Evaluation of the Bovine Tuberculosis Status of Mexican States and Zones

Animal and Plant Health Inspection Service
Veterinary Services

National Center for Animal Health Programs
Eradication and Surveillance Staff

National Center for Import and Export
Regionalization Evaluation Services

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List of abbreviations

1999 UMR  1999 Bovine Tuberculosis Eradication Uniform Methods and Rules
2005 UMR  2005 Bovine Tuberculosis Eradication Uniform Methods and Rules
AF       Accredited free
AP       Accreditation preparatory
APHIS    USDA’s Animal and Plant Health Inspection Service
BNC      U.S.-Mexico Binational Tuberculosis and Brucellosis Committee
Breeding cattle  Sexually intact cattle other than feeder cattle
CCT test  Comparative cervical tuberculin test
CENASA   Centro Nacional de Servicios de Diagnóstico en Salud Animal
CFR      Code of Federal Regulations
CFT test  Caudal fold tuberculin test
CHO      Certificate of the herd of origin
CNOG     National Confederation of Cattlemen’s Organizations
CONASA   National Technical Advisory Council on Animal Health
Consensus Document  Border States Consensus Document
Cooperative TB Program  Cooperative State/Federal Bovine Tuberculosis Eradication Program
Domestic TB rule  Proposed rule to update 9 CFR 77 to reflect the provisions of the 2005 UMR
Feeder cattle  Cattle intended for feeding and subsequent slaughter
FY       Fiscal year
Import TB rule  Proposed rule to harmonize U.S. domestic and import bovine TB regulations
MA       Modified accredited
MAA      Modified accredited advanced
NOM      Norma Oficial Mexicana
OIE      World Organization for Animal Health
PPD      Purified protein derivative
SAGARPA  Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación
TB       Bovine tuberculosis
USAHA    U.S. Animal Health Association
USDA     U.S. Department of Agriculture
VS       APHIS’ Veterinary Services
WCD      Waiver Conditions Document
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Executive summary

This document evaluates the bovine tuberculosis (TB) status of certain Mexican States and zones in accordance with a proposed import TB rule. APHIS plans to publish a proposed rule in 2008 to harmonize the U.S. import and domestic TB regulations and allow application of domestic TB standards, with the associated movement restrictions and testing requirements, to foreign regions. The proposed import TB rule is supported by data that indicate that U.S. domestic TB standards are effective in limiting TB spread and reducing the prevalence of TB-affected herds over time, as described in a separate assessment.

Importation of Mexican cattle is a known risk factor for introduction of bovine TB into the United States. Continued importation of TB-infected cattle from Mexico jeopardizes U.S. progress toward TB eradication. By applying domestic TB status levels and standards to Mexican regions, APHIS intends to address both the short- and long-term risk of importing TB-infected Mexican cattle. From highest to lowest risk, the U.S. TB status levels are nonaccredited (NA), accreditation preparatory (AP), modified accredited (MA), modified accredited advanced (MAA), and accredited free (AF) (see Section 1.1). This evaluation is concerned primarily with cattle, since very few captive bison herds exist in Mexico.

APHIS, together with U.S. States and industry, has been working with Mexico for over a decade to establish equivalency between the two national TB programs and to harmonize international requirements; U.S. import requirements for cattle from Mexico have evolved considerably over this time (see Section 1.3). APHIS is currently operating under two interim rules published in April 2001 and June 2003 and the latest of a series of Veterinary Services (VS) Notices that precisely define import testing requirements for cattle from Mexico. The VS Notices administratively recognize the TB status of certain Mexican States and zones according to U.S domestic TB standards, and apply the associated movement restrictions and testing requirements to cattle exported or otherwise moved to or from those regions.

APHIS initially focused on evaluation of Mexican States and zones as individual regionalized entities and, in each case where TB status was recognized, determined that the conditions were equivalent to those required for that status level in the United States. The evaluation criteria were based on the factors APHIS uses for foreign animal disease evaluations as described in title 9, Code of Federal Regulations, section 92.2 (9 CFR 92.2), modified to reflect the domestic TB standards in 9 CFR 77 (see Section 2.1). These criteria collectively address the prevalence of TB-affected herds in the region; the capacity of the veterinary services to accurately determine and reduce that prevalence; the effectiveness of animal movement controls across zone boundaries; the ability to meet TB testing requirements for movement and surveillance; the ability to maintain accurate census information; and the rate of success in completing epidemiological investigations.

Since some essential aspects of a TB eradication program must be addressed at the national level, such as comprehensive slaughter surveillance, APHIS also conducted a review of Mexico’s national TB eradication program. The reviewers found that TB eradication efforts in Mexico, as in the United States, are a cooperative effort between
State, Federal, and industry partners. However, the States and industry in Mexico assume a comparatively greater role than in the United States.

The review team noted several areas at the national level where additional attention and resources are needed to support and strengthen TB eradication efforts, particularly in the areas of surveillance, laboratory programs, and advancement of NA regions. To encourage progress in these areas, APHIS has developed a 5-year strategic plan with progressive requirements for Mexico’s TB eradication program; failure to comply with the provisions of the plan may result in additional restrictions on cattle imported into the United States from Mexican States and zones.

APHIS concluded from this evaluation that certain individual Mexican States and zones meet the criteria for equivalence to AP, MA, and MAA status under the standards laid out in the proposed domestic and import TB rules, as well as the 2005 Cattle and Bison Tuberculosis Uniform Methods and Rules (2005 UMR). These States and zones are listed in Table 1 and described further in Annex 6. APHIS further concluded that the risk mitigation measures in the proposed import TB rule for all imported bovine animals, in conjunction with existing risk mitigation measures in 9 CFR 93 for cattle from Mexico, sufficiently mitigate the risk of importing TB-infected cattle from Mexico.

Table 1: Mexican States and zones that qualify for equivalent TB status

<table>
<thead>
<tr>
<th>Equivalent TB Status</th>
<th>Mexican State or zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accredited Free (AF)</td>
<td>None</td>
</tr>
<tr>
<td>Modified Accredited Advanced (MAA)</td>
<td>Sonora MAA Zone</td>
</tr>
<tr>
<td>Modified Accredited (MA)</td>
<td>Baja California MA Zone</td>
</tr>
<tr>
<td></td>
<td>Chihuahua MA Zone</td>
</tr>
<tr>
<td></td>
<td>Coahuila MA Zone</td>
</tr>
<tr>
<td></td>
<td>Nayarit MA Zone</td>
</tr>
<tr>
<td></td>
<td>Nuevo Leon MA Zone</td>
</tr>
<tr>
<td></td>
<td>Puebla MA Zones 1 and 2</td>
</tr>
<tr>
<td></td>
<td>Quintana Roo (State)</td>
</tr>
<tr>
<td>Accreditation Preparatory (AP)</td>
<td>Chiapas AP Zone</td>
</tr>
<tr>
<td></td>
<td>Colima (State)</td>
</tr>
<tr>
<td></td>
<td>Durango AP Zone</td>
</tr>
<tr>
<td></td>
<td>Guerrero AP Zone</td>
</tr>
<tr>
<td></td>
<td>Michoacán AP Zone</td>
</tr>
<tr>
<td></td>
<td>Tabasco AP Zone</td>
</tr>
<tr>
<td>Non-Accredited (NA)</td>
<td>Aguascalientes (State)</td>
</tr>
<tr>
<td></td>
<td>Baja California NA Zone</td>
</tr>
<tr>
<td></td>
<td>Baja California Sur (State)</td>
</tr>
<tr>
<td></td>
<td>Campeche (State)</td>
</tr>
<tr>
<td></td>
<td>Chiapas NA Zone</td>
</tr>
<tr>
<td></td>
<td>Chihuahua NA Zones 1, 2, 3</td>
</tr>
<tr>
<td></td>
<td>Coahuila NA Zones 1, 2, 3</td>
</tr>
<tr>
<td></td>
<td>Distrito Federal</td>
</tr>
<tr>
<td></td>
<td>Durango NA Zone</td>
</tr>
<tr>
<td></td>
<td>Guanajuato (State)*</td>
</tr>
<tr>
<td></td>
<td>Guerrero NA Zone</td>
</tr>
<tr>
<td></td>
<td>Hidalgo (State)</td>
</tr>
<tr>
<td></td>
<td>Jalisco NA Zone*</td>
</tr>
<tr>
<td>*A review for equivalence to AP status has been requested.</td>
<td></td>
</tr>
<tr>
<td>**A review for equivalence to AP status for all or part of the State or zone was conducted but conditions for AP status were not met.</td>
<td></td>
</tr>
</tbody>
</table>
In the interests of risk-based decision-making, APHIS considered other options for mitigating the risk of importing TB-infected cattle from Mexico. These included (1) making no changes, or essentially reverting to the Federal requirements for importation of cattle from Mexico in place before 2001; or (2) continuing to follow the import requirements for cattle from Mexico specified by the interim rules published in 2001. However, neither of these options satisfactorily addresses the long-term risk to U.S. livestock. Prohibiting cattle imports from Mexico until such time as the TB infection level is equivalent to that in the United States would address the risk but unrealistically restrict trade.

Note: This risk analysis was originally drafted in January 2004 and was subsequently revised in May 2005, July 2006, and November 2007 to reflect changes to the UMR and TB eradication efforts that occurred during the risk analysis and rulemaking processes.
Hazard identification

The hazard under consideration in this analysis is *Mycobacterium bovis* (*M. bovis*), the causative agent of bovine TB. *M. bovis* has affected animal and human health since antiquity. Once the most prevalent infectious disease of cattle and swine in the United States, bovine TB caused more losses among U.S. farm animals in the early part of the last century than all other infectious diseases combined.

Bovine TB is an infectious, granulomatous disease that commonly takes a chronic debilitating course but can occasionally assume an acute, rapidly progressive course [1]. *M. bovis* can cause progressive disease in most warm-blooded vertebrates and is still a significant public health hazard in many parts of the world. The main reservoirs of infection are humans and cattle, although badgers, bison, opossums, kudu, deer, llamas, elk, and domestic and feral pigs have been found infected with *M. bovis* [2]. The prevalence of the disease in such reservoirs influences the incidence in other species.

Aerosol exposure to *M. bovis* is considered to be the most frequent route of infection of cattle, but infection by ingestion of contaminated materials (including milk) also occurs [3]. The immune response to proliferating mycobacteria leads to the formation of granulomatous lesions (tubercles) at the primary site of infection and in regional lymph nodes. Generalized dissemination through vascular and lymphatic channels may also occur. Characteristic lesions are most frequently found in the lungs and the retropharyngeal, bronchial, and mediastinal lymph nodes [1, 4]. Lesions can also be found in the mesenteric lymph nodes, liver and spleen, on serous membranes, and in other organs.

Infection is often subclinical; when present, clinical signs are not specific to this disease and may include anorexia, weakness, dyspnea, emaciation, enlarged lymph nodes, and cough [1, 4]. After death, bovine TB is usually diagnosed by gross anatomical examination and histopathological and bacteriological techniques, although DNA probe and polymerase chain reaction techniques may also be used.

In the live animal, bovine TB is usually diagnosed on the basis of a delayed hypersensitivity reaction [1, 5]. The prescribed test for international trade is the tuberculin test, which involves the intradermal injection of bovine tuberculin purified protein derivative (PPD) and examination of the injection site for swelling (delayed hypersensitivity reaction) [1]. The location of the test sites vary among countries; in the United States, this test is called the caudal fold tuberculin (CFT) test, since it is performed in the caudal fold of the tail [6].

The CFT test is considered a presumptive test [5, 6]. The injection site is visually observed and palpated at 72 (+/- 6) hours following injection of bovine tuberculin PPD; if a swelling (delayed hypersensitivity reaction) is observed, the animal is classified as suspect. Cross reactions may occur in animals sensitized to other mycobacterial species, most commonly *M. avium*, but also *M. tuberculosis*, *M. paratuberculosis*, or other related species. Cattle classified as suspect on the CFT test are retested using the comparative cervical tuberculin (CCT) test to determine their relative responsiveness to bovine and avian (*M. avium ss avium*) tuberculin PPD [6]. Cattle infected with *M. bovis* usually develop more swelling in response to the *M. bovis* PPD than to the *M. avium* PPD [5].
Aside from the health risks to animals and humans, bovine TB can have a significant adverse effect on trade. In this regard, cattle exported from regions that contain TB-affected herds are often subject to trade restrictions. The World Organization for Animal Health (OIE) has set uniform international testing requirements based on the TB prevalence in a region [7]. U.S. domestic TB regulations similarly require more stringent testing, certification, and identification procedures for movement of susceptible animals from States and zones with a higher prevalence of TB-affected herds than from States and zones with a lower prevalence of TB-affected herds.

Bovine TB is a difficult disease to eradicate and has been the focus of domestic and international eradication efforts for decades. The U.S. program of TB eradication began in 1917; ninety years later, the United States has nearly eradicated the disease from the cattle and captive bison populations. The program is coordinated by the Cooperative State/Federal Bovine TB Eradication Program (Cooperative TB Program), which is in turn administered by APHIS in conjunction with State animal health agencies and U.S. livestock producers.
Release assessment

1. Introduction

This document evaluates the bovine tuberculosis (TB) status of certain Mexican States and zones\(^1\) in accordance with a proposed import TB rule to be published in 2008 [8]. The import rule was published in conjunction with a proposed rule to update the domestic TB standards in 9 CFR 77 to reflect the provisions of the 2005 UMR [6], rather than the preceding 1999 UMR [9]. The intent of the proposed import TB rule is to harmonize the U.S. import and domestic TB regulations and allow application of domestic TB standards, with the associated movement restrictions and testing requirements, to foreign regions. APHIS supported the proposal using data that indicate that U.S. domestic TB standards are effective in limiting TB spread and reducing the prevalence of TB-affected herds\(^2\) over time, as described in a separate assessment [10].

In recent years, APHIS has evaluated and administratively recognized equivalent TB status in individual Mexican States and zones in accordance with the domestic TB standards in 9 CFR 77 and regionalization procedures outlined in 9 CFR 92.2. Section 1 of this assessment provides a brief overview of U.S. national TB eradication program standards, the provisions of the proposed import TB rule, and the evolution of U.S. regulations governing cattle imports from Mexico. Section 2 addresses the TB evaluations of individual Mexican States and zones and Section 3 summarizes the findings and conclusions.

1.1 U.S. TB program standards

Under the guidance of the Cooperative TB Program, the United States has nearly succeeded in eradicating bovine TB from the nation’s cattle and captive bison\(^3\) populations. At the end of fiscal year 2006 (FY 2006), APHIS considered 49 U.S. States and territories to be free of TB; 44 States and the U.S. Virgin Islands had been free for over 10 years [11]. The prevalence of TB-affected herds at the national level in FY 2006 was 0.0009% [11].

APHIS classifies U.S. States and zones as one of five TB status levels based primarily on a maximum allowable prevalence of TB-affected herds. APHIS developed the criteria defining each status level in conjunction with the United States Animal Health Association (USAHA) Committee on Tuberculosis. These criteria are outlined in the proposed domestic TB rule [12] and fully described in the 2005 UMR [6]. Although not discussed here, the 2005 UMR also sets forth specific standards for certain critical aspects of the TB program, such as conducting, validating, and monitoring TB surveillance at slaughter and in the field.

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1 Zone: a geographical area identifiable by geological, political, or surveyed boundaries characterized by the ability to control animal movement across its boundaries.

2 Affected herd: A herd of livestock in which there is strong and substantial evidence that \(M.\ bovis\) exists. This evidence includes, but is not limited to, any of the following: Histopathology, polymerase chain reaction (PCR) assay, bacterial isolation or detection, testing data, or epidemiologic evidence such as contact with known sources of infection.

3 Captive bison: all members of the genus \(Bison\) raised or maintained in captivity for any purpose.
From highest to lowest risk, the TB status levels are nonaccredited (NA), accreditation preparatory (AP), modified accredited (MA), modified accredited advanced (MAA), and accredited free (AF). The movement restrictions and testing criteria associated with each status level are designed to mitigate the risk of TB transmission via movement of cattle and bison from higher to lower risk regions; the TB standards also provide a defined pathway for advancement towards eradication (Table 1.1).

Table 1.1: Criteria for TB status under the proposed domestic TB rule

<table>
<thead>
<tr>
<th>Status level</th>
<th>Herd prevalence requirements</th>
<th>Progression to next higher level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>Herd prevalence of 0% within the previous year. A State or zone may retain AF status if a single affected herd is detected and an epidemiologic investigation is completed within 90 days with no evidence of spread of infection. If 2 or more affected herds are detected within 24 months, the State or zone will be reclassified to a lower status based on the prevalence of TB-affected herds.</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>MAA</td>
<td>Herd prevalence of less than 0.01%, or up to 3 affected herds in States or zones with fewer than 30,000 herds, for each of the most recent 2 years.</td>
<td>Compliance with the current UMR; and If there is a known wildlife reservoir (regardless of prior TB status), no findings of bovine TB in cattle or bison for at least 2 years following release from quarantine of the last affected herd; or If no known wildlife reservoir and not previously AF status, no findings of TB for 2-5 years following release from quarantine of the last affected herd; or If no known wildlife reservoir and previously AF status, no finding of TB for 2 years after release from quarantine of the last affected herd.</td>
</tr>
<tr>
<td>MA</td>
<td>Herd prevalence of less than 0.1%, or up to 10 affected herds in States or zones with fewer than 10,000 herds, for the most recent year.</td>
<td>Compliance with the current UMR; and, for each of the most recent 2 years: Herd prevalence of less than 0.01%; or Up to 3 affected herds in States or zones with fewer than 30,000 herds.</td>
</tr>
<tr>
<td>AP</td>
<td>Herd prevalence of less than 0.5% for the most recent year.</td>
<td>Compliance with the current UMR; and, for the previous year: Herd prevalence of less than 0.1%; or Up to 10 affected herds in States or zones with fewer than 10,000 herds.</td>
</tr>
<tr>
<td>NA</td>
<td>Herd prevalence unknown or ≥ 0.5%.</td>
<td>Compliance with the current UMR and herd prevalence less than 0.5% for the previous year. Within 6 months of being designated NA, a State or zone that previously held an accredited TB status must provide APHIS with a plan to improve its status to at least AP within 2 years of the downgrade in status.</td>
</tr>
</tbody>
</table>

Both the TB status levels and the associated movement testing requirements are based in part on the assumption that the prevalence of TB-affected herds in a State or zone is the primary predictor of risk. Domestic TB regulations dictate a reduction in the stringency of testing requirements for movement of cattle and bison when the reported herd prevalence in a State or zone is reduced and the region is reclassified to a higher (i.e., less risky) TB status level [6, 9, 12].
Movement testing requirements for cattle and bison of different production classes moving out of regions with defined TB status levels is closely tied to the risk of TB spread. The proposed domestic TB rule, in keeping with the 2005 UMR, distinguishes three classes of bovine animals. In decreasing order of risk, these classes are: (1) steers and spayed heifers for feeding, (2) sexually intact heifers and bulls for feeding, and (3) other sexually intact cattle not intended for feeding with subsequent slaughter (also referred to as breeding cattle) [6, 12]. Movement testing requirements are more stringent for breeding cattle than for feeder cattle, in part because the longer productive life of breeding animals affords greater opportunity for exposure while delaying detection via slaughter surveillance.

The proposed domestic rule also creates a separate class for sexually intact dairy cattle, with additional movement restrictions as described below [12]. Sexually intact dairy cattle could be considered either breeding or feeder animals in some circumstances, but the primary purpose they serve, and for which they may be moved interstate, is milk production; therefore, they are categorized separately.

The proposed domestic TB rule would require sexually intact feeder heifers and bulls from nonaccredited herds in MAA, MA, and AP regions to move directly to an approved feedlot [12]. APHIS considers an approved feedlot to be a terminal destination, since the only exit (other than to another approved feedlot) is to a recognized slaughtering establishment. These feeder animals are therefore considered to present less risk than breeding cattle and are subject to less stringent testing requirements. APHIS considers steers and spayed heifers for feeding to present the lowest inherent risk of TB dissemination; however, recent experience suggests that additional risk mitigation measures are necessary to restrict the movement of steers and spayed heifers from AP regions, as described below.

The proposed domestic TB rule, again following the 2005 UMR, also clearly distinguishes between bovine animals from accredited and nonaccredited herds with regard to movement testing requirements [6, 12]. An accredited herd by definition has received negative results on at least two consecutive official TB tests of all eligible animals conducted at 9-15 month intervals and has no evidence of or exposure potential to bovine TB. Accreditation is maintained by annual (AP and MA status levels) or biennial (MAA and AF status levels) herd testing. Due to the testing requirements for accreditation, cattle and bison from accredited herds are considered to be of lower risk than those from nonaccredited herds in regions of the same status level, and therefore are subject to less stringent movement testing requirements.

Cattle and bison of all classes, from all status level regions, may move interstate or interzone without TB testing if moved directly to slaughter at a recognized slaughtering establishment [6, 12]. The proposed domestic TB rule would also require all cattle and bison moved interstate or interzone to be officially identified with an official ear tag prior to movement, except in some instances of cattle or bison moving directly to necropsy or to slaughter at a recognized slaughtering establishment [12].

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4 Dairy cattle: Bovine animals bred and raised primarily for milk production.
5 Recognized slaughtering establishment: Any slaughtering establishment operating under the provisions of the Federal Meat Inspection Act (21 U.S.C. 601 et seq.) or a State meat inspection act.
Finally, the proposed domestic TB rule would incorporate specific requirements in 9 CFR 77 for interstate and interzone movement of dairy cattle [12]. These requirements were developed in response to continued detection of bovine TB in U.S. dairy herds and dairy-raising facilities and the resulting concern that TB may still exist at a very low prevalence within the dairy industry. In summary, the proposed domestic TB rule would require that (1) all dairy cattle be officially identified prior to leaving their premises of birth; and (2) sexually intact dairy cattle originate from a currently accredited herd (and travel with a certificate stating so) or, if from a nonaccredited herd and 6 months of age or older, test negative for TB within 60 days prior to movement. Officially identified dairy cattle, like all other cattle and captive bison, may move directly to slaughter at a recognized slaughter establishment without TB testing, regardless of the TB status of the originating region.

1.2 Proposed risk mitigations for imported bovine animals

In a previous risk analysis, APHIS identified several risk factors for importation of TB-infected bovine animals and exposure of U.S. livestock [10]. These factors include limited APHIS oversight of TB eradication efforts in foreign regions compared to within the United States; limitations of the CFT test (the TB screening test most commonly used in cattle and bison); importation of feeder animals from higher risk regions into the United States; and movement of certain classes of imported cattle while in the United States.

To address these risk factors, the proposed import TB rule contains specific provisions that would require (1) all sexually intact feeder heifers and bulls imported from nonaccredited herds in MAA, MA, and AP regions to move directly to an approved feedlot in an officially sealed means of conveyance, rather than through one approved livestock facility and then to an approved feedlot; and (2) any requisite individual TB tests for sexually intact cattle and captive bison other than sexually intact feeder heifers to occur at the port of entry under the supervision of an official U.S. veterinarian, rather than within 60 days prior to export [8]. The proposed import TB rule also reflects new provisions in the proposed domestic TB rule regarding movement testing of dairy cattle, as discussed above, and includes a requirement for all feeder cattle from nonaccredited herds in AP regions to move directly to an approved feedlot in an officially sealed means of conveyance.

Table 1.2 summarizes the movement restrictions and testing requirements in the proposed import TB rule. Deviations from the provisions of the proposed domestic TB rule that would pertain only to cattle and captive bison imported into the United States (not to cattle and bison movement within the United States) are noted in italics.

1.3 Evolution of U.S. regulations governing cattle imports from Mexico

APHIS, together with U.S. States and industry, has been working with Mexico for over a decade to establish equivalency between the national TB eradication programs and to harmonize international TB requirements. Over the course of these efforts, U.S. import requirements for cattle from Mexico have evolved considerably. The focus has been on
cattle rather than captive bison, since the number of captive bison in Mexico and the desire for export of this species to the United States is negligible. The primary U.S. States affected by the influx of TB-infected cattle are the Border States of California, New Mexico, Arizona, and Texas, as well as the neighboring States of Oklahoma and Kansas.

Table 1.2: Proposed TB movement and testing requirements for imported cattle

<table>
<thead>
<tr>
<th>Status Level</th>
<th>Cattle and bison from a nonaccredited herd</th>
<th>Cattle and bison from an accredited herd</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>Negative test required within 60 days prior to export for all animals ≥ 6 months of age that are included in the movement.</td>
<td>No test required (sexually intact dairy cattle must be accompanied by a certificate stating that herd of origin is currently accredited).</td>
</tr>
<tr>
<td>MAA</td>
<td>No test required.</td>
<td>Negative test required at the port of entry for all animals ≥ 6 months of age included in the movement (no exceptions).</td>
</tr>
<tr>
<td>MA</td>
<td>Negative test required within 60 days prior to movement for all animals included in the movement that are ≥ 6 months of age. Movement must be directly to an approved feedlot in an officially sealed means of conveyance.</td>
<td>Negative test of the herd of origin (all animals ≥ 6 months of age) within 1 year before not less than 60 days prior to movement plus a negative test conducted at the port of entry for all individual animals included in the movement that are ≥ 2 months of age (no exceptions). Testing required according to purpose (feeding/breeding). No test required if accompanied by a certificate stating that herd of origin is currently accredited.</td>
</tr>
<tr>
<td>AP</td>
<td>Negative test of the herd of origin (all animals, regardless of age) within 1 year prior to movement plus a negative test within 60 days of movement for all individual animals included in the movement; except that the individual test is not required if the movement occurs within 60 days following the herd of origin test and provided that the animals to be moved were included in this test. Movement must be directly to an approved feedlot in an officially sealed means of conveyance.</td>
<td>Import not permitted. Testing required according to purpose (import for breeding purposes not permitted). Sexually intact cattle and bison: Negative test required at the port of entry for all animals included in the movement. Other cattle and bison: Negative test required within 60 days prior to movement for all animals included in the movement. All cattle and bison must be accompanied by a certificate stating that herd or origin is currently accredited.</td>
</tr>
<tr>
<td>NA</td>
<td>May only be moved directly to slaughter at a recognized slaughtering facility; must be moved in an officially sealed means of conveyance.</td>
<td></td>
</tr>
</tbody>
</table>

In 1993, the U.S.-Mexico Binational Tuberculosis and Brucellosis Committee (BNC) was formed under the auspices of the U.S. Animal Health Association (USAHA). The BNC meets three times each year with the goal of facilitating, guiding, and harmonizing the TB eradication efforts in the United States and Mexico.

In May 1994, prompted by concerns over continued importation of TB-infected Mexican cattle under existing Federal regulations, APHIS proposed a rule to amend the requirements for importation of Mexican steers and spayed heifers into the United States [13]. In August 2004, the State Veterinarians of the U.S. Border States issued the Border States Consensus Document (Consensus Document) [14], in which they requested that the proposed rule be withdrawn and replaced with a regulation incorporating recommendations stated in the document.

The Consensus Document provided greater incentive for Mexican States to implement an effective TB eradication program than was afforded by the APHIS proposal. For various
reasons, the APHIS proposal was withdrawn in February 1995, without a substitute proposal submitted at the time, and the States of Texas, New Mexico, Arizona, California, Oklahoma, and Kansas adopted the Consensus Document into their State TB regulations in March 1995.

The Consensus Document provided three stages of progressive requirements for a bovine TB eradication program—Control/Preparatory Phase, Eradication Phase, and Free. For Mexican States to continue eligibility to export steers and spayed heifers to the United States, they would have to comply with the criteria of each stage; States failing to meet the criteria for the Control/Preparatory Phase were considered non-status for TB. Testing requirements for entry via one of the Border States were most stringent for cattle originating from Control/Preparatory States and least stringent for Free States. Export of cattle from non-status States into the U.S. Border States for purposes other than immediate slaughter was prohibited.

The BNC, in support of these new State regulations, initiated individual reviews of the TB programs in Mexican States that requested reviews. The lowest risk (i.e., highest status) Mexican State at the time (Sonora) was classified as in the Eradication Phase.

Cattle were imported from Mexico into the U.S. Border States from March 1995 to April 2001 under the unique requirements of the Consensus Document. Enforcement of the Consensus Document provisions ended in April 2001, when APHIS published new provisional regulations in the form of an interim rule [15]. This rule generally classified all of Mexico as relatively high risk for TB and required that cattle imported from Mexico into the United States undergo testing equivalent to that required for interstate or interzone movement from AP regions.

Public comment on the 20 April 2001 interim rule necessitated publication of a second interim rule in June 2003 [16] that added a requirement for exporters of Mexican cattle to apply for a permit to ship cattle to the United States. One commenter pointed out that a considerable portion of Mexico should be considered NA rather than AP status, based on the prevalence of TB-affected herds. Since domestic TB regulations prohibit movement of cattle from NA States or zones to regions of higher TB status for feeding or breeding purposes, the commenter argued that Mexican cattle from NA regions should not be allowed to enter the United States except for slaughter.

The ensuing permit system, described in 9 CFR 93.424, provided a mechanism to identify and reject cattle offered for export from Mexico that originated from the equivalent of NA regions. For the purposes of this system, NA regions were considered to be those that had never been reviewed under the Consensus Document or had been reviewed and classified as non-status.

The provisional import conditions established by the interim rules were intended to apply until APHIS could publish an import TB rule that would allow application of U.S. domestic TB program standards internationally. Whereas the Consensus Document applied specifically to importation of cattle from Mexico into the U.S. Border States, the import TB rule would provide a more harmonized global approach to mitigating the risk of importing TB-infected cattle.
In the meantime, APHIS has conducted numerous evaluations of Mexican States and zones to ascertain the TB status level of these regions in a manner consistent with TB status evaluations in United States [17-61][32, 62-110]. APHIS conducted reviews and site visits using an approach consistent with the methods for both assignment of TB status levels in the United States and evaluation of foreign regions for disease status. This process is described in more detail in Section 2.

As a result of these status evaluations, APHIS generated several VS Notices that detailed the import testing requirements for cattle from Mexican States and zones [111-124]. The most recent VS Notice No. 07-11 concerning the TB status of Mexican States and zones is provided as Annex 1. The import movement restrictions and testing requirements in the VS Notices are based on the provisions of the 1999 UMR, 9 CFR 77, and TB import requirements under 9 CFR 93, as well as additional testing required by Mexico (Table 1.3). A certificate of the herd of origin (CHO) and official identification are required for all imported Mexican cattle. Steers, spayed heifers, and feeder heifers are also required to be identified with an “M” or “Mx” brand (as currently required in 9 CFR 93.427(c)(1)).

**Table 1.3: VS Notice 07-11 Import testing requirements for Mexican cattle**

<table>
<thead>
<tr>
<th>Status level</th>
<th>Nonaccredited herd</th>
<th>Accredited free herd</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steers/Spayed heifers</td>
<td>Sexually intact cattle</td>
</tr>
<tr>
<td>MAA</td>
<td>No test required.</td>
<td>Negative test required at the port of entry.</td>
</tr>
<tr>
<td>MA</td>
<td>Negative test required within 60 day prior to export.</td>
<td>Negative herd test of all cattle 6 months or older within 12 months prior to export and a negative test at the port of entry.</td>
</tr>
<tr>
<td>AP</td>
<td>Negative herd test of all cattle 6 months or older within 12 months prior to export and a negative test within 60 days prior to export (waived if herd test occurs within 6 months prior to export).</td>
<td>Negative herd test of all cattle 6 months or older within 1 year prior to export and two negative tests with 2nd done at the port of entry (the first test may be waived if herd test occurs within 6 months prior to export).</td>
</tr>
<tr>
<td>NA</td>
<td>Direct to slaughter only (negative test within 60 days prior to export required by SAGARPA)</td>
<td></td>
</tr>
</tbody>
</table>

The CHO is an official document endorsed by SAGARPA. The CHO contains information such as the address of the owner, exporter, or broker. It also details the specific location (municipality and farm of origin) of the premises from which the animals originate. The CHO consists of two sections: the first section (parts I through IV) contains administrative information; the second section (the Annex) contains more detailed information about the animals, their origin, and other identification, including farm of origin and State of origin identification firebrands.

The VS Notices define a herd of origin as the herd within which an individual animal was born and raised and was maintained on common ground for at least 4 months. The herd of origin consists of the breeding animals from which steers for export originate, but does not include gathering centers for an assembled group of cattle. Additional animals can be moved into a herd of origin during or after the 4-month qualifying period, if the animals
(a) originated from an accredited herd, or (b) originated from a herd of origin that tested negative to a whole herd test and the individual cattle have tested negative to any additional individual tests for TB required by the Administrator.

The VS Notices also require an Import Permit Application (VS Form 17-129) for all cattle exported from NA and AP regions of Mexico. This form serves as the application for import of these animals into the United States. The application must be endorsed by SAGARPA and included with the other import documents. The application should state the location of the premises of the herd of origin (municipality, city, and State) and any other premises where the animals were held prior to export. VS Form 17-129 can be found at the following Internet address: http://www.aphis.usda.gov/vs/ncie.

Finally, APHIS requires that all cattle be accompanied by (1) a SAGARPA International Export Health Certificate (Zoosanitario de Exportacion), (2) the TB test charts for individual animals, (3) proof of accredited (TB-free) herd status if animals originated from accredited herds and presented as such, and (4) tick dip certificate where indicated. If the U.S. port veterinarian determines that there are inconsistencies in the documentation and/or animal identification, he/she may hold the cattle until those issues are resolved.

The VS Notices define an accredited herd as one that has passed at least two consecutive annual CFT tests, has no other evidence of bovine TB, and meets the standards of the 1999 UMR. Status is maintained through annual herd testing around the anniversary date of the original herd test. A whole herd test is defined as an official tuberculin test of (1) all cattle in a herd of origin that are 6 months of age or older; and (2) all cattle in the herd of origin that are less than 6 months of age and were not born into the herd of origin, unless they were born in and originated from a TB-free herd, or originated from a herd of origin that has tested negative to a whole herd test and the individual cattle have tested negative to any additional individual tests for TB required by the Administrator.

A whole herd test is valid for 12 months prior to export. An additional individual animal test is not required for steers and spayed heifers if the animals were included in the whole herd test and are exported within 60 days of the whole herd test. After 60 days, an individual animal test is required for steers and spayed heifers and is valid up to 60 days from the date that the TB test was interpreted. The interval between consecutive TB tests must be at least 60 days.

Except for the movement testing requirements, the provisions of the VS Notices concerning cattle imported from Mexico are in keeping with regulations put forth in 9 CFR 93. Under current 9 CFR 93.427(c)(2), cattle from a herd in which a tuberculin test reactor was disclosed are not eligible for importation until the herd of origin achieves accredited herd status. Under current 9 CFR 93.427(c)(3), all sexually intact cattle from Mexico must test negative for TB at the port of entry under the supervision of the U.S. port veterinarian. Under current 9 CFR 93.427(c)(4), the importation of Holstein steers, Holstein spayed heifers, Holstein cross steer, and Holstein cross spayed heifers from Mexico is prohibited. If any reactor is disclosed, the entire lot is refused entry and neither the lot nor any portion thereof is eligible for importation until the herd of origin achieves accredited herd status. The proposed import TB rule would also retain these provisions.
2. Bovine TB eradication and control in Mexico

2.1 Introduction

This section summarizes APHIS’ findings from numerous TB reviews conducted in Mexican States and zones from 2001 – 2007 [17-110, 125], as well as a review of Mexico’s national TB eradication program conducted in January 2006 [126]. As mentioned previously, APHIS initially focused on evaluating Mexican States and zones as individual regionalized entities. APHIS conducted each evaluation in accordance with 11 criteria developed to reflect the essential elements of status evaluations as described in the 1999 UMR, 9 CFR 77, and 9 CFR 92.2. The initial criteria used are outlined in the Waiver Conditions Document (WCD), which is provided as Annex 2. The evaluation criteria were revised in April 2007 to reflect the provisions of the 2005 UMR and published as VS Memorandum No. 552.41, which is provided in Annex 3.

Regionalization to the level of a State or zone was implemented under the auspices of the BNC as an incentive for Mexican States to implement and maintain an effective TB eradication program. This approach allowed Mexican States to define a potential export zone with a low prevalence of TB-affected herds by excluding adjacent or nearby high prevalence regions. APHIS offered the regionalization option to facilitate the long-term goal of reducing the risk of importing TB-infected cattle from Mexico, while maintaining an acceptable level of short-term risk.

APHIS also initially offered to consider waiving the herd testing requirement for steers and spayed heifers out of Mexican States and zones that qualified for MA status under all criteria other than prevalence of TB-affected herds. The waiver option was designed with specific goals and timelines as outlined in the WCD and expired on 1 June 2005. At that time, all States and zones that had previously qualified for a waiver had to demonstrate full compliance with the criteria for MA status or else be reclassified as AP status. The waiver did not apply to breeding cattle.

The evaluation process for Mexican States and zones is described in detail in Annex 4. In brief, an evaluation includes collection and review of written documentation supporting a regionalization request [127-202] and one or more site visits by which APHIS determines equivalent TB status [17-46, 203]. Subsequent reviews may be conducted to address risk concerns [51-56, 204] and the TB status of a State or zone adjusted according to the findings of the review team [205-212].

The site visit team provides official observations and recommendations to Mexican State and Federal authorities during an exit interview at the end of the site visit. The TB status results are finalized in discussions between the site visit team members and other APHIS personnel. Starting in 2003, official status results and recommendations—including essential changes that must be made for APHIS to recognize equivalent TB status and less critical suggestions that would benefit the TB program—were provided to Mexican States via official correspondence from APHIS to SAGARPA [203, 205-209, 213-239].

APHIS monitors TB program status and progress in each State and zone via follow-up site visits [32, 76-110, 125] and semi-annual reporting. Mexican States and zones with equivalent TB status began reporting in January 2004 [240-360] and, in July 2004, NA zones within States with TB status began reporting as well [361-432].
The semi-annual report form requires Mexican States and zones to provide data on livestock demographics; prevalence of TB-affected herds; affected herd management and epidemiology; movement control; slaughter surveillance and traceback; CFT surveillance; and exports to the United States. A copy of the semi-annual report form is provided as Annex 5. The semi-annual reports allow SAGARPA and APHIS to assess trends, document progress toward eradication, and identify risk factors in the reporting States and zones. APHIS also reviews summary reports presented by SAGARPA at the triennial BNC meetings.

Between October 2001 and April 2007, a Mexican State or zone seeking APHIS recognition of equivalent TB status had to demonstrate—via written documentation, site visits, and semi-annual reporting—compliance with the provisions of the WCD, 9 CFR 77, and the 1999 UMR. To attain or retain equivalent TB status after April 2007, Mexican States and zones have had to demonstrate compliance with VS Memorandum No. 552.41, which incorporates most elements of the 2005 UMR. Once the domestic and import TB rules are final, Mexican States and zones will have to demonstrate full compliance with 9 CFR 77 and the 2005 UMR.

In August 2001, APHIS administratively recognized two zones in the State of Sonora as equivalent to MA and MAA status [433] based on site visits [434, 435] and a qualitative risk assessment [436]. In 2001 and 2002, APHIS recognized the TB status of 4 States and 9 zones within Mexican States as equivalent to AP status and granted waivers of the whole herd testing requirement prior to export of steers and spayed heifers from these States and zones [17, 26, 36, 39, 78, 82, 83, 88, 91, 93, 98, 105, 108]. Waivers were granted on the expectation that each State and zone would meet all of the criteria for MA status by 1 June 2005.

Between June 2005 and March 2006, APHIS verified via site visits that 3 of the 4 States and 6 of the 9 zones were equivalent to MA status [57-61, 63, 66, 69, 106]; the remaining State and 3 zones retained AP status but without the waiver [71, 437]. APHIS site visits also found that another State and 4 zones that had been recognized as equivalent to AP status in 2003 and 2004 had progressed to MA status in 2005 and 2006.

As in the United States, the TB status of Mexican States and zones may change over time depending fluctuations in the prevalence of TB-affected herds and/or the quality of the TB eradication efforts. Since March 2006, APHIS has administratively recognized at least 2 zones in Mexican States as equivalent to AP status [219, 226] and 1 zone as equivalent to MA status [229], and has downgraded 2 MA zones to AP status [210-212]. Other changes may happen before rulemaking based on this analysis occurs.

This section summarizes APHIS’ findings in the format of the 11 criteria described in the WCD and VS Memorandum No. 552.41 and used by APHIS review teams. The summarized information comes from the references listed in the above paragraphs, except as noted in the text of Sections 2.2 – 2.11.
2.2 Authority, organization, and infrastructure of the veterinary services

2.2.1 Introduction

In order for APHIS to consider a State or zone equivalent in TB status under U.S. standards, bovine TB must be compulsorily notifiable to Mexican State animal health authorities and suspected or confirmed TB cases must be reported to State or Federal animal health officials within 24 hours. State laws and/or regulations must provide sufficient legal authority to implement an effective TB eradication program, apply TB testing to any livestock, and restrict the movement of any animal suspected of being affected with or exposed to *M. bovis*.

In addition, a State must have the legal authority to control and supervise regional boundaries and stop livestock transports as needed. State laws and/or regulations must provide the authority to conduct clinical and epidemiological surveillance, obtain records, and carry out necessary diagnostic tests, and sufficient financial and human resources must be available to implement a TB eradication program and ensure compliance.

2.2.2 Legal authority

*Legal authority at the Federal level*

The Federal regulations governing TB control and eradication in Mexico are encompassed in the *Norma Official Mexicana* (NOM), specifically NOM-031-ZOO-1995 National Campaign Against Bovine Tuberculosis published on 8 March 1996 and amended 27 August 1998 [438]. In the past, the provisions of NOM-031-ZOO-1995 were not equivalent to U.S. standards and were inadequate to eradicate TB in Mexico. NOM-031-ZOO-1995 is currently undergoing revision to be more consistent with U.S. regulations [126]. Per SAGARPA officials, the revised NOM-031-ZOO-1995 will include movement restrictions and testing requirements which will provide a better Federal legal framework for cattle movement controls, as well as provisions intended to create more effective compliance criteria.

The revised NOM-031-ZOO-1995 will list seven TB status levels: four that are generally equivalent to AF, MAA, MA, and AP status as defined in 9 CFR 77 and three others that would be considered NA status in the United States (Table 2.1). All of the States and zones which APHIS has evaluated for equivalent TB status are considered by SAGARPA to be in the Preparatory Eradication, Eradication, or Advanced Eradication phases; SAGARPA does not consider any Mexican State or zone to be free of bovine TB at this time.

### Table 2.1: Comparison of APHIS and SAGARPA TB status levels

<table>
<thead>
<tr>
<th>APHIS Status Level</th>
<th>Herd Prevalence Criteria</th>
<th>SAGARPA Status Level</th>
<th>Herd Prevalence Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>0%</td>
<td>Free</td>
<td>0%</td>
</tr>
<tr>
<td>MAA</td>
<td>≤ 0.01%</td>
<td>Advanced Eradication</td>
<td>≤ 0.01%</td>
</tr>
<tr>
<td>MA</td>
<td>≤ 0.1%</td>
<td>Eradication</td>
<td>≤ 0.1%</td>
</tr>
<tr>
<td>AP</td>
<td>≤ 0.5%</td>
<td>Preparatory Eradication</td>
<td>≤ 0.5%</td>
</tr>
<tr>
<td>NA</td>
<td>0.5% or more</td>
<td>Advanced Control</td>
<td>≤ 2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>≤ 5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preparatory Control</td>
<td>&gt; 5%</td>
</tr>
</tbody>
</table>

*Legal authority at the State level*

Each Mexican State promulgates regulations regarding TB control and eradication, including movement testing requirements, which must be equivalent to but may be more stringent than the Federal regulations. Such requirements are typically laid out in the State Livestock Law. Each State that APHIS has evaluated for equivalent TB status has enacted laws and/or regulations in accordance with APHIS requirements; consequently, the State requirements are substantially more stringent NOM-031-ZOO-1995. APHIS site visits have targeted problem areas and provided recommendations for improvement. APHIS has monitored compliance with the recommendations via follow-up reviews and/or semi-annual reports.

#### 2.2.3 Organization

TB eradication efforts in Mexico, as in the United States, are a cooperative effort between State, Federal, and industry partners. Mexico established the National Commission for the Eradication of Bovine Tuberculosis and Brucellosis (CONETB) in 1993, which is patterned after the U.S. Cooperative TB program [442]. In the United States, the Federal component performs a substantial role in regulation and coordination of State activities. In Mexico, the States and industry are the primary force driving TB eradication efforts and therefore assume a comparatively greater role. However, there is Federal participation in the TB eradication programs in each Mexican State that APHIS has evaluated and there are certain functions that may be performed only by a veterinarian employed by the Federal government.

*Organization at the Federal level*

Mexico consists of 31 States and a Federal District (Figure 2.1). SAGARPA is responsible for Federal oversight of the national TB eradication program through its sub-agency, the Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria (SENASICA). Mexico’s Chief Veterinary Officer (CVO) provides leadership and direction for the national TB eradication program [126]. The TB program staff at the headquarters office in Mexico City is led by the Animal Health Program Director and includes six full-time and part-time veterinarians who provide advice, coordination, and recommendations for the program. The TB staff also includes 31 State Coordinators and 83 District Supervisors who provide oversight of TB program activities within the individual States [442]. SAGARPA inspectors are present at both State and Federal
checkpoints (see Section 2.8), as well as at federally inspected slaughter plants (see Section 2.10).

Figure 2.1: Map of Mexican States

![Map of Mexican States](http://www.mexico.tv/map)

Not all Mexican States are active participants in the national TB eradication program [126]. While NOM-031-ZOO-1995 is applicable to all States, the degree to which it is implemented varies widely. As of October 2007, 7 of 31 States had not applied toAPHIS for recognition of equivalent TB status in the State or a zone within the State; these States do not appear to have active TB eradication programs. However, the number of States with active TB eradication programs has increased since 2001, when only 14 of 31 States applied for APHIS recognition of equivalent TB status.

**Organization at the State level**

Each State with an active TB eradication program has in place a State Animal Health Committee as authorized by the Federal Animal Health Law [126]. The purpose of these State Committees is to assist SAGARPA and the State governments in implementing official animal health programs. The executive board of each State Committee is composed of representatives from the SAGARPA State office, the State government (State Secretary of Agriculture), and the local livestock producers associations. The general manager of a State Committee has the authority to supervise local SAGARPA and State Government officials and ensure that resources are used according to approved plans. The operational branch of each State Committee manages the different animal health programs within the State, including the TB eradication program.

The State Committees receive funding from the Federal government (*Alianza para el campo* program) and the State government which, along with contributions from producers, is used for animal health programs based on plans provided by the State
Committee to SAGARPA for approval. These plans contain the annual goals and funding needs of the State Committee. Each State Committee is responsible for all aspects of the TB eradication program within the State, including conducting TB surveillance at slaughter and in the field, carrying out epidemiological investigations, managing TB-affected herds, and staffing movement control checkpoints.

**Auxiliary organizations**

The National Confederation of Cattlemen’s Organizations (CNOG) functions as an auxiliary government organization through a contract that is authorized by law [126]. SAGARPA delegates certain responsibilities and authority to the CNOG. Sixty percent of the cattle producers in Mexico are members of the CNOG and CNOG producer members own 80% of the Mexico cattle inventory. A producer must have a minimum number of cattle in their herd to qualify for membership. Member dues and other income received from services fund CNOG. The organization assists in building consensus and cooperation through local associations and regional cattlemen’s unions as well as through national and regional meetings. The CNOG works with local and State governments to gain compliance by producers and provides equipment to members to assist with gathering and testing cattle. The organization also assists SAGARPA in implementing the TB program in each State, follows up on APHIS recommendations, and works closely with municipal and/or State authorities to inform all producers of the TB requirements.

The National Technical Advisory Council on Animal Health (CONASA) is a nongovernmental advisory group with representatives from a wide variety of disciplines, including the Federal government [126]. It is not a producer organization. CONASA has 20 committees including a TB committee. It has annual meetings, the proceedings of which are often referred to when making program decisions; however, CONASA’s recommendations on program changes are not binding.

### 2.2.4 Infrastructure

**Personnel resources**

Mexico has 2,725 accredited veterinarians who perform the majority of tuberculin testing activities, in addition to veterinarians employed by the Federal and State governments [126, 442]. The CNOG also employs veterinarians who are approved and paid through the State Committees to conduct supplemental TB testing when needed. These veterinarians are considered quasi-governmental officials through their employment by the State Committees. They receive classroom training and have to pass a written exam every two years, but there is no practical exam. SAGARPA headquarters recently sent out a memorandum to all local offices with guidelines for supervision of accredited veterinarians [126]; the amount of supervision is decided at the local level. TB program officials control the distribution of *M. avium* PPD for CCT testing, so when a CCT test is needed the veterinarian must report detection of a CFT test response to get the *M. avium* PPD for the CCT test.

**Financial resources**

Funding for the national TB eradication program comes from the Mexican national budget, via SAGARPA. APHIS’ review of the national TB program in 2006 found that current program funding has allowed the program to progress but is likely not sufficient
to adequately address all components of the program in coming years [126]. To adequately control and eradicate TB, particularly in NA States and zones, the Federal program requires more funding for personnel, equipment, supplies, indemnity, and TB surveillance activities.

Each State with an active TB program receives Federal funding. Program funding requests are developed within each State by a group of individuals consisting of State government animal health officials, SAGARPA authorities at the State level, and members of the State Committee [126]. SAGARPA monitors the cooperative agreements at the headquarters level. The State Committees also receive dedicated funding from the State government and the livestock producer organizations within the State, which augments the Federal funding.

*Example – State of Sonora:* The following table of budget information was extracted from the report of an APHIS site visit conducted in the State of Sonora in May 2006 [204]. The information was provided by State Committee officials for January – December 2006; all costs are in Mexican pesos.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Federal/State Budget</th>
<th>Funds Needed to Operate</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program testing</td>
<td>1,389,300</td>
<td>1,773,046</td>
<td>-383,745.86</td>
</tr>
<tr>
<td>Epidemiological testing</td>
<td>1,577,933</td>
<td>1,845,923</td>
<td>-267,989.46</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>166,666</td>
<td>75,002</td>
<td>+91,664.00</td>
</tr>
<tr>
<td>Surveillance</td>
<td>1,947,900</td>
<td>2,323,297</td>
<td>-375,396.43</td>
</tr>
<tr>
<td>Removal of reactors</td>
<td>176,000</td>
<td>172,500</td>
<td>+3,500.00</td>
</tr>
<tr>
<td>Training and public info</td>
<td>280,666</td>
<td>222,989</td>
<td>+57,676.59</td>
</tr>
<tr>
<td>Indemnity costs</td>
<td>1,383,334</td>
<td>1,089,742</td>
<td>+293,592.00</td>
</tr>
<tr>
<td>Totals</td>
<td>6,921,800</td>
<td>7,502,499</td>
<td>-580,699.16</td>
</tr>
</tbody>
</table>

Additional funds were provided by the Federal and State governments to cover certain TB programs costs on a case-by-case basis during the last quarter of FY 2006.

**Compliance and enforcement activities**

Enforcement of the TB program requirements appears to be adequate and strong in Mexican States and zones that wish to maintain an APHIS-recognized equivalent TB status [126]. Penalties for lack of compliance vary, ranging from warnings to fines to incarceration, depending on the nature of the infraction. Enforcement of Federal laws and regulations is carried out by SAGARPA officials at the State level. The ability of States to enforce penalties often depends on support from local judges. At the local level, movement violations are often addressed by the State Committees and the cattlemen’s associations by restricting cattle movement permits.

APHIS reviews of Mexican States and zones have found that quarantines of TB-affected herds are, in general, effectively enforced. Any deficiencies found during site visits are noted and compliance subsequently verified through another review. However, quarantines are not always enforced in Mexican regions that do not participate in the
national TB eradication program, those that do not have APHIS-recognized equivalent TB status higher than NA status, or those that have a high concentration of TB-affected dairy herds.

**Industry support**

The TB programs in States participating in Mexico’s national TB eradication program generally enjoy broad industry support. The beef industry in particular plays a significant role in keeping the programs functioning within the States through planning, providing oversight, enforcing movement requirements, and educating the public [126]. In contrast, industry support in States that do not participate in the national TB eradication program is generally poor. Federal and State funding are insufficient to implement an adequate program in these States.

2.2.5 Discussion

Mexico has made substantial progress towards TB eradication in a relatively short time. The States and industry are the primary force driving TB eradication efforts; there is far less involvement at the Federal level than in the United States. Not all States in Mexico are currently active participants in the national TB eradication program, which hampers the overall effort.

The Federal TB laws and regulations are not fully equivalent with those in the United States but are being amended to increase consistency between the two. The Federal TB staff has developed good partnerships with the States and the livestock industries with the goal of eliminating TB from Mexican cattle herds and protecting export markets. However, additional funding and personnel resources are needed to support and strengthen the eradication efforts at the Federal level.

APHIS has evaluated certain States and zones within Mexico as regionalized entities and found that these regions have taken steps to compensate for the lack of a strong Federal program as needed. APHIS has verified through document reviews and site visits that these States and zones have the legal authority, organization, and veterinary infrastructure to implement a TB eradication program equivalent to U.S. standards. However, obtaining sufficient funding for TB eradication efforts is likely to remain an issue in coming years.

2.2.6 Conclusions

- Certain Mexican States and zones have sufficient legal authority, organization, and infrastructure to attain and retain TB status equivalent to that of U.S. States and zones, regardless of the balance of Federal, State, and industry involvement.

- Mexico’s national TB eradication program does not currently have legal authority, organization, or infrastructure equivalent to the U.S. Cooperative TB Program. The current Federal regulations do not provide an effective framework for TB eradication efforts—although Mexico is currently revising them—and scarce personnel and financial resources limit Federal oversight.
2.3 Disease status in the region

2.3.1 Summary

Bovine TB infection is an ongoing problem throughout large portions of Mexico. The prevalence of TB-affected herds in many States is quite high, particularly in the dairy industry. SAGARPA estimates the herd prevalence of bovine TB throughout Mexico to be 0.28% [442]. SAGARPA further estimates the aggregate herd prevalence to be 0.09% in States and zones where APHIS has recognized equivalent TB status, 0.32% in NA zones within Mexican States that were created by zoning out higher prevalence areas (often due to large numbers of affected dairy operations), and 0.14% in other NA States.

In keeping with U.S. standards, APHIS calculates the prevalence of TB-affected herds in Mexican States and zones seeking equivalent TB status as period prevalence, i.e. the number of TB-affected herds occurring in a 12-month consecutive period divided by the total number of herds in the region. Herd prevalence in MAA States and zones with less than 30,000 herds and MA States and zones with less than 10,000 herds is calculated in accordance with VS Memorandum No. 552.38 Discretionary Tuberculosis Herd Prevalence Calculations in States or Zones with Small Numbers of Herds [443].

Regionalization of Mexican States was undertaken with the understanding that NA zones within States with at least one accredited zone (AP status or higher) would continue to show progress toward TB eradication, although likely at a slower rate than the accredited zones, since the NA zones represent a risk to the accredited zones.

2.3.2 Discussion

The overall prevalence of TB-affected herds in Mexico is far higher than in the United States, since some States are not actively participating in the national TB eradication program and herd prevalence in the dairy industry is very high in some States and zones. Nonaccredited States and zones continue to pose a risk to accredited regions within Mexico. However, APHIS has verified via document reviews, site visits, and semi-annual reports that Mexican States and zones with equivalent TB status meet the herd prevalence criteria for the specific status as specified in VS Memorandum 552.41, which in turn reflects the criteria in the proposed domestic TB rule and the 2005 UMR.

2.3.3 Conclusions

- Individual Mexican States and zones continue to meet the herd prevalence criteria for TB status equivalent to U.S. States and zones.
- At the national level, TB prevalence is far higher in Mexico than in the United States.
- NA States and zones in Mexico will continue to pose a risk of introducing TB infection into accredited States and zones—and, by extension, into the United States—without active intervention.
2.4 Disease status in adjacent regions

2.4.1 Summary

Mexico is bordered to the north by the United States (see Figure 2.2), specifically the States of California, Arizona, New Mexico, and Texas. To the south, Mexico borders on Guatemala and Belize; to the west lies the Pacific Ocean and to the east the Gulf of Mexico and the Caribbean Sea.

Figure 2.2: Map of Mexico and adjacent regions

![Map of Mexico and adjacent regions](http://www.lib.utexas.edu/maps/cia07/mexico_sm_2007.gif)

APHIS recognizes California, Arizona, Texas, and most of New Mexico as AF status for bovine TB. A small zone in New Mexico, not adjacent to the Mexican border, is considered MAA status. APHIS has not evaluated the TB status of either Guatemala or Belize; Guatemala continues to report clinical cases whereas the last reported occurrence in Belize was in 1991 [444].

2.4.2 Discussion

TB infection is endemic in Guatemala and may be present in Belize as well, which presents a risk of introduction of TB-infected animals, either legally or illegally, into Mexican States. Each of the Mexican States along the southern border—Chiapas, Tabasco, Campeche, and Quintana Roo—has an active TB eradication program, although the areas of Chiapas and Tabasco along Mexico’s southern border are considered NA zones.

2.4.3 Conclusions

- Endemic TB infection in at least one country on Mexico’s southern border presents a risk of TB introduction into Mexican States and zones.
- U.S. States along Mexico’s northern border present little risk of TB introduction.
2.5 Disease control/eradication program in the region

Each State or zone in which APHIS recognizes equivalent TB status must have in place an active, functioning bovine TB eradication program that provides for quarantine of TB-affected herds, epidemiological investigations and testing of suspicious herds and animals, procedures to eliminate infection from TB-affected herds, and procedures for cleaning and disinfecting contaminated premises.

2.5.1 Trace-back systems

Mexican States and zones seeking to attain or retain equivalent TB status must demonstrate that an effective trace-back system is in place to identify and locate suspicious herds. Since 2001, APHIS has required that such States and zones demonstrate that 75% of TB-slaughter submissions (histopathology-suggestive or -compatible, or culture positive) with official identification found in the previous 2 years were traced to the most probable herd(s) of origin and the herd(s) tested.

APHIS site visit teams review slaughter surveillance data to determine the percentage of all adult slaughter cases (cattle 3 years of age and older) in which TB has been detected in the previous 2 years and those that result in a newly affected herd being identified. The APHIS teams verify that a herd test of the most probable herd of origin has been or will be conducted. The semi-annual reports also allow evaluation of these parameters (see Annex 5).

Any problem areas are noted in the site visit report and compliance monitored via follow-up site visits and semi-annual reporting. A recurring problem has been that the most probable herd of origin, as determined by the trace-back investigation, is often negative on a whole herd test. In this case, the State or zone should be able to demonstrate that slaughter records have been reviewed and other potential sources of infection have been investigated.

2.5.2 Quarantine and epidemiological procedures

Herds under suspicion for TB infection as a result of either slaughter trace-back or other surveillance methods must have animal movements restricted, an epidemiological investigation initiated, and a complete herd test conducted. APHIS site visit teams review these procedures to ensure that suspect herds are placed under quarantine in a timely manner (preferably within 15 days) and that a thorough epidemiological investigation is conducted, including tracing and testing of possible source or contact herds. Ideally, the investigation and testing should be completed within 3 months, as per the 2005 UMR [6]. All known TB-affected herds must be tested at appropriate intervals or depopulated in accordance with TB program standards.

APHIS teams initially found that many States and zones were not conducting adequate epidemiological investigations and were often not following up on trace-ins and trace-outs from an TB-affected herd. APHIS has consistently recommended providing additional training to investigators, developing standard operating procedures and forms for epidemiological investigations and, in some cases, restructuring to include a supervisory position, which has largely resolved these issues.

Quarantine release procedures under the current NOM-031-ZOO-1995 do not meet APHIS requirements. SAGARPA and APHIS negotiated the following procedure that is
currently in use: At least four consecutive negative whole-herd tuberculin tests, with an interval of at least 60 days between the first and second tests, at least 180 days between the second and third tests, and at least 180 days between the third test and fourth tests, before the herd is released from quarantine [445, 446]. Once 9 CFR 77 is updated to reflect the 2005 UMR, Mexican States and zones will need to conduct an additional 3 annual tests following the release of a definitive quarantine.

2.5.3 Recordkeeping requirements

Each State and zone must have a functional recordkeeping system in place that provides the capability to review individual herd tests, to verify and accredit TB-free herds according to program standards, to track the progress of epidemiological investigations, and to monitor overall TB program progress.APHIS teams have found that epidemiological investigations are well documented in paper files (not electronic), as is the testing required for accredited herd status—two consecutive herd tests 12 months apart or 3 consecutive tests between 6 and 12 months apart. Records to monitor ingress and egress of cattle from an accredited zone are initially kept as paper files (logbooks) at the movement control checkpoints, but many States convert these to electronic files for ease of reference.

2.5.4 Discussion

APHIS site visit teams initially noted many problem areas in slaughter traceback, epidemiological investigation, and quarantine release procedures. Since these parameters are central to TB eradication efforts, APHIS required that States and zones comply with review team recommendations in order to attain equivalent status. States and zones with equivalent status that were found to be out of compliance were also required to comply or risk losing that status. Site visit teams have noted that the State Committee personnel involved in traceback and epidemiological investigations are generally quite knowledgeable about their cases and any issues noted on recent reviews have been minor.

Federal requirements for releasing a herd from definitive quarantine are not equivalent to U.S. standards; however, APHIS has verified that States and zones with equivalent TB status currently follow the negotiated procedure outline above. Once the domestic TB rule is final, both Mexican and U.S. States and zones will have to comply with the quarantine release procedures in 9 CFR 77 and the 2005 UMR.

2.5.5 Conclusions

- Individual Mexican States and zones have TB control and eradication programs in place that are generally equivalent to those in U.S. States and zones.
- Federal requirements for release of quarantined herds are changing in both the United States and Mexico; implementation of these changes at both the State and Federal levels should be closely monitored to ensure equivalency.
2.6 Vaccination practices

2.6.1 Summary

Federal regulations in Mexico do not specifically prohibit vaccination against TB [126]; however, an effective vaccine is not currently available. SAGARPA officials indicated that they would consider using a vaccine if one became available but would consult with APHIS prior to making any decisions [126].

2.6.2 Conclusions

- An effective vaccine could be a useful tool to aid in eradicating TB, particularly in States or zones with a high prevalence of TB-affected herds (no effective vaccine is currently available).

2.7 Separation of the region from higher risk regions

2.7.1 Summary

Each Mexican State or zone requesting APHIS recognition of equivalent TB status has provided written documentation—maps and a narrative description—describing the boundaries of the region and how the region is separated from adjacent regions by physical, legal, or artificial boundaries. Physical boundaries may include, but are not limited to, mountains, deserts, rivers, and large bodies of water; artificial boundaries include manmade structures such as major highways and dams. Mexican States are defined by legal (administrative) boundaries that may also be physical or artificial boundaries. Whenever possible, zone boundaries should be epidemiologically defensible and promote disease exclusion. Zones within Mexican States are described in more detail in Annex 6.

**Example – State of Michoacán:** The following is excerpted from the report of an APHIS site visit to evaluate a proposed AP zone in Michoacán in August 2006 [27]:

**Condition VI – Separation of the region from higher risk regions**

*Overall, the APHIS VS team considers that natural barriers used to regionalize the [proposed AP zone] are adequate to maintain this zone separate from adjacent regions of higher risk. ... The [proposed AP zone] is separated from the NA zone by the Sierra Madre Occidental mountain range. The two regions are connected by three roads, all three of which have inspection points (Tepemezquites, Puente de Fierro, and Los Coyotes checkpoints) which permit the control of animal movement. To the east is the State of Guerrero with natural barriers consisting of the Morelos dam and the Balsas River; in addition, the checkpoints of Isla Cayacal and Presa Morelos lie between Michoacán and Guerrero. To the west there is only one route of communication with the State of Colima and the checkpoint Boca de Apiza exists to control interstate movement. To the northeast the Trojes checkpoint is located on the route between Michoacán and Jalisco.*

2.7.2 Conclusions

- Physical, legal, and artificial boundaries, in conjunction with the movement controls discussed in Sections 2.8.1 and 2.8.2, aid in limiting the introduction of TB-infected cattle from higher risk regions into individual States and zones.
2.8 Movement control and biosecurity from higher risk regions

Each State or zone requesting APHIS recognition of equivalent TB status must have in place movement control regulations, checkpoints and/or patrols, and sufficient health requirements to minimize the risk of importing TB-infected cattle from higher risk regions. Each State or zone must also have the legal, financial, and personnel resources to supervise boundaries and carry out necessary animal movement controls (see Section 1).

2.8.1 Internal movement controls

SAGARPA has divided Mexico into six sectors from north to south, according to the progress of various animal and plant health programs in those sectors. To control livestock movement among the six sectors, SAGARPA has implemented five cordon lines that consist of 43 checkpoints on major roadways (see Figure 2.3) [126, 442]. All trucks and vehicles must stop for inspection at the Federal checkpoints. The checkpoints are equipped for plant, animal, and animal products inspection, with corrals and pens, dip vats, fumigation chambers (for fruit treatment), and incinerators. The checkpoint personnel enforce the applicable Federal regulations. Some State governments employ State inspectors at the Federal checkpoints, who conduct inspections immediately after the Federal inspection, to enforce State regulations.

Figure 2.3: Federal movement control cordons in Mexico

State and Federal movement control checkpoints are set up to cover primary and secondary routes of cattle movement that are determined via monitoring of animal movements [126]. In addition, the State governments and the cattlemen’s associations have roving enforcement units that can stop vehicles and inspect them for compliance at any time. The CNOG maintains a database of all interstate certificates of zoosanitary
inspection for cattle movement, which amounts to about 600,000 certificates per year, and provides monthly reports to SAGARPA [126].

Cattle must be identified as to the State of origin and farm of origin with metal ear tags and hot-iron brands [126]. Certification that all applicable testing requirements have been met is also required. Under supervision by local SAGARPA and State government livestock inspectors, each State cattlemen’s association is empowered to enforce State livestock movement laws and regulations pertaining to TB within that State. Cattle movement permits are required and are valid for only five days.

2.8.2 Interstate/interzone movement requirements

All States and zones seeking to obtain APHIS recognition of equivalent TB status must have interstate/interzone movement control and TB testing requirements in place that are, at a minimum, equivalent to those governing the interstate movement of cattle in the United States. Such requirements depend on the TB status of the State or zone from which the cattle originate, as in the United States. Adequate movement controls must be in place to ensure compliance, including checkpoints at critical points with inspectors who accurately document all movements through the checkpoint. Seals on transport vehicles must be properly used and documented as well.

APHIS verifies through site visits that checkpoints are strategically located along State and zone boundaries and are sufficient in number to protect the boundaries. A consignor or agent must request (in advance) an import permit from the State Committee of the destination State. This permit states the sanitary requirements for entry and, in the case of cattle intended for breeding or pasture, the approved destination premises. All cattle must also be listed on a Federal health certificate and be accompanied by certificates of TB testing. A herd of origin certificate identifying each animal by ear tag, brand, and owner is also required for interstate movement.

The movement papers are verified and the cattle inspected at the point of entry into the State or zone. The truck is sealed by an inspector and a transit guide is issued to the point of destination within the State. A livestock inspector records the seal number at the point of issuance and the point of destination. The movement papers are examined at each inspection point encountered during transit.

Example – State of Sonora: APHIS administratively recognized two zones within the State of Sonora in 2001, a northern zone equivalent to MAA status and a southern zone equivalent to MA status (see Section 2.1). The following is excerpted from the report of an APHIS site visit to Northern Sonora conducted in June 2004:

The MAA zone has three international border inspection points along the border with the United States: San Luis Rio Colorado, which borders San Luis, Arizona; Nogales, which borders Nogales, Arizona; and Agua Prieta, which borders Douglas, Arizona (see Figure below). These three stations control the cattle exports/imports between Sonora and the United States through Arizona.

There are also three interstate border inspection points along the borders with other Mexican States: one that controls movement from Baja California (San Luis Rio Colorado), and two that control movement from Chihuahua (Puerto San Luis in the northeast and Maycoba located more centrally). All international and interstate inspection points have quarantine facilities and are open 24 hours, although by State law livestock inspections can only occur during daylight hours.
Movement control checkpoints in the State of Sonora

The main inspection point on the border between the MAA and MA zones is Las Guasimas, which is located on the primary north-south road. This inspection point is also open 24 hours. There are facilities to unload and inspect cattle in transit. Other inspection points are located on minor roads between the two zones at Hornos, Bachoco, Tepahui, Fundicion and Bahuises. There is one interstate border inspection point on the border between the MA zone and Sinaloa at Estacion Don, also with quarantine facilities. An intrastate inspection point is located at Navajoa to account for livestock entering from Sinaloa along other, less passable routes.

Border inspection points are staffed by both State and Federal personnel. Movement papers are verified at each inspection point. Cattle are unloaded and inspected at all interstate and international points of entry; in addition, cattle traveling to the MAA zone from the southern region of the State are unloaded and inspected at one of the interregional inspection points. There are numerous additional inspection centers in areas of high intrastate livestock movement. A written record of animal movements is maintained at each inspection point.

Checkpoint inspectors keep a logbook of cattle movements through the checkpoint and document the date of inspection, number of head, type of livestock, state and county of origin and destination, consignor and consignee, import permit number, herd of origin certificate number, seal number, and tuberculosis and health certificate numbers. Most checkpoints have good working relationships with local law enforcement agencies and many States and zones employ roving patrols to augment the stationary checkpoints.

2.8.3 Buffer zones

Mexican States and zones that border higher risk (lower status) regions must establish buffer zones along those borders to maintain biosecurity. The initial application for equivalent TB status must include a description of the proposed buffer zone(s) and a rationale for the proposed location and size. All herds within the buffer zone must be TB tested annually.
Example – State of Durango: The Figure below was excerpted from documentation provided by Durango [179] to give an example of a buffer zone in that State. This zone was designed to provide biosecurity between Durango’s AP and NA zones and consists of a sparsely populated area along the Sierra de Guadalupe mountain chain. APHIS has verified via site visits and semi-annual reports that the 15 cattle herds in Durango’s buffer zone are TB tested annually.

Buffer zone in the State of Durango

2.8.4 Equivalency agreements

As mentioned above, APHIS provided Mexican States the opportunity to regionalize within a State in order to maximize export potential while promoting progress toward TB eradication. However, regionalization of Mexican States had several unintended consequences. For one, traditional movement of high genetic quality cattle from herds located in NA zones to accredited States and zones, and from herds located in accredited zones to livestock exhibitions in NA zones and back again, was curtailed. In addition, movement of feeder cattle from NA States and zones to accredited regions was prohibited, which severely impacted the feeder cattle industry in certain Mexican States. These issues and the resulting agreements between SAGARPA and APHIS are described in more detail below.

Certification and movement from accredited herds in NA zones

For many years, SAGARPA has recognized a number of cattle herds in Mexico as TB-free herds. These are typically herds with animals of high genetic quality that historically have sold breeding cattle throughout Mexico. As Mexican States regionalized, some of these herds were located in NA zones and movement of cattle from these herds to
accredited regions except directly to slaughter was therefore prohibited. The resulting restriction of trade within Mexico was undesirable.

Consequently, under the auspices of the BNC, representatives of APHIS and SAGARPA drafted procedures and conditions for recognition of certification of accredited herds in Mexico and movement of cattle from accredited herds in NA zones into accredited regions [447]. Input was provided by State veterinary officials and representatives of private industry on both sides of the border, as well as members of the USAHA Committee on Tuberculosis.

The resulting certification agreement allows Mexican animal health officials to officially sanction and regulate the movement of breeding cattle from NA regions to other regions in Mexico with higher TB status. It also allows Mexico to preserve high quality genetics within the national dairy and beef herds. However, the agreement pertains only to movement of cattle within Mexico; cattle from accredited herds in NA zones in Mexico remain ineligible for export to the United States except for immediate slaughter.

The infrastructure for certification of accredited herds in Mexico initially built upon an existing SAGARPA program for herd accreditation. The full terms of the agreement are described in Attachment 2 of VS Memorandum 552.41 (see Annex 3). In summary, qualifying herds must be tested and recognized by SAGARPA as free from TB for a minimum of 2 consecutive years (5 years if previously affected); each herd must test negative annually to maintain accredited status. Additional requirements include an epidemiological investigation of purchased additions to the herd, annual herd testing, and annual testing of adjacent herds. All animals moving to accredited States/zones must be permanently identified and accompanied by a movement permit, and move in sealed trucks. They must test negative for TB prior to movement and after arrival, and be kept segregated until the testing is complete with negative results.

The basic criteria for certification of accredited herds specified in the APHIS-SAGARPA agreement are equivalent to those in U.S. TB regulations. The strict standards for achieving accredited herd status provide considerable assurance that animals from such herds present a low risk of transmitting infection to other herds. To further mitigate risk, the agreement incorporates measures such as testing of individual animals prior to movement and testing of adjacent herds. Herd testing, as required for accredited herd status and for adjacent herds, has been shown by quantitative modeling to be highly effective in preventing the movement of TB-infected cattle [10].

APHIS has concluded that, provided that the veterinary infrastructure is sufficient to ensure adequate testing and compliance with the conditions of the agreement, animals from accredited herds in NA zones can be moved interstate or interzone within Mexico with minimal increase in the risk of infecting cattle in the recipient region. To address the question of infrastructure support for the program, the agreement stipulates that only herds located in an NA zone of a State in which at least one zone is accredited may qualify. Known areas of very high risk are excluded from the agreement.

Movement of cattle to shows and fairs

Regionalization of Mexican States limited access to and trade in high genetic quality cattle within Mexico in other ways as well, most notably in that cattle from accredited
States and zones could not attend livestock fairs and exhibitions in NA zones with the expectation of returning to the accredited region. Cattle involved in this type of movement are typically breeding animals of high genetic quality that return to the herd of origin if they are not sold at the fair or exhibition. Under U.S. regulations, return to the accredited region would not be permitted since the cattle could have been directly or indirectly exposed to TB while in the NA zone.

SAGARPA indicated that this restriction on cattle movement within Mexico was hindering some segments of the national cattle industry. APHIS and SAGARPA therefore negotiated an agreement that allows movement of cattle from accredited regions to livestock fairs and exhibitions in NA zones within Mexican States that have at least one accredited zone, with possible return to an accredited region [447, 448]. The terms of this agreement are described in Attachment 4 of VS Memorandum 552.41 (see Annex 3).

The agreement contains substantial biosecurity measures that must be implemented to prevent TB transmission. In summary, Mexican officials can officially sanction and regulate this type of movement provided that the cattle are from accredited herds, all participating cattle have a negative TB test within 60 days prior to movement to the fair, and the cattle are moved in sealed trucks while in an NA region [447, 448]. While at the event, cattle must be segregated according to their State or zone of origin and subject to other biosecurity measures such as sanitary mats and separate watering/feeding troughs. Cattle returning to an accredited region must be segregated and test negative for TB before they are incorporated into the herd.

Many of the mitigation measures outlined in this equivalency agreement are based on standard biosecurity practices designed to prevent exposure to and transmission of *M. bovis* within TB-affected herds. APHIS has concluded that, with all of the mitigation measures in place, cattle from accredited regions can move to livestock fairs and exhibitions in NA zones, and then back again, with minimal increase in the risk of infecting cattle in the accredited State or zone.

*Quarantine feedlots*

Large portions of Mexico remain NA status and therefore, under U.S. standards, cannot move cattle into regions of higher TB status unless directly to slaughter. One inadvertent effect of this constraint on cattle movement was a hindering of the feeder cattle industry in some Mexican States and zones, to the extent that the supply of beef and beef products for domestic consumption decreased substantially. In response, APHIS and SAGARPA developed criteria by which cattle from NA States and zones could move to quarantine feedlots in AP and MA States and zones [449]. The terms of this agreement are described in Attachment 1 of VS Memorandum 552.41 (see Annex 3). The agreement pertains only to cattle movement within Mexico, not to cattle exported to the United States.

A quarantine feedlot is essentially a terminal destination, since cattle may not be removed from the feedlot except in sealed trucks to an approved slaughter facility. The agreement allows quarantine feedlots to accept cattle from lower status regions, provided that the cattle test negative for TB within 60 days prior to movement, are officially identified and branded for national consumption, and are moved to the feedlot in sealed trucks.
The agreement specifies strict recordkeeping requirements and requires oversight of the quarantine feedlots by SAGARPA and State personnel. Such facilities must grant access to inspectors during normal business hours. To prevent exposure of other cattle, adequate perimeter fencing is required and pasturing of feedlot cattle is not permitted. In addition, premises adjacent to a quarantine feedlot must be inspected and any cattle present must be tuberculin tested annually.

In light of the strict mitigation measures in the agreement, APHIS has concluded that quarantine feedlots in compliance with the agreed protocol present a minimal increase in the risk of infecting cattle outside of the quarantine feedlot in the recipient State or zone. Compliance is monitored by SAGARPA and State personnel, as well during APHIS site visits.

2.8.5 External movement controls

Import controls

According to SAGARPA, Mexico only allows importation of breeding cattle from New Zealand, Australia, Canada, and the United States [126]. Other sources indicate that purebred breeding cattle were imported in small numbers from Guatemala in 2006, as well [450]. The current NOM does not prohibit cattle imports, breeding or otherwise, from Central America or South America, although movement of such cattle into Mexican States or zones with APHIS-recognized equivalent TB status is prohibited at the State level unless the cattle are transported in a sealed vehicle directly to slaughter.

Export controls

All cattle exported to the United States from Mexican States and zones must be certified by a Mexican Federal animal health official on an international health certificate as having met the criteria specified in the most recent VS Notice (see Section 4). All cattle must be officially identified and accompanied by the TB test charts for individual animals, as well as the international health certificate. An import permit is required for cattle from NA and AP regions of Mexico. APHIS site visit teams have visited numerous export gathering centers and border ports to verify the procedures for cattle exported to the United States from Mexican States and zones.

Example – State of Tamaulipas: The State of Tamaulipas has 62 active, SAGARPA-approved export gathering centers (Corrales de Acopio de Exportacion or CAE). The following is excerpted from the report of an APHIS site visit in May 2006 [67]:

CAE #20 in Jimenez, Tamaulipas: This facility has four pens with a capacity of 100-110 animals per pen. Animals are placed in green pens until they are castrated, tested, and dipped for ticks, and then are moved to the blue pens. The team reviewed the file records of exports and they appeared complete. All animals arrive at the facility with an invoice, transit guide, and a brand investigation report. The owner/manager, the accredited veterinarian, and the official veterinarian were interviewed about the process of verification and certification of the export process. SAGARPA claimed that 95% of export tests are supervised. During the last year there have been 8 responders to the CFT test out of 880 tests. All were negative on the CCT. The responders were removed and the negative animals were exported. All shipments are moved to the port in sealed trucks.
2.8.6 Discussion

Federal cordon lines and checkpoints in Mexico create an overall framework for animal movement control throughout the country. Although State-level regulations restrict the movement of imported cattle into States and zones with APHIS-recognized equivalent TB status, Federal regulations are needed to restrict cattle imports into Mexico to countries and regions with equivalent sanitary TB status.

APHIS has verified that States and zones with equivalent TB status have interstate/interzone movement control and TB testing requirements that are equivalent to those governing such cattle movement in the United States. State checkpoints are strategically located along primary and secondary routes of cattle movement and are often augmented by roving patrols. APHIS has generally found the checkpoint inspectors to be knowledgeable and industrious; recent reviews have confirmed that States and zones have largely resolved initial problem areas such as incomplete logbook entries and inadequate signage.

States and zones with equivalent TB status have established buffer zones to maintain biosecurity along borders with higher-risk regions, although it appears that not all States and zones are testing the buffer zone herds annually. APHIS continues to emphasize the need for annual testing to provide essential biosecurity for the adjacent accredited region.

Under the World Trade Organization’s Agreement on the Application of Sanitary and Phytosanitary Measures (WTO SPS Agreement), APHIS must establish requirements for the importation of animals and animal products that are no more restrictive than the requirements APHIS imposes on the interstate movement of animals and animal products. Inherent in this agreement is the concept of equivalence, which essentially requires the recognition of different practices in a foreign country that result in an equivalent level of risk. In this way, APHIS is required to evaluate for risk equivalence certain practices in Mexico that are not directly in keeping with U.S. TB regulations. Instances that APHIS considers equivalent in risk are described in Section 2.8.4 on equivalency agreements. These agreements pertain only to cattle movements within Mexico, not to cattle exports to the United States.

2.8.7 Conclusions

- Individual Mexican States and zones have implemented interstate/interzone cattle movement controls and TB testing requirements that are equivalent to those in the United States.
- Federal cordon lines and checkpoints aid in cattle movement control.
- Existing buffer zones, if adequately monitored and maintained, provide added protection against TB introduction into accredited States and zones.
- The equivalency agreements for certain types of cattle movements within Mexico contain provisions that substantially limit the likelihood of TB introduction and spread in accredited States and zones.
- The equivalency agreements will likely remain necessary until Mexican officials actively implement TB eradication efforts in NA States and zones.
2.9 Livestock demographics and marketing practices

2.9.1 Demographic information

Mexico has approximately 711,300 cattle herds with 27 million head [442]. Of these, about 350,200 herds are beef herds, 130,000 are dairy herds, and 231,100 are dual-purpose herds. Approximately 138,200 herds are located in States and zones with APHIS-recognized equivalent TB status (AP, MA, or MAA); 179,000 herds are located in NA zones within a State with at least one accredited zone; and the remaining herds are located in NA States. It is not uncommon for a small community, or ejido, to share grazing land with commingling of cattle belonging to multiple owners; the combined cattle are typically considered one herd.

APHIS requires that all States and zones applying for equivalent TB status maintain an accurate livestock census to allow calculation of herd and animal prevalence rates for bovine TB. A description must be provided of the methodology used to attain the census figures, including the herd definition used. Data must also be provided on the number of cattle exported out of the region including type, destination, and purpose. This data is also requested for semi-annual reporting.

Figure 2.4: Beef cattle numbers in Mexican States in 2003


2.9.2 Marketing practices

Roughly two-thirds of Mexico is arid or semiarid, and much of the land is used for cattle grazing [126, 442]. Grazing lands are located mainly in the north, where cattle are raised on large ranches primarily for export to the United States. In the southern, central, and southeastern States, beef cattle are raised primarily for domestic consumption. Cattle in these regions are usually transported internally to gathering centers and then on to slaughter. Most of the dairy production also occurs in the northern States.
Mexican producers raise beef cattle for either domestic consumption or export; the disposition of large numbers of cattle, particularly in the northern States, depends in large part on market forces in Mexico and the United States. When sale prices are high for feeder cattle exported to the United States, there is increased incentive for illegal movement of cattle from NA States and zones into accredited regions for export.

The United States has the largest fed-cattle industry in the world and is the world’s largest producer of beef, primarily high-quality, grain-fed beef for domestic consumption and export. Only a small percentage of the cattle fed in U.S. feedlots are of Mexican origin. Beef production is related to the cattle cycle, a series of peaks and troughs in herd size and production that typically lasts from 8 to 12 years. Because the cattle/beef industry is a major user of feed grains, beef production is also affected by grain supplies and prices.

Some States and zones have extensive marketing systems and cattle may be sold several times after leaving the farm of origin. In addition, cattle dealers may travel substantial distances purchasing the animals that will ultimately comprise a single lot of feeder or slaughter cattle. Many States require registration of cattle dealers with periodic oversight of their activities and records.

2.9.3 Conclusions

- Extensive marketing systems can confound efforts to trace TB-infected cattle from slaughter to the most likely herd of origin, as can the quality of dealer records.
- Traceback of TB-infected cattle in individual States and zones is facilitated by State requirements for health certificates, permits, multiple forms of identification (brands and eartags), and dealer oversight.

2.10 Disease surveillance

2.10.1 Slaughter surveillance

National level slaughter surveillance

SAGARPA has the authority to implement TB surveillance in federally inspected slaughter plants (TIF plants) nationwide, but does not have direct authority to require TB surveillance in municipal plants or privately owned plants [126]. These types of plants are currently under the authority of the Ministry of Health. According to SAGARPA, public health authorities have been reluctant to assist SAGARPA in implementing TB surveillance and sampling, although this situation is improving [126].

Consequently, not all slaughter plants are required to perform postmortem inspections for TB lesions at this time; in fact, in 2005, approximately 50.4% of the cattle slaughtered nationally were not under surveillance (see Table 2.2) [126]. SAGARPA has a preliminary national plan to serve as a guide in finishing the implementation of slaughter surveillance for TB in major cattle kill plants in the country. Per SAGARPA officials, the revised NOM-031-ZOO-1995 will require all slaughter cattle, regardless of origin, to be routed to plants with TB slaughter surveillance [126].
Table 2.2: National slaughter inspection data

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<tr>
<th>Plant type</th>
<th>Cattle killed with inspection</th>
<th>Cattle killed without inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal</td>
<td>380,158</td>
<td>954,643</td>
</tr>
<tr>
<td>TIF</td>
<td>478,065</td>
<td>0</td>
</tr>
<tr>
<td>Private</td>
<td>81,499</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>939,722</td>
<td>954,643</td>
</tr>
</tbody>
</table>

State level slaughter surveillance

APHIS requires that States and zones recognized as equivalent TB status have an effective and reliable slaughter surveillance system in place that includes a dependable method to correlate animals to the herd of origin. The WCD required that at least 75% of all cattle slaughtered in the State or zone were under approved inspection for TB, and that at least 75% of the adult slaughter cattle were killed in plants with approved inspection. Under VS Memorandum 552.41, over 95% of all cattle slaughtered for wholesale or retail purposes, within and from regions with equivalent TB status, must be under TB surveillance (either inspection at slaughter or TB testing). Mexican States and zones are currently working towards this new standard.

In addition, each slaughter plant with inspection must submit at least one granuloma for TB diagnosis for every 2,000 regular-kill adult cattle killed, or one granuloma for every 2,500 regular-kill cattle of all classes. Contingency plans to improve surveillance must be developed and approved if these surveillance goals are not achieved.

Example – State of Chiapas: APHIS site visit teams go to slaughter plants and analyze slaughter data to determine whether the required conditions are met. The following text is excerpted from the report of a site visit to Chiapas in February 2006 (prior to VS Memorandum 552.41) to evaluate a zone for equivalence to AP status [47]:

**Condition IX – Disease surveillance ... T.I.F. 78, Tuxtla Gutierrez:** This slaughter plant killed 23,040 cattle head during 2005. Two veterinary inspectors manned this plant. It is an excellent facility with good lighting. They use an ink marking system matching up the head, lungs, viscera and hides. All ear tags are collected placed on a hook that is attached to the neck of the carcass and follows the carcass until it reaches to cooler. This provides a means for retrieving the ear tag if lesions are found. All inspections are made on racks or tables in adequately lighted areas. The plant slaughtered 12,901 cattle in 2004 and submitted 110 lesions from regular-kill cattle to the laboratory for histopathology and culture, representing a sample submission rate of 21.31/2500 cattle slaughtered. Since 5,160 of these cattle were from Chiapas and 58 samples were sent from Chiapas cattle, the sample submission rate for Chiapas was 21.1 per 2500 cattle slaughtered. ... plants [in the proposed AP zone] killed 56,480 cattle head in 28 plants in 2005; 48,750 head were killed with approved inspection, representing 86.31% of the total cattle slaughtered. ... During 2005 there were 56,480 cattle slaughtered in 28 plants in the [proposed AP zone] with 86 samples submitted from regular-kill animals for a submission rate of 3.8/2,500 animals. Out of the 11 plants under inspection, 2 plants submitted no samples and one submitted a high of 22.5/2,500.

APHIS site visit teams go to slaughter plants and analyze slaughter data to determine whether the required conditions are met. APHIS provides recommendation to the State or
zone based on the findings of the review team. Although the overall slaughter inspection and sample-submission rate in a State or zone with equivalent TB status is usually adequate, the review team may identify specific problems at individual slaughter plants. Plants not meeting the minimum standards for slaughter inspection are notified and compliance with the APHIS recommendations monitored via follow-up site visits and review of the semi-annual reports.

Many State Committees have negotiated with slaughter plants under public health authority to conduct TB surveillance [126]. Each State Committee has a slaughter surveillance coordinator or other designated official who inspects the slaughter plants in the region and ensures that slaughter inspectors are following approved standard operating procedures. SAGARPA officials also provide training for personnel in slaughter inspection techniques through the State Committee infrastructure.

2.10.2 Tuberculin testing

The majority of tuberculin testing in Mexico is conducted by accredited veterinarians who are trained and approved by SAGARPA [126]. Private accredited veterinarians may apply to their local State veterinary association to be approved to conduct tuberculin testing. The veterinary associations then coordinate with the national SAGARPA staff to conduct training that includes instruction and hands-on training in performing TB tests (including the CFT test, CCT test, and the single cervical tuberculin (SCT) test), as well as interpretation and reporting of the test results.

Upon completion of the training, approved veterinarians are authorized to conduct CFT testing and subsequent CCT testing on test responders with random oversight by regulatory veterinarians in all States except Chihuahua, Sonora, Zacatecas, and Quintana Roo [126]. In these four States, the accredited veterinarians are restricted to conducting CFT testing; follow-up testing is conducted by an official veterinarian.

APHIS requires States and zones seeking equivalent TB status to supply evidence of tuberculin testing of 100% of cattle herds in the region. In addition, each State must have a recordkeeping system in place to collect data on CFT testing and results by purpose of test (export, area testing, etc) and a system to monitor the response rate reported by each individual authorized to conduct official tuberculin testing.

A recurring problem noted by APHIS site visit teams is a low CFT test response rate, particularly among cattle for export to the United States. A false positive rate of at least 1% is expected if more than 300 cattle head are tested, primarily due to cross-reactions with other mycobacterial species (see the Hazard Identification section). APHIS has taken steps to address low CFT response rates in the United States by requiring, via the 2005 UMR (Appendix C), each State to implement a system to monitor the response rate reported by each individual authorized to conduct CFT testing [6]. Appropriate action must be taken to address low response rates.

*Example – State of Campeche:* APHIS site visit teams review State Committee records concerning CFT testing conducted by accredited and State Committee veterinarians to determine CFT test response rates by purpose of testing and by testing veterinarian. The following text is excerpted from the report of an APHIS site visit to Campeche in December 2006 [79].
**Condition IX – Disease surveillance** … Accredited veterinarians had an overall CFT [test] response rate of 0.28 percent in 2006 (1,723 tests, 397 responders). The response rate by reason for testing is being tracked and for private veterinarians ranged from zero to 0.08 percent. The response rate for [State] TB Committee veterinarians was higher, ranging from 0.34 to 1 percent.

From December 2005 to November 2006, the review team found that Campeche exported 46,027 cattle directly to United States. Of these, there were 30 CFT [test] responders (0.065%). The team discussed with Campeche authorities the low response fraction and explained the concept of having false positive animals from the CFT and the concern for the low response fraction. Although this is an increase from 2004 when they did not have any responders, the fraction is still low.

**Comment:** The expected false positive test response fraction in cattle is 1 percent. The low CFT response rate is an indication that the State TB Committee supervisors should review the testing/interpretation procedures with each accredited veterinarian. The expectation is to have at least a 1 percent CFT test response fraction per veterinarian.

**Recommendations (for future International TB Rule compliance):**

1. Campeche authorities must review the CFT response fraction of each veterinarian (especially for export tests) and develop corrective actions (review procedures and provide training) when this parameter is lower than acceptable (1 percent). Information was provided indicating some progress was being made with a select group of veterinarians; however, this requirement will take continued effort by the [State] TB Committee.
2. Campeche authorities should provide more training and supervision of veterinarians conducting CFT testing, including supervision of at least 80 percent of export testing.
3. Campeche authorities should work closely with individual veterinarians to improved testing and reporting procedures, and focus supervision, when indicated.
   a. If these steps do not correct the problem, the authorities should consider revoking the accreditation of veterinarians with a poor CFT response rate.
4. The SAGARPA office should create and maintain a searchable database that can be queried for veterinarian, tag number, or exporter.

The 1999 UMR and current 9 CFR 77 do not directly address CFT response rates. Once the domestic TB rule is final, States and zones in both Mexico and the United States will be held to the new standards for monitoring tuberculin testing. APHIS review teams have noted this eventuality in virtually all reports of site visits conducted in Mexican States and zones in the past 2 years, and both the States and SAGARPA are implementing plans to monitor individual testing veterinarians and to provide additional training and/or supervision as needed.

**2.10.3 Discussion**

Slaughter surveillance is an essential tool for TB eradication and the current lack of a national slaughter surveillance plan appears to be impeding TB eradication efforts in Mexico. The historic lack of cooperation between Mexico’s Ministry of Health and Ministry of Agriculture has resulted in inadequate implementation of TB surveillance and traceback. One problem is that it may be difficult for a Mexican State to ensure adequate surveillance of cattle that are sent to another State for slaughter. These cattle may be slaughtered without inspection, or slaughtered with inspection but the results not communicated to the State of origin.

CFT testing is also a cornerstone of TB surveillance and a problem area for the TB eradication programs in both Mexico and the United States. Both countries are implementing national guidelines for monitoring the veterinarians who conduct CFT testing and providing additional training and/or supervision as needed. A review of the
semi-annual reports from Mexican States and zones with equivalent TB status suggests that the overall CFT test response rate is gradually improving, although the response rates still vary greatly when analyzed by the reason for testing.

APHIS currently requires Mexican States and zones with equivalent TB status to account for cattle sent out-of-state for slaughter, including whether or not they were slaughtered in a plant with inspection and the results (see Annex 5, Section 2-II). However, these States and zones may have limited access to slaughter surveillance results from plants in other States. States or zones that send large numbers of cattle out-of-state to slaughter plants without inspection, or to plants that have inspection but do not share the results, must demonstrate that they are conducting CFT testing (exit testing) of these cattle sufficient to satisfy the surveillance requirements.

APHIS has thus far recognized equivalent TB status of certain Mexican States and zones based on this system, although it is less than ideal. APHIS has therefore communicated to SAGARPA the urgent need for a national slaughter surveillance system in Mexico. SAGARPA officials have indicated that a cooperative plan with the Ministry of Health is under development that would provide inspection in all slaughter plants that serve more than 50,000 consumers [126]. This is a high priority for SAGARPA in order to establish equivalency between the U.S. and Mexican TB programs.

2.10.4 Conclusions

- Individual States and zones have taken steps to meet the U.S. standards for TB surveillance, including slaughter surveillance within the State or zone, exit testing of cattle for out-of-state slaughter, and cooperative agreements with other States.
- The lack of a cohesive national TB slaughter surveillance program impedes eradication efforts at the national level and within individual States and zones.
- Tuberculin testing standards and systems to monitor the performance of individual testing veterinarians are evolving in the United States; similar standards and systems are needed at both the State and national level in Mexico.

2.11 Diagnostic laboratory capacity

2.11.1 Summary

The national TB program in Mexico is supported by twelve regional laboratories and one central laboratory, the Centro Nacional de Servicios de Diagnóstico en Salud Animal (CENASA) [126]. Of these laboratories, SAGARPA funds only CENASA directly. The regional laboratories are supported by the individual State Committees, which receive money from SAGARPA, the State government, and the livestock producers within the State.

The central laboratory provides both histopathology and culture isolation/identification services [126]. Except for the Animal Health Laboratory in Delicias, Chihuahua, the regional laboratories provide histopathology services. Eight of the twelve regional laboratories can both isolate and identify acid-fast bacteria recovered from fresh tissues, whereas the remaining four regional laboratories can only isolate but not further identify...
acid-fast bacteria without concurrent identification. State Committees appear to be responsible for paying for CENASA to identify the species of any isolated that were identified only as acid-fast positive at the regional laboratory.

The three laboratories reviewed by APHIS in 2006 kept very good documentation of laboratory results [126]. All laboratory personnel were well trained and had sufficient resources to perform the diagnostic tests required by the TB eradication program. It also appeared that basic equipment and adequate personnel numbers were in place and sufficient funding was provided by SAGARPA to update and improve facilities as necessary to maintain the quality of diagnostic results.

One concern identified during the site visit was that acid-fast positive isolates at one regional laboratory were not being further identified by CENASA or another appropriate laboratory [126]. In addition, although the laboratories recognize that the fresh tissue samples in borate are not arriving in an expeditious manner from the field and are attempting to address this issue, it is a significant concern that the lengthy time in borate may inactive \( M. \text{bovis} \) and cause false negative culture results. The review team also noted that the growth media used in laboratories doing culture work for the TB campaign was not Middlebrook 7H10 agar with pyruvate, which provides optimal recovery rates for \( M. \text{bovis} \). SAGARPA subsequently indicated that the laboratories had switched to Middlebrook 7H10 agar with pyruvate (as specified by NOM-031-ZOO-1995) [442].

Currently, four laboratories are accredited for TB-related testing through the Mexican Entity for Accreditation (EMA); the term of accreditation is four years. Two other laboratories (the regional laboratory in Monterrey, Nueva Leon, and the regional laboratory in Merida, Yucatan) have also been approved by SAGARPA for TB-related testing and require re-approval biannually. However, the 2006 review team noted that some regional and local laboratories in Mexico appeared to be performing culture and histology testing for the official bovine TB campaign without approval or accreditation by any governing body [126]. In addition, local and regional laboratories were not required to utilize the central laboratory (e.g., CENASA) for isolate identification and/or confirmation of \( M. \text{bovis} \) identification.

The 2006 review team also found that several laboratories appeared to be lacking a system for comparison and coordination of results between the histopathology and bacteriology sections within the laboratories [126]. In many instances, the histopathology and bacteriology results for individual cases were not in agreement. This is a concern regarding the ultimate status of the herd of origin for culture negative cases.

2.11.2 Discussion

The 2006 APHIS review team commended laboratory support for Mexico’s national TB eradication program for its many accomplishments, including excellent recordkeeping, training, and accreditation. Each time that APHIS conducts a site visit to a Mexican State or zone, the review team visits the diagnostic laboratory or laboratories used by the State or zone for TB diagnostic tests and verifies that conditions are sufficient to support TB eradication. Any deficiencies are noted in the site visit report for future monitoring and, if of sufficient magnitude, may result in a downgrade in the TB status of the State or zone.
APHIS has also communicated to SAGARPA the urgent need to correct certain deficiencies in the national laboratory system, including the need for official accreditation or approval for all regional laboratories, confining testing to only officially approved laboratories, and processing samples promptly and in accordance with good laboratory practices for TB [451, 452]. This has also been a topic of discussion at BNC meetings since the 2006 APHIS review, with Mexican officials reporting progress as it occurs.

2.11.3 Conclusions

- Laboratory support of TB eradication efforts in individual Mexican States and zones appears marginally adequate based on review reports, although timely delivery of tissue samples to the laboratory and processing of tissues continue to be problematic.

- Laboratory support of national TB eradication efforts is currently quite limited.
3. Summary

In recent years, APHIS has conducted numerous TB reviews of Mexican States and zones as individual regionalized entities; APHIS also conducted a review of Mexico’s national TB eradication program in January 2006. APHIS concluded from these reviews that individual States and zones met the criteria for equivalence to U.S. domestic TB standards and administratively recognized these States and zones as AP, MA, or MAA status. However, APHIS also concluded that Mexico’s national TB eradication program was not equivalent to the U.S. national program in several key areas.

APHIS is constrained by international agreements to recognize the equivalence of risk-mitigation practices in a foreign country (see Section 7). This applies directly to the certification of accredited herds in Mexico and movement of animals from accredited herds in NA regions to accredited regions and other equivalency agreements. Although such movements are prohibited under U.S. TB regulations, extending this policy to Mexico would constitute interference in that nation’s internal trade practices. The agreements allow Mexico to officially sanction and regulate extraordinary cattle movements, thereby reducing the potential for unofficial movement.

3.1 Equivalence at the State/zone level

APHIS concludes from this analysis that individual States and zones in Mexico have taken actions sufficient to compensate for the lack of a strong national TB program. These States and zones have demonstrated, via initial documentation, site visits, and semi-annual reports, that they meet the criteria for equivalence to AP, MA, or MAA status under U.S. domestic TB standards.

Specifically, these States and zones have demonstrated that they have sufficient legal authority, organization, and infrastructure to carry out regulatory programs for TB eradication; meet the prevalence criterion for a given TB status; and have in place movement controls and health requirements equivalent to those governing interstate cattle movements in the United States. In addition, these States and zones maintain an active TB eradication program that provides for quarantine of TB-affected herds, epidemiological investigations and testing of suspicious herds and animals, procedures to clean up TB-affected herds, and procedures for cleaning and disinfection of contaminated premises.

These States and zones have also demonstrated that they maintain an effective and reliable slaughter surveillance system that meets appropriate validation standards. APHIS has ascertained that laboratory support of TB eradication efforts in these States and zones is marginally adequate, and that tuberculin testing standards are being developed that will parallel those being implemented in the United States. Qualifying States and zones are listed according to their equivalent TB status in Table 3.1 and described further in Annex 6.
### Table 3.1: Mexican States and zones that qualify for equivalent TB status

<table>
<thead>
<tr>
<th>Equivalent TB Status</th>
<th>Mexican State or zone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accredited Free (AF)</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Modified Accredited Advanced (MAA)</strong></td>
<td>Sonora MAA Zone</td>
</tr>
<tr>
<td><strong>Modified Accredited (MA)</strong></td>
<td>Baja California MA Zone</td>
</tr>
<tr>
<td></td>
<td>Chihuahua MA Zone</td>
</tr>
<tr>
<td></td>
<td>Coahuila MA Zone</td>
</tr>
<tr>
<td></td>
<td>Nuevo Leon MA Zone</td>
</tr>
<tr>
<td></td>
<td>Puebla MA Zones 1 and 2</td>
</tr>
<tr>
<td></td>
<td>Quintana Roo (State)</td>
</tr>
<tr>
<td><strong>Accreditation Preparatory (AP)</strong></td>
<td>Chiapas AP Zone</td>
</tr>
<tr>
<td></td>
<td>Colima (State)</td>
</tr>
<tr>
<td></td>
<td>Durango AP Zone</td>
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<tr>
<td></td>
<td>Guerrero AP Zone</td>
</tr>
<tr>
<td></td>
<td>Michoacán AP Zone</td>
</tr>
<tr>
<td><strong>Non-Accredited (NA)</strong></td>
<td>Aguascalientes (State)</td>
</tr>
<tr>
<td></td>
<td>Baja California NA Zone</td>
</tr>
<tr>
<td></td>
<td>Baja California Sur (State)</td>
</tr>
<tr>
<td></td>
<td>Campeche (State)</td>
</tr>
<tr>
<td></td>
<td>Chiapas NA Zone</td>
</tr>
<tr>
<td></td>
<td>Chihuahua NA Zones 1, 2, 3</td>
</tr>
<tr>
<td></td>
<td>Coahuila NA Zones 1, 2, 3</td>
</tr>
<tr>
<td></td>
<td>Distrito Federal</td>
</tr>
<tr>
<td></td>
<td>Durango NA Zone</td>
</tr>
<tr>
<td></td>
<td>Guanajuato (State)*</td>
</tr>
<tr>
<td></td>
<td>Guerrero NA Zone</td>
</tr>
<tr>
<td></td>
<td>Hidalgo (State)</td>
</tr>
<tr>
<td></td>
<td>Jalisco NA Zone*</td>
</tr>
<tr>
<td></td>
<td>Mexico (State)</td>
</tr>
<tr>
<td></td>
<td>Michoacán NA Zone</td>
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<tr>
<td></td>
<td>Morelos (State)</td>
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<tr>
<td></td>
<td>Nayarit NA Zone</td>
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<tr>
<td></td>
<td>Nuevo Leon NA Zone</td>
</tr>
<tr>
<td></td>
<td>Oaxaca (State)**</td>
</tr>
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<td></td>
<td>Puebla NA Zone</td>
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<tr>
<td></td>
<td>Queretaro de Arteaga (State)</td>
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<td></td>
<td>San Luis Potosi (State)**</td>
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<tr>
<td></td>
<td>Tabasco NA Zone</td>
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<td></td>
<td>Tlaxcala (State)</td>
</tr>
<tr>
<td></td>
<td>Veracruz NA Zone**</td>
</tr>
<tr>
<td></td>
<td>Zacatecas NA Zone</td>
</tr>
</tbody>
</table>

* A review for equivalence to AP status has been requested.

** A review for equivalence to AP status for all or part of the State or zone was conducted but conditions for AP status were not met.

3.2 Equivalence at the national level

APHIS concludes from this analysis that Mexico’s national TB eradication program is not equivalent to the U.S. Cooperative TB Program in terms of Federal TB regulations and quarantine standards, surveillance standards, and laboratory standards. In addition, a national plan is needed to ensure that NA zones progress towards TB eradication.

To encourage Mexico to progress at the national level, APHIS has developed a 5-year strategic plan with progressive requirements for Mexico’s national TB eradication program [453]. This plan specifically addresses the need for equivalence between Mexican and U.S. Federal TB regulations and provides for follow-up APHIS reviews to assess progress. Failure to meet individual goals in the strategic plan is expressly linked to loss of equivalent TB status and/or additional restrictions on cattle exports to the United States.

For example, the plan requires that Mexico implement slaughter inspection in plants in NA States and zones in graduated steps that will allow inspection of 95% of all cattle slaughtered (the current standard for accredited States and zones) by the end of 2010.
Mexican States and zones with equivalent TB status that send cattle to slaughter in plants that do not meet the criteria in the strategic plan would be downgraded to NA status. The plan also requires that the CFT test response rate in States and zones with equivalent TB status be no less than 1% per testing veterinarian by the end of 2007, unless the State or zone can document that actions have been taken to improve the performance of veterinarians that do not meet this requirements. Cattle from States or zones not meeting these criteria will be restricted to approved feedlots in the United States.

The strategic plan further requires that, by the end of 2008, TB laboratory testing in Mexico will be confined to officially approved laboratories using only approved tests; laboratory accreditation must be obtained and maintained according to internationally recognized standards. The plan also contains requirements to address other problem areas in the laboratory system, as described in the 2006 APHIS review of the national TB program, by the end of 2009. Cattle from States or zones with equivalent TB status that do not meet the timeline for laboratory improvements will be restricted to approved feedlots.

Finally, the strategic plan contains specific requirements for advancement of NA zones, with graduated steps from 2007 to 2012; failure to meet the given timetable would result in the NA zone being included in the herd prevalence calculations for the accredited State in which the zone is located (which would likely result in a reduction in TB status).

APHIS has held discussions with SAGARPA officials concerning the 5-year strategic plan and requested implementation by 1 January 2008 [454]. APHIS intends to conduct follow-up reviews of Mexico’s national TB eradication program near the end of the year in 2008 and 2010 to assess the progress according to the strategic plan. In the interim, APHIS will assess progress via semi-annual reports from States and zones with equivalent TB status and from NA zones, and via SAGARPA reports at BNC meetings.

### 3.3 Conclusions

As noted above, APHIS concludes from this assessment that the regionalized States and zones listed in Table 3.1 are equivalent to AP, MA, or MAA status under U.S. domestic TB standards. In each case, APHIS has determined that equivalent conditions exist regardless of the balance of State, industry, and Federal components in the TB eradication campaign.

However, some essential functions must be addressed at the Federal level to ensure continued and cohesive progress towards TB eradication throughout Mexico. To encourage progress at the national level, APHIS has developed the 5-year strategic plan outlined above, and plans to closely monitor progress in this regard.
**Exposure assessment**

APHIS continues to monitor TB importation into the United States primarily by inspection at slaughter. The United States imported approximately 1.26 million head of cattle from Mexico in 2006, virtually all of which were steers or spayed heifers [450]. The majority were imported to holding pens, rearranged into purchase lots, grazed on pasture, sent to feedlots for fattening, and then slaughtered.

Epidemiological investigations indicate that the majority of TB-infected cattle detected at slaughter in the United States originated in Mexico [455]. The percentage of closed cases in feedlot cattle (steers and spayed heifers) and absolute numbers of cases traced back to Mexican States from FY 1992-2006 are given in Table 4.1 and described graphically in Figure 4.1. Although the percentage of closed cases from Mexico was not substantially different between 1992 (83%) and 2006 (89%), the absolute number of Mexican cases declined dramatically, from 436 to 16 [11, 455-461].

<table>
<thead>
<tr>
<th>Year</th>
<th>Total No. Closed Cases</th>
<th>No. Closed Cases from Mexico</th>
<th>% Closed Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>523</td>
<td>436</td>
<td>83</td>
</tr>
<tr>
<td>1993</td>
<td>388</td>
<td>327</td>
<td>84</td>
</tr>
<tr>
<td>1994</td>
<td>249</td>
<td>182</td>
<td>73</td>
</tr>
<tr>
<td>1995</td>
<td>195</td>
<td>123</td>
<td>63</td>
</tr>
<tr>
<td>1996</td>
<td>136</td>
<td>114</td>
<td>83</td>
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<tr>
<td>1997</td>
<td>124</td>
<td>107</td>
<td>86</td>
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<tr>
<td>1998</td>
<td>31</td>
<td>14</td>
<td>45</td>
</tr>
<tr>
<td>1999</td>
<td>64</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>2000</td>
<td>17</td>
<td>8</td>
<td>47</td>
</tr>
<tr>
<td>2001</td>
<td>51</td>
<td>41</td>
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<tr>
<td>2002</td>
<td>73</td>
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<tr>
<td>2003</td>
<td>39</td>
<td>28</td>
<td>87</td>
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<tr>
<td>2004</td>
<td>35</td>
<td>21</td>
<td>60</td>
</tr>
<tr>
<td>2005</td>
<td>35</td>
<td>24</td>
<td>69</td>
</tr>
<tr>
<td>2006</td>
<td>18</td>
<td>16</td>
<td>89</td>
</tr>
</tbody>
</table>

Cattle importations from all States in Mexico decreased from approximately 1.2 million in 2001 to around 825,000 in 2002, largely as a result of changes in U.S. TB requirements for importation of Mexican cattle [458]. The rate of 0.34 cases detected per 10,000 head of imported Mexican cattle during FY 2003 was less than one third the rate seen during the early 1990’s. In combination with the decline in absolute numbers of TB-infected Mexican cattle found at slaughter, this lower rate suggests that the TB eradication campaign in Mexico is making progress in reducing the number of TB-infected cattle exported to the United States.
Fence line contact or commingling of TB-infected Mexican cattle with adult cattle in the United States that are not destined for slaughter may occur while on pasture, constituting the greatest sources of exposure for the U.S. domestic cattle population. Exposure of U.S. cattle not intended for immediate slaughter to TB-infected cattle from Mexico could result in further establishment and spread of TB within the domestic cattle population, particularly as the exposed animals may be maintained for significant periods of time and moved great distances.

However, APHIS anticipates that the number of TB-infected cattle imported from Mexico, and therefore the likelihood of U.S. cattle being exposed to imported TB-infected Mexican cattle, will continue to decline as a result of Mexican States and zones attaining, maintaining, and progressing in equivalent TB status. As discussed in Section 1.2 above and described in more detail elsewhere [10], APHIS has found that shipments of feeder cattle from AP regions in Mexico are up to three times more likely to contain TB-infected cattle than those from MA or MAA regions. Mitigation measures in the proposed import TB rules such as requiring all feeder cattle imported from nonaccredited herds in AP regions to move directly to an approved feedlot would further limit the potential for exposure of U.S. domestic livestock to these cattle. Other measures such as testing of certain classes of cattle by U.S. veterinarians at the port of entry and restrictions on movement of some classes of imported cattle once in the United States would also limit exposure of U.S. livestock to potentially TB-infected imported cattle.
Consequence assessment

Consequences of TB infection have historically been assessed in economic terms. Over the past 90 years, the U.S. bovine TB program has spent over $700 million ($350 million in Federal funds and $375 million in nonfederal funds) to eradicate this disease [458]. Additional funding of $44 million was authorized in October 2000 through an emergency declaration issued by USDA’s Secretary of Agriculture and intended to accelerate the eradication of TB from the United States [456]. The additional funds allowed a more rapid and complete response to tuberculosis outbreaks, including depopulation with indemnity, as well as development and implementation of a comprehensive strategic plan for bovine TB eradication.

The authorization of extra funds in October 2001 to expand the bovine TB eradication program underscores the importance of bovine TB to animal health in the United States. This sum represented an initial payment on a multi-year effort to eliminate TB from domestic livestock in the United States and to ensure that, once eradicated, the disease does not recur. By the end of FY 2003, a total of $109.1 million in emergency funding had been apportioned [459]. In addition, annual appropriations for line item expenditures increased from $4.9 million in FY 2000 to $15 million in FY 2003.

If U.S. cattle or bison are exposed to imported TB-infected bovines, a likely outcome is an increase in, and subsequent maintenance of, TB infection in the domestic cattle and/or bison population, resulting in delay or failure of TB eradication efforts. Consequences include the cost of additional surveillance, control, and compensation, as well as potential trade losses. U.S. competitiveness in international markets depends on its reputation for producing high-quality animals and animal products; consequently, persistence of bovine TB in U.S. cattle and/or bison could make these domestic livestock industries less competitive in the global market.

Most of the cattle imported from Mexico are steers and spayed heifers for feeding and subsequent slaughter [450, 455], with slaughter usually occurring 9-12 months after importation [455]. As shown in Figure 3.1, the number of TB cases in imported Mexican cattle has declined substantially from previous levels.

The rate of detection of TB in imported Mexican cattle has averaged 2.37 cases per 100,000 head imported since FY 2003 (see Table 4.2), which is less than one third the rate seen during the early 1990’s [455, 458-460]. The case rate has continued to incrementally decline in recent years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total No. Cases Investigated</th>
<th>No. PCR +/- Culture positive cases</th>
<th>No. Cases in Imported Mexican Cattle*</th>
<th>No. Cattle Mexican Cattle Imported in Previous Cycle**</th>
<th>Case Rate per 100,000 Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2003</td>
<td>54</td>
<td>39</td>
<td>28</td>
<td>826,550</td>
<td>3.39</td>
</tr>
<tr>
<td>FY 2004</td>
<td>44</td>
<td>36</td>
<td>22</td>
<td>948,694</td>
<td>2.32</td>
</tr>
<tr>
<td>FY 2005</td>
<td>49</td>
<td>40</td>
<td>27</td>
<td>1,393,059</td>
<td>1.94</td>
</tr>
<tr>
<td>FY 2006</td>
<td>37</td>
<td>28</td>
<td>23</td>
<td>1,246,450</td>
<td>1.85</td>
</tr>
</tbody>
</table>

*Includes both closed cases and open cases with clear evidence (ear tag etc) of Mexican origin
**Export data from SAGARPA – Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria.
The prevalence of TB-affected herds has declined in virtually all of the Mexican States and zones with APHIS-recognized equivalent TB status over the past five years and the case rate in imported Mexican cattle has declined as well [10, 455]. APHIS therefore anticipates that recognizing the equivalent TB status of the Mexican States and zones via rulemaking (rather than administratively) will enable this trend to continue and will thereby limit the long-term costs of TB introduction.
Risk estimate

APHIS concludes from this evaluation that certain Mexican States and zones meet the criteria for equivalence to AP, MA, and MAA status under the standards laid out in the 2005 UMR [6], the proposed domestic TB rule to update 9 CFR 77 [12], and the proposed import TB rule [8]. These States and zones are listed in Table 3.1 and described further in Annex 6. APHIS further concludes that the additional risk mitigation measures for all imported bovine animals that are in the proposed import TB rule, in conjunction with existing risk mitigation measures in 9 CFR 93 for cattle from Mexico, substantially mitigate the risk of importing TB-infected bovine animals from Mexico in comparison to the import requirements currently in 9 CFR 93 for cattle from Mexico.

The prevalence of TB-affected herds in individual Mexican States and zones has generally declined since APHIS began administratively recognizing equivalent TB status. Similarly, the case rate in imported Mexican cattle has declined as well [10, 455]. APHIS anticipates that recognizing the equivalent TB status of individual Mexican States and zones via rulemaking (rather than administratively) will enable this trend to continue and will limit both the likelihood of exposure of U.S. cattle to imported TB-infected Mexican cattle and the long-term consequences of TB introduction. Additional mitigation measures in the proposed import TB rule, such as restricting imported feeder cattle from nonaccredited herds in AP States and zones to approved feedlots, will further limit exposure potential.
Annexes

**Annex 1:** Veterinary Services Notice No. 07-11 Bovine Tuberculosis Testing Requirements for the Importation of Mexican Cattle *(see attached file)*
Annex 2: Waiver Conditions Document (WCD)

CONDITIONS FOR GRANTING WAIVERS TO THE HEALTH REQUIREMENTS FOR MEXICAN CATTLE IMPORTED INTO THE UNITED STATES UNDER THE ANTICIPATED INTERIM RULE

Condition I: Authority, organization, and infrastructure of the veterinary services organization in the region.

- Must have adequate legal authorities, organization, and effective, veterinary infrastructure in the requesting region to carry out regulatory programs for the eradication of bovine tuberculosis.

Condition II: Disease status of the region.

- Must provide data and other information that adequately describes the history and current bovine tuberculosis disease status of the region.

Specific requirement: The region from which the cattle originate must demonstrate a bovine TB herd prevalence rate of 0.5% or less before a waiver can be considered. To continue to qualify for a waiver, the TB eradication program in the region must show progress towards reducing the herd prevalence rate, and must have reduced the herd prevalence rate to 0.25% (or less) by June 1, 2003, and to 0.1% by June 1, 2005. Once the international rule becomes effective, requirements for cattle from those regions that have established status levels will be allowed to export to the United States under the conditions defined by the appropriate status level assigned to that region.

Note: Application for a waiver must occur within 10 months from publication of the interim rule.

Condition III: Disease status of each adjacent region.

- Must provide data and other information that adequately describes the bovine tuberculosis disease status of all adjacent regions to the region requesting a waiver.

Condition IV: Disease control/eradication program in the region.

- Must have in place an active, functioning bovine tuberculosis eradication program that provides for quarantine of TB-affected herds, epidemiological investigations and testing of suspicious herds and animals, procedures to clean-up TB-affected herds, and procedures for cleaning and disinfection of contaminated premises.

Specific requirement #1: Must provide data that supports the maintenance of an effective trace-back capability to identify and locate suspicious herds targeted by
surveillance. Seventy-five percent of TB-positive slaughter submissions (histo suggestive, histo compatible or culture positive) with official identification found in the previous 2 years prior to application for a waiver must be traced to a most probable herd(s) of origin and a herd test completed.

**Specific requirement #2:** Herds determined to be suspicious of having TB resulting from either slaughter tracing or other surveillance methods must have animal movements restricted, an epidemiological investigation initiated, and a complete herd test scheduled within 30 days of laboratory notification of positive samples or tuberculosis test positive results. Epidemiological investigations, including a herd test as required, must be completed within 3 months of initiation of the investigation. Herds containing animals positive to tuberculin tests or with gross lesions suggestive of TB must be restricted from movement. All known TB-affected herds must be tested or depopulated in accordance with TB program standards.

**Specific requirement #3:** A functional record keeping system must be in place that will provide the capability to review individual herd tests, to verify and accredit TB-free herds according to program standards, to track the progress with epidemiological investigations, and to monitor overall TB program progress. Epidemiologic investigations must be documented.

**Condition V: Vaccination status of the region.**

- Must provide data addressing the status of vaccination for bovine tuberculosis if any is being attempted. Include research projects in progress in the region.

**Condition VI: Separation of the region from higher risk regions.**

- Must provide data and information that thoroughly describes how the requesting region is separated from regions of higher risks by physical, legal, or artificial boundaries. The region must have the legal, financial, and personnel resources to be able to supervise boundaries, maintain clinical and epidemiological surveillance, record keeping, and carry out necessary animal movement controls and testing requirement oversight.

**Condition VII: Movement control and bio-security from higher risk regions.**

- Must have in place regulations, movement control stations and/or patrols as needed, and sufficient health requirements that reduce the risk of importing TB-infected cattle from regions of higher risk.

**Specific requirement #1:** All regions requesting a waiver must have interstate (inter-region) importation health requirements in place that are, as a minimum, equivalent to those governing the interstate movement of cattle and bison in the United States depending on the region from which the cattle or bison originate.
Specific requirement #2: All cattle being imported into the United States from regions that have been granted a waiver must be certified by a federal animal health official on the face of the international health certificate as having originated from the waivered region, or that the cattle originated in a non-waivered region but have met the required interstate & international importation requirements to be considered as waivered region cattle for export purposes.

Condition VIII: Livestock demographics & marketing practices.

- Must maintain an accurate livestock census that will allow calculation of herd and animal prevalence rates for bovine TB based on the different types of livestock operations (i.e. beef, commercial dairy, dual purpose, etc.).

Condition IX: Disease Surveillance.

- Must provide data describing all surveillance for bovine TB that has been conducted in the region. Must have an active, on-going surveillance methodology for bovine TB.

Specific requirement #1: Must have an effective and reliable slaughter surveillance system in place that includes a dependable method to correlate all body parts.

Specific requirement #2: At least 75% of all cattle slaughtered in the region requesting a waiver must be under approved inspection for TB. Also, at least 75% of the adult slaughter cattle from the region requesting the waiver must be killed in plants having approved inspection. The use of specially trained technicians to conduct TB inspections in extremely small plants only may be considered and approved on a case-by-case basis.

Specific requirement #3: The region requesting a waiver must provide a plan that sets goals of submitting at least one granuloma for TB diagnosis for every 2,000 regular-kill, adult cattle killed, or one granuloma for every 2,500 regular-kill cattle of all classes. Contingency plans to improve surveillance must be developed and approved if these surveillance goals are not achieved. Suspicious granulomas must be submitted to the laboratory within 7 days of collection, & histopathology results must be received within 30 days following receipt of the tissues at the lab.

Specific requirement #4: Must have completed TB testing of 100% of all beef and dairy herds in the region requesting a waiver, or have achieved adequate regional surveillance by other approved methods.

Condition X: Diagnostic laboratory capability.

- Must provide data about the diagnostic laboratories used to support the bovine TB campaign, and their diagnostic capabilities (i.e. which tests are run, qualifications of personnel at the labs, etc).
Specific requirement: All laboratories used to support bovine TB eradication program activities for the region requesting a waiver must be approved by federal animal health authorities.

Condition XI: Emergency response capability.

- Must provide information regarding procedures and policies that are in place in case bovine TB is found in the region considered to be free or of very low prevalence.
Annex 3: Veterinary Services Memorandum No. 552.41 Guidelines for Tuberculosis Reviews in Mexico (see attached files)
Annex 4:    APHIS’ evaluation process for Mexican States and zones

A4.1 Introduction

TB control and eradication programs have gradually evolved at both the State and Federal levels in Mexico, although significant progress has been made only in the past decade. As noted above, APHIS has conducted numerous evaluations of Mexican States and zones in order to determine equivalent TB status; this section describes the evaluation process in detail.

APHIS initially focused on evaluating Mexican States and zones as individual regionalized entities. APHIS conducted each evaluation in accordance with 11 criteria developed to reflect the essential elements of status evaluations as described in the 1999 UMR, 9 CFR 77, and 9 CFR 92.2. The initial criteria used are outlined in the Waiver Conditions Document (WCD), which is provided as Annex 2 above. The evaluation criteria were revised in April 2007 to reflect the provisions of the 2005 UMR and published as VS Memorandum No. 552.41, which is provided in Annex 3 above. These criteria were designed to provide a standardized format for TB reviews that would guide the review team in a comprehensive evaluation of the following parameters:

1. Authority, organization, and infrastructure of the veterinary services
2. Disease status in the region
3. Disease status of adjacent regions
4. Extent of an active disease control program
5. Vaccination status
6. Separation from adjacent regions
7. Movement controls and biosecurity from higher risk areas
8. Livestock demographics and marketing practices in the region
9. Disease surveillance
10. Diagnostic laboratory capability
11. Emergency response capacity

Between October 2001 and April 2007, a Mexican State or zone seeking APHIS recognition of equivalent TB status had to demonstrate compliance with the provisions of the WCD, 9 CFR 77, and the 1999 UMR. To attain or retain equivalent TB status after April 2007, Mexican States and zones have had to demonstrate compliance with VS Memorandum No. 552.41, which incorporates most elements of the 2005 UMR. Once the domestic and import TB rules are final, Mexican States and zones will have to demonstrate full compliance with 9 CFR 77 and the 2005 UMR.

Members of the U.S. Cooperative TB Program and the USAHA Committee on TB assisted in developing the review criteria and participated in both document reviews and site visits to Mexican States and zones, thereby providing consistency with domestic TB evaluations. The regionalization elements incorporated into the review criteria were designed to provide consistency with international requirements. As discussed in Section 2.1 of the Release Assessment, APHIS allowed Mexico to regionalize to the level of a State or zone as an incentive for Mexican States to implement and maintain an effective TB eradication program.
A4.2 Collection and evaluation of initial information documents

Each Mexican State or zone seeking equivalent TB status must provide to APHIS written documentation defining regional boundaries and describing the TB eradication program according to the 11 criteria described above [127-156, 202]. In some cases, APHIS may request additional information [462-476] which the State or zone must provide before APHIS will schedule a site visit [157-201].

APHIS initially encouraged all Mexican States interested in exporting cattle to the United States to document their current status with regard to TB and their plan for control and eradication of the disease. To ensure consistency between submissions from different States and zones, as well as completeness of information and verification by Federal officials in Mexico, APHIS required all supporting documents to be submitted through the Mexican Ministry of Agriculture (SAGARPA).

The status evaluations were particularly concerned with two main issues. The first was the effectiveness of the existing infrastructure in maintaining the integrity of the boundaries of a State or zone. This included effectiveness in controlling animal movement across zone boundaries, meeting the TB testing requirements for movement and surveillance, maintaining accurate census information, and completing epidemiologic trace-back investigations. The second issue concerned the adequacy of the veterinary infrastructure to verify the prevalence of TB-affected herds the State or zone over time.

A4.3 Site visits to Mexican States and zones

If the evaluation of the information submitted by a Mexican State or zone was satisfactory, an APHIS site visit team composed of 3-6 people visited the region to evaluate and verify the information provided. Site visit teams included APHIS personnel, State Veterinarians of the U.S. Border States, other U.S. State animal health personnel, USAHA Committee on TB members, and individuals representing the U.S. component of the BNC. Many of these individuals participated in reviews to assign status levels under the Consensus Document (see Section 1.3 of the Release Assessment), thereby lending consistency to the review process.

Site visit teams identified areas of weakness in the TB programs of the evaluated regions and presented recommendations for improvement as part of a comprehensive site visit report [17-41]. The site visit teams provided official recommendations during the exit interview portion of each site visit.

Consistency of the review process was critical to the validity of this endeavor, particularly in view of the number of people involved in the review effort. One factor providing consistency was the willingness of many reviewers to participate on multiple review teams—one individual coordinated and served as team leader for virtually all of the reviews. Other reviewers served on more than 30 separate teams.

A4.4 Notification of official status results and recommendations

As noted above, each site visit team provided official recommendations to the evaluated State or zone as part of the exit interview. Following the site visit, the team also provided
the site visit report to APHIS’ Regionalization Evaluation Services – Import, whose staff helped coordinate the TB status evaluations [17-110, 125]. The status results were finalized in discussions between the site visit team members and other APHIS personnel. Starting in 2003, official status results and recommendations—including essential changes that must be made for APHIS to recognize equivalent TB status and less critical suggestions that would benefit the TB program—were provided to Mexican States via official correspondence from APHIS to SAGARPA [203, 205-209, 213-239].

A4.5 Recognition of initial TB status

Following an initial site visit, APHIS accorded individual Mexican States and zones a provisional TB status—via a series of VS Notices [111-124]—based on the criteria described above. APHIS requires States and zones in Mexico to progress in TB status according to U.S. domestic TB standards, starting from the initial status level; for example, from AP to MA to MAA to AF. A State or zone may not bypass a status level in the progression no matter how quickly the TB eradication efforts progress; however, the initial TB status of a State or zone may be higher than AP, depending on the conditions in the region.

APHIS initially referred to accredited zones within Mexican States as “Zone A” regions, whereas nonaccredited zones in Mexican States with at least one accredited zone were referred to as “Zone B” regions. This terminology was later changed to refer to each zone by the recognized equivalent TB status level (NA Zone, AP Zone, MA Zone, or MAA Zone).

Some Mexican States and zones were reviewed for initial status more than once [20, 28, 41-46, 203]. States or zones that did not meet the overall program requirements on initial review were classified as NA status and received recommendations from the site visit and specific feedback regarding the areas in which the programs should be improved [20, 41, 205, 222, 228]. These States and zones provided additional information as evidence of compliance with the feedback suggestions [166, 188, 192] and a follow-up site visit was conducted [42-46]. With few exceptions, the State or zone was able to document sufficient progress to achieve or upgrade TB status as a result of re-review [208, 217, 227].

A4.6 Monitoring for verification

Maintenance of initial TB status and advancement in status was predicated on the ability of a State or zone to demonstrate continued progress toward TB eradication over time. One means of verification is an APHIS requirement for semi-annual reports from all Mexican States and zones with equivalent TB status; a blank report form is provided in Annex 5. Mexican States and zones with equivalent TB status began reporting in January 2004 [240-360] and, in July 2004, NA zones within States with TB status began reporting as well [361-432]. These reports provide a mechanism for APHIS and SAGARPA to monitor TB program status and progress, assess trends, document progress toward eradication, and identify risk factors in States and zones. APHIS also reviews summary reports presented by SAGARPA at the triennial BNC meetings.
A second means of verification is ongoing site visits (annual reviews) to ensure that each Mexican State and zone is progressing towards TB eradication [32, 76-110]. The focus of these reviews is to determine whether conditions justifying recognition of equivalent TB status have been maintained or improved, whether recommendations from previous site visits have been implemented, and whether the States and zones are implementing or preparing to implement the 2005 UMR standards.

A4.7 Monitoring for risk concerns

APHIS also conducts site visits to address risk concerns as needed [51-56, 204]. These reviews are conducted as quickly as possible following the identification of risk concerns. Conditions that elicit immediate re-review of a region included a significant increase in the number of TB-infected animals detected at slaughter in the United States (greater than 1 case per 100,000 head exported); a reported herd prevalence that is higher than allowed under the given equivalent TB status; a low reported successful trace-back rate of TB-infected animals detected at slaughter in the reporting region; significant deficiencies in the TB program noted in a site visit or a semi-annual report; and conditions in an adjacent State or zone suggesting a change in the risk of TB transmission to the State or zone under consideration.

As of October 2007, APHIS has conducted eight reviews specifically for risk concerns, two in Aguascalientes Zone A [51, 52] and one each in Campeche Zone A [79], Durango Zone A [54], and the States of Tamaulipas [56], Colima [53], Sinaloa [55], and Sonora [204]. Aguascalientes, Campeche, and Tamaulipas were identified as the source of significant numbers of TB-infected cattle slaughtered in the United States. Sonora reported a higher prevalence of TB-affected herds than allowed for the given equivalent status. Durango Zone A had not fully implemented the appropriate regulations to control movement of animals from higher risk regions into lower risk regions, and was also the source of several head of TB-infected cattle detected at slaughter in the United States. Similarly, Colima and Sinaloa had not appropriately implemented regulations governing movement of cattle out of quarantined feedlots.

In most cases, the information provided by Mexican officials regarding the changes made and the verifying observations of the review team were considered sufficient to maintain the designated status until the next review cycle [205-209]. However, the accredited zones in Aguascalientes and Campeche were downgraded from MA to AP status in September 2006 and February 2007, respectively, and the AP status subsequently suspended (i.e., exporting under NA status requirements) pending verification that significant deficiencies have been addressed [210-212].

A4.8 Changes in the TB status of Mexican States and zones

APHIS has downgraded the TB status of several other Mexican States and zones due to deficiencies in various aspects of the TB programs that were detected either via monitoring reviews or via semi-annual reports. These deficiencies ranged from irregularities in cattle movement control [217, 477, 478] to deficiencies in the application of existing TB regulations [477, 479, 480]. APHIS has also downgraded TB status when
a State unduly delayed a scheduled site visit [481]. In most cases, the State or zone has been able to regain the previous TB status [208, 215, 226, 228, 237]; however, each State or zone must demonstrate—via documentation and a follow-up site visit—that the deficiencies have been corrected and that all other criteria for advancement in status are met.

A4.9 Alternative status recognition procedures

APHIS recognized the TB status of the State of Sonora by alternate procedures in 2001. In January 1998, prior to the interim rules enacted by APHIS, Sonora requested that APHIS recognize two zones within the State with regard to TB status: a northern zone of low herd prevalence and a southern zone of medium herd prevalence [482]. In response to this request, APHIS conducted an initial site visit in March 2000 [434], followed by a second review in June 2001 [435] to verify that specific risk concerns had been addressed.

A qualitative risk assessment [436] was conducted based on the documentation provided by Sonora and the findings of the review teams. APHIS found that Sonora Zone A met the criteria for equivalence to MAA status under U.S. domestic TB regulations, and Sonora Zone B met the criteria for equivalence to MA status. APHIS administratively recognized the status of these two zones via a VS Notice issued 6 August 2001 [433]. APHIS has subsequently monitored the progress of the TB program in both zones through site visits [101, 102] and semi-annual reports [322, 324-327, 329-332], and intends to recognize the status of the two zones in Sonora in the proposed rule.

A4.10 Summary

As described in Section 3 of the Release Assessment, APHIS currently administratively recognizes equivalent TB status in 5 Mexican States and 16 zones within Mexican States (see Table 3.1). However, large portions of Mexico have not requested and APHIS evaluation and thus are considered to be NA status. Other States and zones have requested an evaluation but the site visit concluded that the region failed to meet the criteria for the requested status. In the interests of recognizing progress toward TB control and eradication, APHIS has re-reviewed or agreed to re-review some States and zones classified as NA status after an initial review. If the re-review indicates that a State or zone has demonstrated sufficient progress, that State or zone may be recognized as AP status.
Annex 5: Semi-annual report form for Mexican States and zones (see attached file)
Annex 6: Definitions of Mexican States and zones

A6.1 State of Aguascalientes
APHIS considers the entire State of Aguascalientes to be NA status for bovine TB [124].

A6.2 State of Baja California
The State of Baja California is regionalized into two zones. APHIS considers one zone to be equivalent to MA status (Baja California MA Zone) [124]; this zone consists of part of the municipality of Ensenada [111]. The other zone is considered NA status (Baja California NA Zone) [124] and consists of the other part of the municipality of Ensenada and the remaining municipalities in the State [111].

A6.3 State of Baja California Sur
APHIS considers the entire State of Baja California Sur to be NA status for bovine TB [124].

A6.4 State of Campeche
APHIS considers the entire State of Campeche to be NA status for bovine TB [124].

A6.5 State of Chiapas
The State of Chiapas is regionalized into two zones. APHIS considers one zone to be equivalent to AP status (Chiapas AP Zone) [124]; this zone consists of the 21 municipalities listed in Table A6.1 [111]. The other zone is considered NA status (Chiapas NA Zone) and consists of the remaining municipalities in the State [124].

Table A6.1: Municipalities comprising the Chiapas AP Zone

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Town</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acayocuaga</td>
<td>Mazatán</td>
</tr>
<tr>
<td>Acapetahua</td>
<td>Montecristo de Guerrero</td>
</tr>
<tr>
<td>Angel Albino Corzo</td>
<td>Ocozocoauhla de Espinoza</td>
</tr>
<tr>
<td>Arriaga</td>
<td>Pijijiapan</td>
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<tr>
<td>Cintalapa</td>
<td>Tapachula</td>
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<td>La Concordia</td>
<td>Tonalá</td>
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<tr>
<td>Escuintla</td>
<td>Tuzantán</td>
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<td>Huehuetán</td>
<td>Villa Comaltitlán</td>
</tr>
<tr>
<td>Huixtla</td>
<td>Villa Corzo</td>
</tr>
<tr>
<td>Jiquipilas</td>
<td>Villaflorices</td>
</tr>
<tr>
<td>Mapastepec</td>
<td></td>
</tr>
</tbody>
</table>

A6.6 State of Chihuahua
The State of Chihuahua is regionalized into four zones. APHIS considers one zone to be equivalent to MA status (Chihuahua MA Zone) [124]; this zone consists of 56 municipalities listed in Table A6.2 [111]. The other three zones are considered NA status.
(Chihuahua NA Zones 1, 2, and 3) [124]; these are small, noncontiguous entities located within the MA zone that together constitute the remaining municipalities in the State [111].

### Table A6.2: Municipalities comprising the Chihuahua MA Zone

<table>
<thead>
<tr>
<th>Ahumada</th>
<th>Guachochi</th>
<th>Morelos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allende</td>
<td>Guadalupe</td>
<td>Moris</td>
</tr>
<tr>
<td>Ascensión</td>
<td>Guadalupe y Calvo</td>
<td>Nonoava</td>
</tr>
<tr>
<td>Bachiniva</td>
<td>Guazapares</td>
<td>Nuevo Casas Grandes</td>
</tr>
<tr>
<td>Balleza</td>
<td>Guerrero</td>
<td>Ocampo</td>
</tr>
<tr>
<td>Batopilas</td>
<td>Hidalgo del Parral</td>
<td>Ojinaga</td>
</tr>
<tr>
<td>Bocoyna</td>
<td>Huejotitán</td>
<td>Praxedis G. Guerrero</td>
</tr>
<tr>
<td>Buenaventura</td>
<td>Ignacio Zaragoza</td>
<td>Rosario</td>
</tr>
<tr>
<td>Camargo</td>
<td>Janos</td>
<td>San Francisco de Borja</td>
</tr>
<tr>
<td>Carichi</td>
<td>Jiménez</td>
<td>San Francisco de Conchos</td>
</tr>
<tr>
<td>Casas Grandes</td>
<td>Juárez</td>
<td>San Francisco del Oro</td>
</tr>
<tr>
<td>Chinipas</td>
<td>Julimes</td>
<td>Santa Bárbara</td>
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<tr>
<td>Coronado</td>
<td>La Cruz</td>
<td>Santa Isabel</td>
</tr>
<tr>
<td>Coyame del Sotol</td>
<td>López</td>
<td>Satevo</td>
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<tr>
<td>Dr. Belisario Domínguez</td>
<td>Madera</td>
<td>Temósachi</td>
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<tr>
<td>El Tule</td>
<td>Maguarichi</td>
<td>Urique</td>
</tr>
<tr>
<td>Galeana</td>
<td>Manuel Benavides</td>
<td>Uruachi</td>
</tr>
<tr>
<td>Gómez Farias</td>
<td>Matachi</td>
<td>Valle de Zaragoza</td>
</tr>
<tr>
<td>Gran Morelos</td>
<td>Matamoros</td>
<td></td>
</tr>
</tbody>
</table>

### A6.7 State of Coahuila

The State of Coahuila is regionalized into four zones. APHIS considers one zone to be equivalent to MA status (Coahuila MA Zone) [124]; this zone consists of the 26 municipalities listed in Table A6.3 [111]. The other three zones are considered NA status (Coahuila NA Zones 1, 2, and 3) [124]; these are small, noncontiguous entities located within the MA zone that together constitute the rest of the State [111]. Six municipalities—Abasolo, Candela, Escobedo, Lamadrid, Monclova, and Nadadores—are split between the MA and NA zones [111].

### Table A6.3: Municipalities comprising the Coahuila MA Zone

<table>
<thead>
<tr>
<th>Abasolo*</th>
<th>Morelos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acuña</td>
<td>Múzquiz</td>
</tr>
<tr>
<td>Allende</td>
<td>Nadadores*</td>
</tr>
<tr>
<td>Candela*</td>
<td>Nava</td>
</tr>
<tr>
<td>Castaños</td>
<td>Ocampo</td>
</tr>
<tr>
<td>Cuatrocienegas</td>
<td>Piedras Negras</td>
</tr>
<tr>
<td>Escobedo*</td>
<td>Progreso</td>
</tr>
<tr>
<td>Guerrero</td>
<td>San Juan de Sabinas</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>Sabinas</td>
</tr>
<tr>
<td>Jiménez</td>
<td>San Buenaventura</td>
</tr>
<tr>
<td>Juárez</td>
<td>Sierra Mojada</td>
</tr>
<tr>
<td>Lamadrid*</td>
<td>Villa Unión</td>
</tr>
<tr>
<td>Monclova*</td>
<td>Zaragoza</td>
</tr>
</tbody>
</table>

*Municipality split between the MA zone and an NA zone*
A6.8 State of Colima
APHIS considers the entire State of Colima to be AP status for bovine TB [121, 124].

A6.9 Distrito Federal
APHIS considers the Distrito Federal to be NA status for bovine TB [124].

A6.10 State of Durango
The State of Durango is regionalized into two zones. APHIS considers one zone to be equivalent to AP status (Durango AP Zone) [124]; this zone consists of the 36 municipalities listed in Table A6.4. The other zone is considered NA status (Durango NA Zone) and consists of the rest of the State [124]. Three municipalities—Cuencame, Mapimi, and Simon Bolivar—are split between the AP and NA zones.

<table>
<thead>
<tr>
<th>Canatlan</th>
<th>Nazas</th>
<th>San Juan de Guadalupe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canelas</td>
<td>Nombre de Dios</td>
<td>San Juan del Río</td>
</tr>
<tr>
<td>Coneto de Comonfort</td>
<td>Nuevo Ideal</td>
<td>San Luis del Cordero</td>
</tr>
<tr>
<td>Cuencame*</td>
<td>Ocampo</td>
<td>San Pedro del Gallo</td>
</tr>
<tr>
<td>Guadalupe Victoria</td>
<td>Otaez</td>
<td>Santa Clara</td>
</tr>
<tr>
<td>Durango</td>
<td>Panuco de Coronado</td>
<td>Santiago Papasquiaro</td>
</tr>
<tr>
<td>El Oro</td>
<td>Peñon Blanco</td>
<td>Simon Bolivar*</td>
</tr>
<tr>
<td>Guanacevi</td>
<td>Poanas</td>
<td>Suchil</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>Pueblo Nuevo</td>
<td>Tamazula</td>
</tr>
<tr>
<td>Inde</td>
<td>Rodeo</td>
<td>Tepehuanes</td>
</tr>
<tr>
<td>Mapimi*</td>
<td>San Bernardo</td>
<td>Topia</td>
</tr>
<tr>
<td>Mezquital</td>
<td>San Dimas</td>
<td>Vicente Guerrero</td>
</tr>
</tbody>
</table>

*Municipality split between zones.

A6.11 State of Guanajuato
APHIS considers the entire State of Guanajuato to be NA status for bovine TB [124].

A6.12 State of Guerrero
The State of Guerrero is regionalized into two zones. APHIS considers one zone to be equivalent to AP status (Guerrero AP Zone) [124]; this zone consists of the 9 municipalities listed in Table A6.5. The other zone is considered NA status (Guerrero NA Zone) and consists of the remaining municipalities in the State [124].
A6.13 State of Hidalgo
APHIS considers the entire State of Hidalgo to be NA status for bovine TB [124].

A6.14 State of Jalisco (and State of Zacatecas)
The State of Jalisco is currently regionalized into two zones. One zone is combined with part of the State of Zacatecas to comprise the Zacatecas-Jalisco MA Zone [124]. This combined zone consists of the 45 municipalities listed in Table A6.6 [111, 118]. The remaining municipalities form NA zones in each State (Jalisco NA Zone and Zacatecas NA Zone) [111, 118].

Table A6.6: Municipalities comprising the Zacatecas-Jalisco MA Zone

<table>
<thead>
<tr>
<th>Zacatecas Municipalities</th>
<th>Jalisco Municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apozol</td>
<td>Jiménez del Teul</td>
</tr>
<tr>
<td>Apulco</td>
<td>Juan Aldama</td>
</tr>
<tr>
<td>Atolinga</td>
<td>Juchipila</td>
</tr>
<tr>
<td>Benito Juarez</td>
<td>Mazapil</td>
</tr>
<tr>
<td>Cañitas de Felipe Pescador</td>
<td>Melchor Ocampo</td>
</tr>
<tr>
<td>Chalchihuities</td>
<td>Mezquital del Oro</td>
</tr>
<tr>
<td>Concepcion del Oro</td>
<td>Miguel Auza</td>
</tr>
<tr>
<td>El Salvador</td>
<td>Momax</td>
</tr>
<tr>
<td>García de la Cadena</td>
<td>Monte Escobedo</td>
</tr>
<tr>
<td>Gral. Fco. R. Murguia</td>
<td>Moyahua de Estrada</td>
</tr>
<tr>
<td>Huanusco</td>
<td>Nochistlán de Mejía</td>
</tr>
<tr>
<td>Jalpa</td>
<td></td>
</tr>
</tbody>
</table>

A6.15 State of Mexico
APHIS considers the entire State of Mexico to be NA status for bovine TB [124].

A6.16 State of Michoacán
The State of Michoacán is regionalized into two zones. APHIS considers one zone to be equivalent to AP status (Michoacán AP Zone) [124]; this zone consists of the 6 municipalities listed in Table A6.7. The other zone is considered NA status (Michoacán NA Zone) and consists of the remaining municipalities in the State [124].
Table A6.7: Municipalities comprising the Michoacán AP Zone

<table>
<thead>
<tr>
<th>Municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aguililla</td>
</tr>
<tr>
<td>Aquila</td>
</tr>
<tr>
<td>Chinicuila</td>
</tr>
<tr>
<td>Coahuayana</td>
</tr>
<tr>
<td>Coalcomán</td>
</tr>
<tr>
<td>Lázaro Cardenas</td>
</tr>
</tbody>
</table>

A6.17 State of Morelos

APHIS considers the entire State of Morelos to be NA status for bovine TB [124].

A6.18 State of Nayarit

The State of Nayarit is regionalized into 2 zones. APHIS considers one zone to be equivalent to MA status (Nayarit MA Zone) [124]; this zone consists of the 9 municipalities listed in Table A6.8 [119]. The other zone is considered NA status (Nayarit NA Zone) [124] and consists of the rest of the State [119]. One municipality—Santiago Ixcuintla—is split between the 2 zones [119].

Table A6.8: Municipalities comprising the Nayarit MA Zone

<table>
<thead>
<tr>
<th>Municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acaponeta</td>
</tr>
<tr>
<td>El Nayor</td>
</tr>
<tr>
<td>Huajicori</td>
</tr>
<tr>
<td>La Yesca</td>
</tr>
<tr>
<td>Rosamorada</td>
</tr>
</tbody>
</table>

* Municipality split between zones.

A6.19 State of Nuevo Leon

The State of Nuevo Leon is regionalized into 2 zones. One zone is considered equivalent to MA status (Nuevo Leon MA Zone) [124] and consists of the 26 municipalities listed in Table A6.9 [111]. The other zone is considered NA status (Nuevo Leon NA Zone) [124] and consists of the remaining municipalities in the State [111].

Table A6.9: Municipalities comprising the Nuevo Leon MA Zone

<table>
<thead>
<tr>
<th>Municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agualeguas</td>
</tr>
<tr>
<td>Anáhuac</td>
</tr>
<tr>
<td>Aramberri</td>
</tr>
<tr>
<td>Cerralvo</td>
</tr>
<tr>
<td>China</td>
</tr>
<tr>
<td>Doctor Arroyo</td>
</tr>
<tr>
<td>Doctor Coss</td>
</tr>
<tr>
<td>Galeana</td>
</tr>
<tr>
<td>General Bravo</td>
</tr>
<tr>
<td>General Terán</td>
</tr>
<tr>
<td>General Treviño</td>
</tr>
<tr>
<td>General Zaragoza</td>
</tr>
<tr>
<td>Hualahuises</td>
</tr>
<tr>
<td>Iturbide</td>
</tr>
<tr>
<td>Lampazos de Naranjo</td>
</tr>
<tr>
<td>Linares</td>
</tr>
<tr>
<td>Los Aldamas</td>
</tr>
<tr>
<td>Los Herreras</td>
</tr>
<tr>
<td>Melchor Ocampo</td>
</tr>
<tr>
<td>Mier y Noriega</td>
</tr>
<tr>
<td>Montemorelos</td>
</tr>
<tr>
<td>Paras</td>
</tr>
<tr>
<td>Rayones</td>
</tr>
<tr>
<td>Sabinas Hidalgo</td>
</tr>
<tr>
<td>Vallecillo</td>
</tr>
</tbody>
</table>
A6.20 State of Oaxaca
APHIS considers the entire State of Oaxaca to be NA status for bovine TB [124].

A6.21 State of Puebla
The State of Puebla is regionalized into three zones. Two noncontiguous zones are considered equivalent to MA status (Puebla MA Zones 1 and 2) [124] and consist of the municipalities listed in Table A6.10 [115, 119]. The third zone is considered NA status (Puebla NA Zone) [124] and consists of the remaining municipalities in the State [115, 119].

Table A6.10: Municipalities comprising the Puebla MA Zones 1 and 2

<table>
<thead>
<tr>
<th>MA Zone 1</th>
<th>MA Zone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acateno</td>
<td>Nauzontla</td>
</tr>
<tr>
<td>Atempan</td>
<td>Olintla</td>
</tr>
<tr>
<td>Ayotoxco de Guerrero</td>
<td>Tenampulco</td>
</tr>
<tr>
<td>Caxhauacán</td>
<td>Teteles de Avila Castillo</td>
</tr>
<tr>
<td>Chignuautla</td>
<td>Teziutlán</td>
</tr>
<tr>
<td>Cuetzalán del Progreso</td>
<td>Tlatlauquitepec</td>
</tr>
<tr>
<td>Huehuetla</td>
<td>Tuzamapán de Galeana</td>
</tr>
<tr>
<td>Hueyapan</td>
<td>Xitutelco</td>
</tr>
<tr>
<td>Hueytamaulco</td>
<td>Xochitlán de Vicente Suárez</td>
</tr>
<tr>
<td>Hueytalpan</td>
<td>Yaonahuac</td>
</tr>
<tr>
<td>Huitzilan de Serdan</td>
<td>Zapotitlán de Méndez</td>
</tr>
<tr>
<td>Ignacio Allende</td>
<td>Zongozotla</td>
</tr>
<tr>
<td>Ixtepec</td>
<td>Zoquitlán</td>
</tr>
<tr>
<td>Jonotla</td>
<td></td>
</tr>
</tbody>
</table>

A6.22 State of Queretaro de Arteaga
APHIS considers the entire State of Queretaro de Arteaga to be NA status for bovine TB [124].

A6.23 State of Quintana Roo
APHIS considers the entire State of Quintana Roo to be equivalent to MA status [114, 124].

A6.24 State of San Luis Potosi
APHIS considers the entire State of San Luis Potosi to be NA status for bovine TB [124].

A6.25 State of Sinaloa
APHIS considers the entire State of Sinaloa to be equivalent to MA status [124].
State of Sonora
The State of Sonora is regionalized into two zones. APHIS considers the northern zone to be equivalent to MAA status (Sonora MAA Zone) [124]; this zone consists of the 65 municipalities listed in Table A6.11 [111]. The southern zone is considered equivalent to MA status (Sonora MA Zone) [124] and consists of the rest of the State [111]. Two municipalities—Cajeme and Guaymas—are split between the MAA and MA zones [111].

<table>
<thead>
<tr>
<th>MAA Zone (Northern Sonora)</th>
<th>MA Zone (Southern Sonora)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aconchi</td>
<td>Fronteras</td>
</tr>
<tr>
<td>Aguas Prietas</td>
<td>Granados</td>
</tr>
<tr>
<td>Altar</td>
<td>Guaymas*</td>
</tr>
<tr>
<td>Arivechi</td>
<td>Hermosillo</td>
</tr>
<tr>
<td>Arizpe</td>
<td>Huachinera</td>
</tr>
<tr>
<td>Atíl</td>
<td>Huásabas</td>
</tr>
<tr>
<td>Bacadéhuachi</td>
<td>Huépac</td>
</tr>
<tr>
<td>Bacaona</td>
<td>Ímuris</td>
</tr>
<tr>
<td>Bacoachi</td>
<td>Magdalena de Kino</td>
</tr>
<tr>
<td>Banamichi</td>
<td>Mazatán</td>
</tr>
<tr>
<td>Baviácora</td>
<td>Moctezuma</td>
</tr>
<tr>
<td>Bavispe</td>
<td>Naco</td>
</tr>
<tr>
<td>Benjamín Hill</td>
<td>Nácori Chico</td>
</tr>
<tr>
<td>Caborca</td>
<td>Nacozari</td>
</tr>
<tr>
<td>Cajeme*</td>
<td>Nogales</td>
</tr>
<tr>
<td>Cananea</td>
<td>Ónavas</td>
</tr>
<tr>
<td>Carbó</td>
<td>Opodepe</td>
</tr>
<tr>
<td>Cucurpe</td>
<td>Oquitoa</td>
</tr>
<tr>
<td>Cumpas</td>
<td>Pitiquito</td>
</tr>
<tr>
<td>Divisaderos</td>
<td>Puerto Peñasco</td>
</tr>
<tr>
<td>Empalme</td>
<td>Plutarco Elías Calles</td>
</tr>
</tbody>
</table>

*Municipality split between zones.

State of Tabasco
The State of Tabasco is regionalized into two zones. APHIS considers one zone to be equivalent to AP status (Tabasco AP Zone) [124]; this zone consists of the 7 municipalities listed in Table A6.12 [119].

| Cárdenas  
| Comalcalco  
| Cunduacán*  
| Huimanguillo*  
| Jalpa de Méndez  
| Nacajuca*  
| Paraiso  |

*Municipality split between zones.
The other zone is considered NA status (Tabasco NA Zone) [124] and consists of the rest of the State [119]. Three municipalities—Cunduacán, Huimanguillo, and Nacajuca—are split between the two zones [119].

A6.28 State of Tamaulipas
APHIS considers the entire State of Tamaulipas to be equivalent to MA status.

A6.29 State of Tlaxcala
APHIS considers the entire State of Tlaxcala to be NA status for bovine TB [124].

A6.30 State of Veracruz

<table>
<thead>
<tr>
<th>Table A6.13: Municipalities comprising the Veracruz MA Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acajete</td>
</tr>
<tr>
<td>Acatlan</td>
</tr>
<tr>
<td>Actopan</td>
</tr>
<tr>
<td>Acultzingo</td>
</tr>
<tr>
<td>Alpatlahuac</td>
</tr>
<tr>
<td>Alto Lucero</td>
</tr>
<tr>
<td>Altotonga</td>
</tr>
<tr>
<td>Amatlán de los Reyes</td>
</tr>
<tr>
<td>Apazapan</td>
</tr>
<tr>
<td>Aquila</td>
</tr>
<tr>
<td>Astacinga</td>
</tr>
<tr>
<td>Atlahuila</td>
</tr>
<tr>
<td>Atoyac</td>
</tr>
<tr>
<td>Atzalan</td>
</tr>
<tr>
<td>Atzalan</td>
</tr>
<tr>
<td>Ayahualulco</td>
</tr>
<tr>
<td>Banderilla</td>
</tr>
<tr>
<td>Benito Juárez</td>
</tr>
<tr>
<td>Boca del Rio</td>
</tr>
<tr>
<td>Calcahuila</td>
</tr>
<tr>
<td>Camarón de Tejeda</td>
</tr>
<tr>
<td>Camerino Z. Mendoza</td>
</tr>
<tr>
<td>Carrillo Puerto</td>
</tr>
<tr>
<td>Castillo de Teayo</td>
</tr>
<tr>
<td>Cazones</td>
</tr>
<tr>
<td>Cerro Azul</td>
</tr>
<tr>
<td>Chalma</td>
</tr>
<tr>
<td>Chiconamel</td>
</tr>
<tr>
<td>Chicontepec</td>
</tr>
<tr>
<td>Chiconquioaco</td>
</tr>
<tr>
<td>Chinampa de Gorostiza</td>
</tr>
<tr>
<td>Chocaman</td>
</tr>
<tr>
<td>Chontla</td>
</tr>
</tbody>
</table>
The State of Veracruz is regionalized into two zones. APHIS considers one zone to be equivalent to MA status (Veracruz MA Zone) [124]; this zone consists of the 162 municipalities listed in Table A6.13 [111]. The other zone is considered NA status (Veracruz NA Zone) [124] and consists of the remaining municipalities in the State [111].

A6.31 State of Yucatán
APHIS considers the entire State of Yucatán to be equivalent to MA status [124].

A6.32 State of Zacatecas
See Section A6.14 State of Veracruz above.
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34. APHIS: San Luis Potosi Low Prevalence Zone (Zone A) TB review - final report, September 17-21, 2006.
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149. Tabasco: Conditions to grant waivers from the sanitary requirements for Mexican livestock imported into the United States under the anticipated provisional regulation, State of Tabasco; dated February 2002.


151. Veracruz: Information on the TB eradication program in Veracruz Zone A provided in support of waiver status; dated May 2003.


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161. Baja California: Information on the TB eradication program in Baja California Zone A provided in support of waiver status; dated May 2003.
162. Baja California: Record of follow-up advances in compliance with the observations generated by the USDA bovine Tuberculosis campaign group; dated June 2002.
163. Campeche: Information on the TB eradication program in Campeche Zone A provided in support of waiver status; dated May 9, 2003.
164. Campeche: Request for recognition of Zone A as region of low prevalence for bovine tuberculosis by the State of Campeche and record of follow-up of advances; dated June 2002.
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181. Durango: Information on the TB eradication program in Durango Zone A provided in support of waiver status; dated May 2003.
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205. APHIS: Official notification of TB status results and recommendations following the reviews of Zacatecas Zone A in December 2002 and Aguascalientes Zone A, the State of Nayarit, and Durango Zone A in February 2003; dated October 27, 2003.


208. APHIS: Official notification of TB status results and recommendations following the reviews of Baja California Zone A and the State of Sinaloa in May 2004, and Zacatecas Zone A/Jalisco Zone A1 in March and July 2004; dated September 20, 2004.


214. APHIS: Official notification of TB status results and recommendations following the review of Aguascalientes Certified Modified Accredited Zone (Zone A) in August 2005; dated November 2005.
215. APHIS: Official notification of TB status results and recommendations following the reviews of Baja California Certified Modified Accredited Zone (Zone A) in January 2006 and the State of Chiapas in February 2006; dated May 25, 2006.
216. APHIS: Official notification of TB status results and recommendations following the reviews of Campeche Certified Modified Accredited Zone (Zone A) in October 2005; Nayarit Accreditation Preparatory/Certified Modified Accredited Zone (Zone A) in November 2005; and the State of Yucatan and Puebla Accreditation Preparatory/Certified Modified Accredited Zones 1 and 2 (Zones A1 and A2) in December 2005; dated March 6, 2006.
217. APHIS: Official notification of TB status results and recommendations following the reviews of Jalisco Zone A2, Chiapas Zone A, and the State of Quintana Roo in March 2003; dated 2003.
219. APHIS: Official notification of TB status results and recommendations following the reviews of Chihuahua Nonaccredited Zones 1, 2, and 3 (Zones B1, B2, B3) in July 2006 and Michoacan Low Prevalence Zone (Zone A) in August 2006; dated December 14, 2006.
221. APHIS: Official notification of TB status results and recommendations following the reviews of Veracruz Zone A1 in March 2005 and Coahuila Certified Modified Accredited Zone (Zone A) in July 2005; dated September 1, 2005.
223. APHIS: Official notification of TB status results and recommendations following the review of the State of Colima in September 2005.
224. APHIS: Official notification of TB status results and recommendations following the review of Durango Zone A in February 2004; dated June 2004.
225. APHIS: Official notification of TB status results and recommendations following the review of Durango Low Prevalence Zone (Formerly Zone A) in April 2006; dated May 10, 2006.
226. APHIS: Official notification of TB status results and recommendations following the review of Durango Low Prevalence Zone (Formerly Zone A) in October 2006; dated October 17, 2006.
227. APHIS: Official notification of TB status results and recommendations following the reviews of Jalisco Zone A3 in September 2004; Nayarit Zone A and Puebla Zones A1 and A2 in October 2004; and Tabasco Zone A in November 2004; dated March 2005.
228. APHIS: Official notification of TB status results and recommendations following the reviews of the State of Nayarit in March 2004 and Jalisco Zone A2 in April 2004; dated August 27, 2004.
229. APHIS: Official notification of TB status results and recommendations following the reviews of Nuevo Leon Nonaccredited Zone (Zone B) in June 2006 and Veracruz Accreditation Preparatory Zone (Zone A) in July 2006; dated November 21, 2006.
230. APHIS: Official notification of TB status results and recommendations following the review of Nuevo Leon Certified Modified Accredited Zone (Zone A) in August 2005; dated October 7, 2005.
231. APHIS: Official notification of TB status results and recommendations following the review of the State of Quintana Roo in January 2006; dated May 12, 2006.
232. APHIS: Official notification of TB status results and recommendations following the review of San Luis Potosi Low Prevalence Zone (Zone A) in September 2006; dated December 28, 2006.
234. APHIS: Official notification of TB status results and recommendations following the review of the State of Tamaulipas in May 2006; dated August 3, 2006.
239. APHIS: Official notification of TB status results and recommendations following the review of Nuevo Leon Modified Accredited and Nonaccredited zones January 22-26, 2007; dated July 31, 2007.
244. Aguascalientes: Semi-annual report of the TB eradication campaign in Aguascalientes Zone A from July - December 2003.
246. Baja California: Semi-annual report of the TB eradication campaign in Baja California Certified Modified Accredited Zone (Zone A) from June - December 2005.
247. Baja California: Semi-annual report of the TB eradication campaign in Baja California Modified Accredited Zone (Zone A) from January - June 2006.
249. Baja California: Semi-annual report of the TB eradication campaign in Baja California Zone A from January - May 2005.
250. Baja California: Semi-annual report of the TB eradication campaign in Baja California Zone A from July - December 2003.
251. Baja California: Semi-annual report of the TB eradication campaign in Baja California Zone A from July - December 2004.
258. Chiapas: Semi-annual report of the TB eradication campaign in Chiapas Accreditation Preparatory Zone (Zone A) from January - June 2006.
Chiapas: Semi-annual report of the TB eradication campaign in Chiapas Zone A from July - December 2004.

Chihuahua: Semi-annual report of the TB eradication campaign in Chihuahua Certified Modified Accredited Zone (Zone A) from June - December 2005.

Chihuahua: Semi-annual report of the TB eradication campaign in Chihuahua Modified Accredited Zone (Zone A) from January - June 2006.


Coahuila: Semi-annual report of the TB eradication campaign in Coahuila Certified Modified Accredited Zone (Zone A) from June - December 2005.

Coahuila: Semi-annual report of the TB eradication campaign in Coahuila Modified Accredited Zone (Zone A) from January - June 2006.


Coahuila: Semi-annual report of the TB eradication campaign in Coahuila Zone A from July - December 2003.


Durango: Semi-annual report of the TB eradication campaign in Durango Zone A from July - December 2003.

Durango: Semi-annual report of the TB eradication campaign in Durango Zone A from July - December 2004.

Jalisco: Semi-annual report of the TB eradication campaign in Jalisco Accreditation Preparatory Zone 1 (Zone A2) from January - June 2006.

Jalisco: Semi-annual report of the TB eradication campaign in Jalisco Accreditation Preparatory Zone 2 (Zone A3) from January - June 2006.

Jalisco: Semi-annual report of the TB eradication campaign in Jalisco Accreditation Preparatory Zones 1 and 2 (Zones A2 and A3) from June - December 2005.


Nayarit: Semi-annual report of the TB eradication campaign in Nayarit Certified Modified Accredited Zone (Zone A) from June - December 2005.
324. Sonora: Semi-annual report of the TB eradication campaign in Northern Sonora (Zone A) from January - May 2005.
325. Sonora: Semi-annual report of the TB eradication campaign in Northern Sonora (Zone A) from June - December 2005.
326. Sonora: Semi-annual report of the TB eradication campaign in Northern Sonora (Zone A) from July - December 2004.
333. Tabasco: Semi-annual report of the TB eradication campaign in Tabasco Accreditation Preparatory Zone (Zone A) from January - June 2006.
334. Tabasco: Semi-annual report of the TB eradication campaign in Tabasco Accreditation Preparatory Zone (Zone A) from June - December 2005.
344. Veracruz: Semi-annual report of the TB eradication campaign in Veracruz Accreditation Preparatory Zone (Zone A) from June - December 2005.

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365. Baja California: Semi-annual report of the TB eradication campaign in Baja California Nonaccredited Zone (Zone B) from January - June 2006.
366. Baja California: Semi-annual report of the TB eradication campaign in Baja California Nonaccredited Zone (Zone B) from June - December 2005.
367. Baja California: Semi-annual report of the TB eradication campaign in Baja California Zone B from January - May 2005.
368. Baja California: Semi-annual report of the TB eradication campaign in Baja California Zone B from July - December 2004.
373. Chiapas: Semi-annual report of the TB eradication campaign in Chiapas Nonaccredited Zone (Zone B) from January - June 2006.
403. Nayarit: Semi-annual report of the TB eradication campaign in Nayarit Nonaccredited Zone (Zone B) from January - June 2006.
404. Nayarit: Semi-annual report of the TB eradication campaign in Nayarit Nonaccredited Zone (Zone B) from June - December 2005.
408. Nuevo Leon: Semi-annual report of the TB eradication campaign in Nuevo Leon Nonaccredited Zone (Zone B) from June - December 2005.
412. Puebla: Semi-annual report of the TB eradication campaign in Puebla Nonaccredited Zone (Zone B) from January - June 2006.
413. Puebla: Semi-annual report of the TB eradication campaign in Puebla Nonaccredited Zone (Zone B) from June - December 2005.
441. NOM-054-Z00-1996 Establishment of quarantines for animals and their products. Published 8 June 1998.
442. SAGARPA: Official response to APHIS recommendations following a review of Mexico's national TB eradication program; dated October 5, 2005.
446. APHIS: Official letter concerning the protocol for testing and release of herds under quarantine for bovine tuberculosis; dated November 4, 2005.
447. APHIS/SAGARPA: Agreement on certification of bovine TB accredited free herds and proposal to move cattle for livestock shows and to sell them into Zones A; dated October 14, 2003.
448. APHIS: Official letter clarifying the protocol for movement of cattle from accredited States/zones to nonaccredited zones within a State with recognized TB status, and back again, for livestock shows, fairs, and exhibitions; dated March 2006.
449. APHIS: Official letter concerning minimum requirements for movement of cattle from nonaccredited States/zones to quarantined feedlots in States/zones with Accreditation Preparatory or Modified Accredited TB status; dated June 23, 2005.
452. APHIS: Official letter concerning the recommendations resulting from APHIS' January 2006 review of Mexico's national tuberculosis eradication program; dated May 9, 2006.
454. APHIS: Official letter concerning APHIS-SAGARPA discussion on the 5-year strategic plan for reducing the number of tuberculosis-infected cattle imported from Mexico; dated December 2007.
462. APHIS: Baja California Zone A - List of goals to accomplish for waiver; dated February 8, 2002.
463. APHIS: Campeche Zone A - List of goals to accomplish for waiver; dated February 8, 2002.
464. APHIS: Chihuahua Zone A - List of goals to accomplish for waiver; dated February 8, 2002.
465. APHIS: Coahuila Zone A - List of goals to accomplish for waiver; dated February 8, 2002.
466. APHIS: Colima - List of goals to accomplish for waiver; dated February 8, 2002.
467. APHIS: Durango Zone A - List of goals to accomplish for waiver; dated February 8, 2002.
468. APHIS: Jalisco Zone A2 - List of goals to accomplish for waiver; dated February 8, 2002.
469. APHIS: Nuevo Leon Zone A - List of goals to accomplish for waiver; dated February 8, 2002.
471. SAGARPA: Audit report of the TB eradication program in San Luis Potosi proposed Accreditation Preparatory Zone (Zone A1); dated August 31, 2006.
473. Sinaloa: Information on the TB eradication program in the State of Sinaloa provided in support of waiver status; dated May 2003.
475. APHIS: Tamaulipas - List of goals to accomplish for waiver; dated February 8, 2002.
476. APHIS: Veracruz Zone A - List of goals to accomplish for waiver; dated February 8, 2002.
479. APHIS: Official letter warning of a substantial deficiency in the TB eradication program in Coahuila Modified Accredited Zone (Zone A); dated March 5, 2007.
480. APHIS: Official notification of suspension of the Modified Accredited status of Coahuila’s accredited zone (Zone A); dated April 10, 2007.
481. APHIS: Official notification of waiver suspension for Baja California Zone A; dated February 20, 2004.