle power spotlights. To estimate the number of crew nights for a survey, divide the total area (acres) of prairie dog town to be surveyed by 320/acres and multiply by 3. One or both of the observers in each survey crew should be a biologist trained in ferret search techniques.

Survey Reports

The following outline provides a general summary of the types of information useful to the Service in reviewing the results of ferret surveys for concurrence with an agency's decision of "may affect" or "no affect." This information will be used to assist in Section 7 compliance decisions. Headings listed can be used in field data forms to ensure that all pertinent data are collected and surveys are not unnecessarily repeated. It is recommended that a report summarizing survey data be prepared for each project and submitted to the lead agency and to the appropriate Service office (see Appendix I).

Data requirements for daylight searches (December 1 to March 31) or night searches (July 1 to October 31) are as follows:

1. Date
2. Hours spent searching (record time started - time stopped)
3. Acres searched
4. Number of colonies searched
5. Number of burrows inspected
6. Ferrets or ferret sign observed and locations
7. Photos taken
8. Names, address(es), telephone numbers and qualifications of searchers
9. Weather conditions (ground condition bare or snow covered)
10. Method used to search (backpack spotlight, vehicle, walking)
11. Mapped survey route and location of prairie dog town

Survey Summary

1. Starting and completion dates for the survey
2. Total hours of spotlight search
3. Total acres searched by spotlight
4. Total colonies searched using spotlight
5. Total ferrets observed and locations by night search
6. Total hours searched in daylight
7. Total acres searched in daylight

8. Total colonies searched in daylight
9. Total ferret sign observed and location of sign observed
10. Narrative describing search technique used
11. Mapped location of central project (include acres and description)
12. Copies of field data sheets

Surveyor Qualifications

The Service has established a process to provide specific training for conducting ferret surveys. This formal training (a 1-day workshop for biologists) is currently available through the Wyoming Cooperative Fishery and Wildlife Research Unit, Box 3166, University Station, Laramie, Wyoming 82071, telephone (307) 766-5415. A trained biologist should accompany each survey crew; i.e., one trained biologist in each two person crew, when surveys are being conducted.

A field guide "Handbook of Methods for Locating Black-footed Ferrets" provides detailed methods for locating black-footed ferrets and interpreting sign made by this animal under field conditions. This handbook should be useful when designing surveys for black-footed ferrets, whether for Section 7 compliance or for locating ferrets for conservation and recovery. A copy of this document may be obtained from:

Bureau of Land Management
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82001

Bureau of Land Management
Montana State Office
P.O. Box 36800
Billings, Montana 59107

COORDINATION OF SURVEYS

This section discusses coordination measures that the Service believes are vital to completing a proper survey.

State Wildlife Agency

The appropriate State wildlife agency should be contacted prior to initiating ferret surveys. State agency personnel may provide historical information or literature pertinent to the survey or offer suggestions regarding access or landowner contacts needed for the survey. In addition, some States may require special permits for spotlighting wildlife or have minimum requirements for protecting ferrets under State laws which are different or more detailed than those described in these guidelines.

Other Local Authorities

We recommend that persons planning surveys contact local authorities before initiating surveys. Many sheriff departments cooperate with State

conservation officers in investigating possible game violations. Spotlighting crews are often reported to the game warden and sheriff by local citizens and ranchers. Proper coordination of survey activities should prevent unnecessary conflict with these groups and agencies.

PROCEDURES TO FOLLOW IF FERRET SIGN OR A FERRET IS LOCATED

Wildlife agencies of some States located within the potential range of the black-footed ferret have developed a procedure to follow when ferrets are seen and reported. We recommend that agencies or their representatives request these procedures from the States in which they are working and review them before conducting surveys. If no procedures are available, contact the appropriate Service office (see Appendix I) for guidance. If you observe a ferret while conducting surveys, you should notify the closest Service or State wildlife agency office identified in Appendix I within 24 hours.

Experience has shown that premature release of a ferret sighting to the news media or others can have lasting negative effects upon recovery actions in the area. We request that contacts with the public be avoided until the presence of a ferret is confirmed by the Service or State wildlife agency and necessary landowner contacts and discussions are completed.

APPENDIX I

Lists

1. Contacts should be made with the appropriate Service Fish and Wildlife Enhancement Office or Regional Office to the attention of the following individuals when possible.

Kemper McMaster, Act. State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
Federal Bldg. & U.S. Courthouse
301 So. Park, Room 494
P.O. Box 10023
Helena, Montana 59626
Telephone FTS 585-5225
Commercial (406) 449-5222

CHUCK DAVIS
~~Ron Starkey~~, State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
2120 Capitol Avenue, Room 7010
Cheyenne, Wyoming 82001
Telephone FTS 328-2374
Commercial (307) 772-2374

Lee Carlson, State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
730 Simms Street, Suite 292
Golden, Colorado 80401
Telephone FTS 776-2675
Commercial (303) 236-2675

Al Sapa, State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
1500 Capitol Avenue
Bismarck, North Dakota 58501
Telephone FTS 783-4481
Commercial (701) 250-4401

REED HARRIS
~~Robert Ruesink~~, State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
2078 Administrative Building
1745 W. 1700 South
Salt Lake City, Utah 84104
Telephone FTS 588-4430
Commercial (801) 524-4430

Stan Zschomler, State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
225 So. Pierre, P.O. Box 986
Federal Building, Room 227
Pierre, South Dakota 57501
Telephone (605) 224-8693

BOB McCUE
~~Jerry Brabander~~, State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
2604 So. Patrick, Suite 7
Grand Island, Nebraska 68801
Telephone (308) 381-5571

BILL GILL
~~Ronel Finley~~, State Supervisor
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
215 Southwind Place
Manhattan, Kansas 66502
Telephone FTS 752-4528
Commercial (913) 539-3474

Jack Woody, Associate Regional Director
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
P.O. Box 1306
500 Gold Avenue, S.W. Room 3018
Albuquerque, New Mexico 87103
Commercial (505) 766-3972
FTS 474-2323
(AZ, NM, TX, OK)

Robert Jacobsen, Assistant Regional Director
Fish and Wildlife Enhancement
U.S. Fish and Wildlife Service
134 Union Blvd.
Lakewood, Colorado 80228
Telephone FTS 776-8189
Commercial (303) 236-8189
(CO, KS, MT, NE, ND, SD, UT, WY)

2. Contacts with the States should be addressed to the appropriate State Director, to the attention of the following individuals:

Arizona

Terry Johnson, End. Sp. Coordinator
or Barry Spicer, Nongame Mammalogist
Arizona Game and Fish Department
2222 West Greenway Road
Phoenix, Arizona 85023
Telephone (602) 942-3000

Colorado

Judy Sheppard, Nongame Program Specialist
Colorado Division of Wildlife
6060 Broadway
Denver, Colorado 80216
Telephone (303) 291-7337

Kansas

Marvin Schwilling, Project Leader
Nongame and Endangered Wildlife
Department of Wildlife and Parks
832 East 6th Street
Emporia, Kansas 66801
Telephone (316) 342-0658

Montana

Arnold Dood, Wildlife Biologist
Montana Dept. Fish, Wildlife & Parks
Montana State University Campus
Bozeman, Montana 59717
Telephone (406) 994-3285

Nebraska

Ross Lock, Nongame Specialist
Nebraska Game and Parks Commission
P.O. Box 30370
Lincoln, Nebraska 86503
Telephone (402) 464-0641

New Mexico

Sartor Williams, End. Sp. Biologist
New Mexico Dept. of Game and Fish
Villagra Building
Santa Fe, New Mexico 87503
Telephone (505) 827-7899

North Dakota

Randy Kreil, Wildlife Biologist
North Dakota Game and Fish Dept.
100 North Bismarck Expressway
North Dakota Game and Fish Dept.
Bismarck, North Dakota 58505
Telephone (701) 224-6348 or
Telephone (701) 221-6300

Oklahoma

John Skeen, Program Director
Nongame and Endangered Species
Okla. Dept. of Wildlife Conservation
1801 No. Lincoln, P.O. Box 53456
Oklahoma City, Oklahoma 73105
Telephone (405) 521-3851

South Dakota

Eileen Dowd, Wildlife Biologist
Endangered Species
South Dakota Game, Fish
and Parks Department
Sigurd Anderson Building
Pierre, South Dakota 57501
Telephone (605) 773-4229

Texas

Catrina Martin, Wildlife Biologist
Nongame and Endangered Species Program
Texas Parks and Wildlife
4200 Smith Road
Austin, Texas 78744
Telephone (512) 389-4771

Utah

Dr. Jordan Pederson,
Mammals Program Coordinator
Utah Division of Wildlife
Resources
1596 West North Temple
Salt Lake City, Utah 84116
Telephone (801) 533-9333

Wyoming

Bob Luce,
Nongame Mammal Biologist
Wyoming Game and Fish Department
260 Buena Vista
Lander, Wyoming 82520
Telephone (307) 332-2689

Appendix II

A set of rules for circumscribing a prairie dog complex has been developed by "Biggins, D., B. Houston, B. Miller, B. Oakleaf, T. Clark and A. Dood. 1988. A system for evaluating black-footed ferret habitat. U.S. Fish and Wildlife Service Draft Report, 40 p. plus appendix." This method provides a practical and reasonably straightforward procedure for circumscribing a complex of prairie dogs.

To determine the acreage that a prairie dog town or complex of towns occupy, several steps are required. A diagrammatic example of a simulated complex is presented here. Before starting this exercise, those prairie dog towns that will be affected by the action and those in the surrounding area should be identified on a map having a scale of 1:24,000. Once this has been done, the following procedures should be followed:

1. Determine the northernmost prairie dog town on the map. Start at the northernmost point of the northernmost town of the complex being considered.

2. Pivot a 7-km (4.34 mile) line segment clockwise from due north until it touches a point on a town (see example). The line between the initial point and the second point forms the first segment of the polygon.

3. From the second point, pivot the 7-km line clockwise from alignment with the first segment until it touches a third point on a town. This forms the second segment of the polygon.

4. If a convex town perimeter prevents "pivoting" the 7-km line to another point, move clockwise around that perimeter until Step 3 can be accomplished. The convex perimeter of a town can thus become a segment of the boundary of the complex.

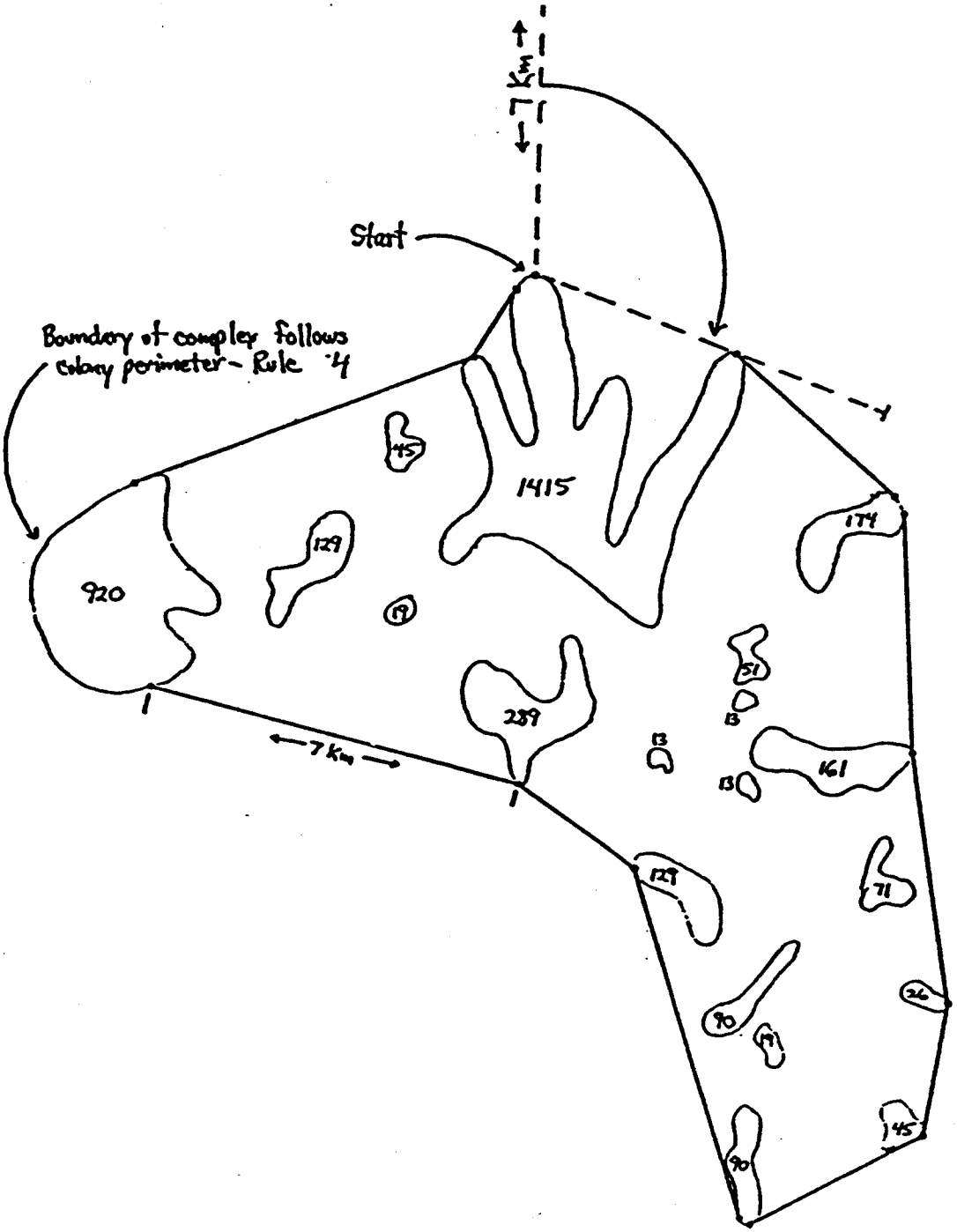
5. Continue pivoting the line from town to town until the polygon becomes closed,

6. In rare circumstances, a complex may contain one or more large prairie dog-free spaces (diameter = 7 km). Delete this space from the area of the complex, circumscribing it as follows.

   a. Start at the southernmost point of the northernmost town in the prairie dog-free space.

   b. Pivot a 7-km long line counter-clockwise from due south until it touches a point on a town.

   c. If a concave town perimeter prevents the "pivoting" 7-km line from contacting another point, move counter-clockwise around that perimeter until (b) can be accomplished.

   d. Repeat step (b) until the polygon becomes closed.

Circumscribing a Prairie Dog Town Complex
(number within or adjacent to a colony is its area in hectares)