



Public Barriers at Dangerous Animal Exhibits – A Study

Response to Recommendation 1 from OIG Audit Report 33601-0001-23

Introduction

During 2020, the USDA’s Office of Inspector General (OIG) conducted an audit of APHIS’ controls over the licensing of exhibitors of dangerous animals, with the stated objective of evaluating the agency’s efforts to safeguard both the animals and members of the public who visit these facilities.¹ OIG’s original intent had been to conduct site visits of 19 facilities that historically had dangerous animals on exhibit; however, the COVID-19 pandemic precluded them doing so. The final report contained 4 recommendations. Recommendation 1 called for APHIS to “conduct a study to determine if there continues to be an issue with public barriers at licensed exhibitors with potentially dangerous animals. If the results indicate an issue, determine and implement the necessary corrective actions (i.e., new regulations, training, and/or guidance)”. We have since carried out such a study, and this report documents those findings, along with our conclusions and recommendations going forward.

Methodology

Complete details of the methodology can be found in **Appendix A**. Twenty licensed exhibitors with dangerous animals in their inventories were included in the study. The list of facilities included the 19 facilities OIG had intended to visit as part of their audit. For purposes of the study, “dangerous animals” were defined as: large felines (lions, tigers, cougars, leopards, jaguars, cheetahs and hybrids), bears, great apes, hippos, rhinos and wolves.^{2,3,4} Facilities ranged from large public zoos and those accredited by various professional standards organizations, to private zoos and those with no certifications or affiliations.

Site visits were carried out by teams of 2 APHIS employees – an Animal Care Inspector (ACI) or Veterinary Medical Officer (VMO) and a Supervisory Animal Care Specialist (SACS) (or in a few instances, an Animal Welfare Operations Assistant Director). Facilities were contacted in advance and informed these would be courtesy visits. APHIS personnel were provided training that included a webinar and several guidance documents describing how to carryout measurements and photograph different types of public barriers. A group of internal subject matter experts (SMEs) from various units in APHIS-Animal Care (the “Barrier Study Team”) reviewed the data and photographs from each dangerous animal exhibit at every facility and made determinations on the adequacy of all public barriers.

In addition, APHIS secured the services of an external SME as a consultant to independently review the data and photographs and provide a formal report. This individual is a Diplomate of the American College of Zoological Medicine and an AZA member, who works as a professional consultant to the zoo

¹ Audit Report 33601-0001-23, Follow-up to Animal and Plant Health Inspection Service’s Controls Over Licensing of Animal Exhibitors, USDA-OIG, March 2021.

² 9 CFR, § 2.131 (d)(3) Handling of animals.

³ 9 CFR, § 3.127 (d) Facilities, outdoor.

⁴ Animal Welfare Inspection Guide, Appendix B, December 2021.

community. To ensure objectivity and to protect the privacy of the licensees, the consultant was blinded to their identity (facilities were identified only by a number, and photographs were modified to remove any potentially identifiable information, if applicable).

The findings and opinions of the internal and external subject matter experts were taken together in this report to generate our results and inform our conclusions.

Results

Site visits and data collection were carried out during October and November 2021. The list of 20 facilities included in the study can be found in **Appendix B**. Twenty was chosen as a round number, which included the 19 facilities on OIG’s original list. A few substitutions were made for facilities that no longer have dangerous animals in their inventories. Additional substitutions were made due to declinations by a few facilities to participate voluntarily in the study (3 total). APHIS selected a variety of replacement facilities to ensure broad representation of dangerous species and type of licensees (e.g., public or private, accredited or non-accredited, geographic location).

In total, the 20 facilities had 170 exhibits (primary enclosures), with 212 associated public barriers protecting visitors from 720 dangerous animals.

Species Distribution

Large felines accounted for just over half of all dangerous animals in the study population, followed by great apes and bears. (See **Figure 1** for a complete breakdown.)

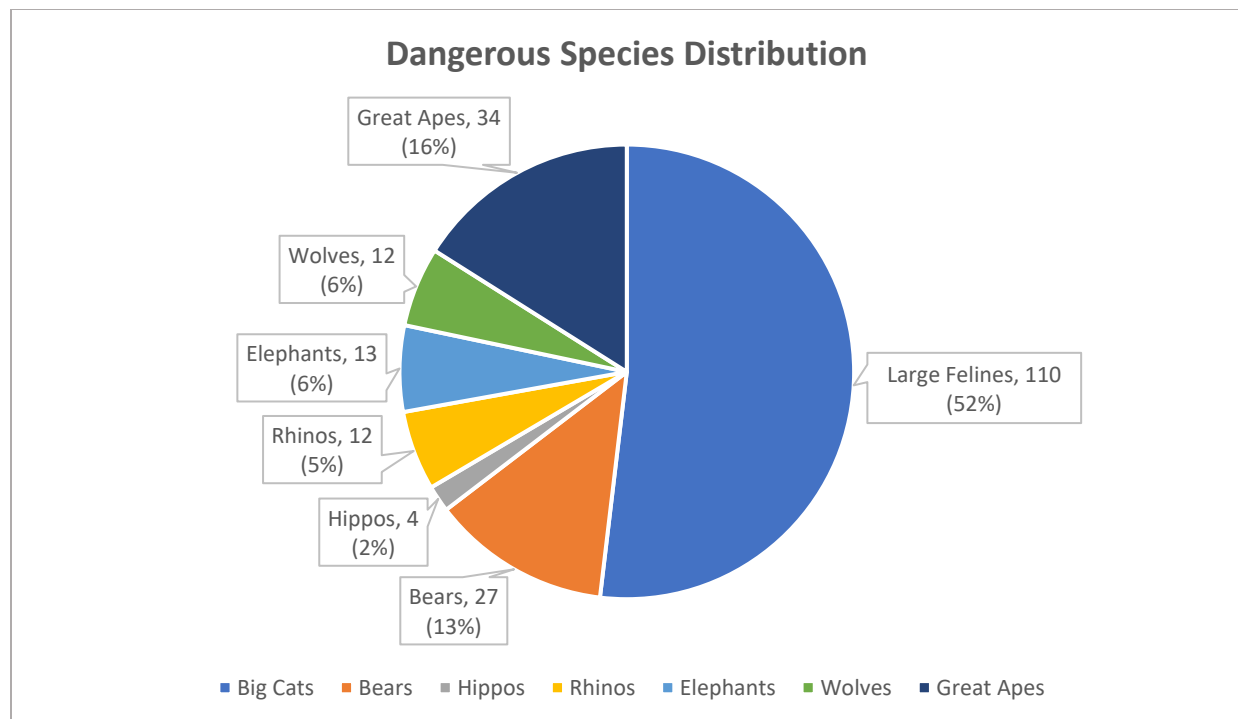


Figure 1: Distribution of dangerous animal species in the study – totals and (%).

Barrier Construction

Public barriers at dangerous animal exhibits were fashioned from of a wide variety of materials and constructs. The most frequently used materials were welded metal wire (89 instances), wood (88 instances), vegetation (73 instances) and metal mesh/chain link (62 instances). Most barriers were comprised of a combination of different materials. Public barriers were noted as absent or “none” at several exhibits in which the primary enclosure was constructed of solid walls of a transparent material (e.g., Plexiglas). (See **Figure 2** for a complete breakdown.)

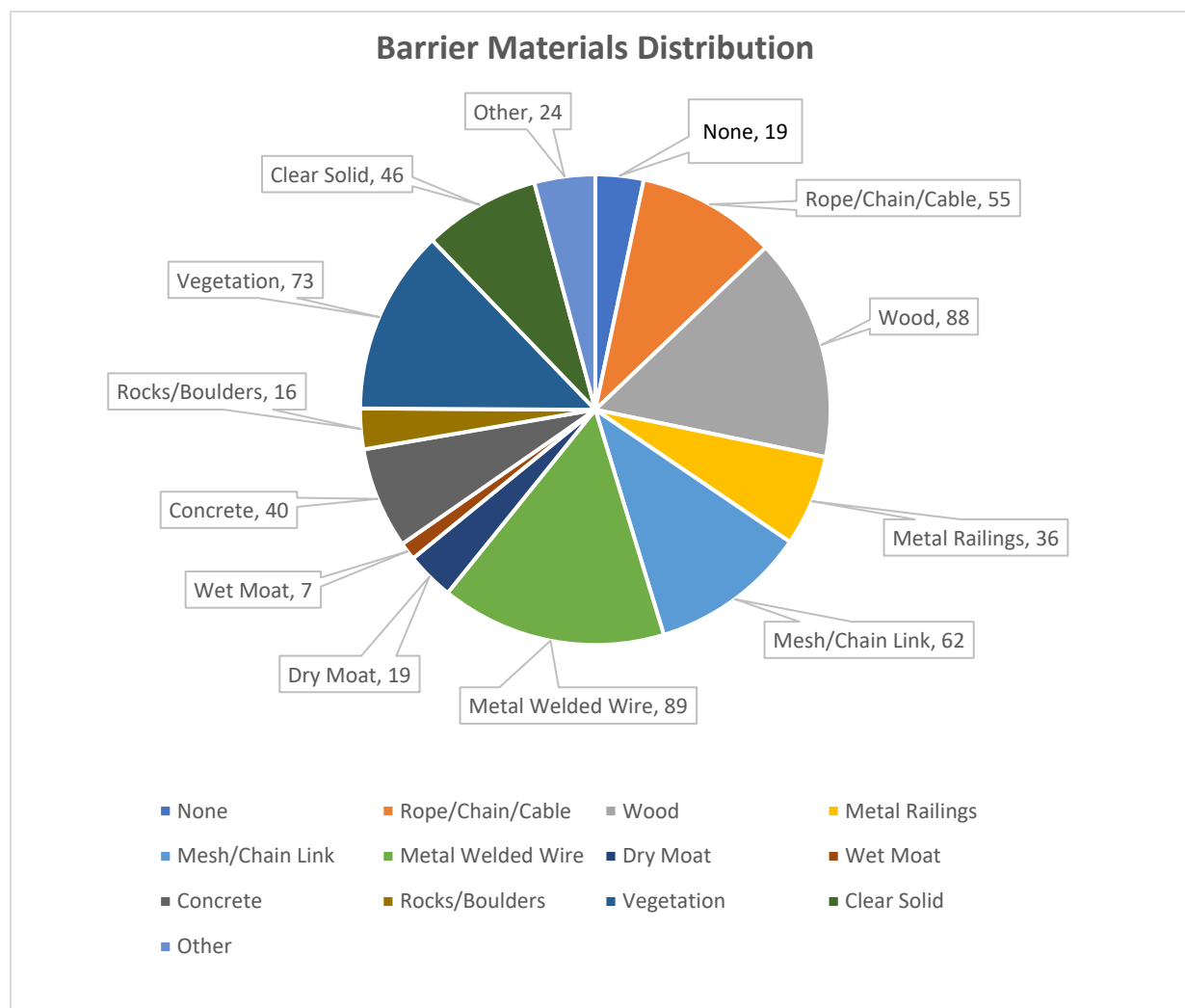


Figure 2: Distribution of materials utilized in public barrier construction at dangerous animal exhibits in the study (numbers represent total instances each material was used). **Other** includes metal beams, stainless steel mesh, high-tensile steel, gunite, bricks, piano wire, hot wire, and nylon mesh. **Clear Solid** refers to glass, Plexiglas, or Lexan. **None** indicates that a separate public barrier was not present. This was only the case for selected exhibits where primary closures had walls of solid, clear material (as above).

Barrier Measurements

Barrier heights and the distances between barriers and the primary enclosures were wide-ranging (see **Table 1**).

Barrier Measurement	Range	Mean	Median
Height	18"-264" (1.5'-22')	63" (5.3')	50" (4.2')
Distance to Primary Enclosure	24"-1200" (2'-100')	105" (8.7')	79" (6.6')

Table 1: Cumulative ranges, means and median values for heights and distances to enclosure of public barriers in the study.

Documented Incidents Involving Barriers

Inspectors were queried and inspection reports were reviewed for documentation of any incidents involving the public intentionally or unintentionally breaching barriers at dangerous animal exhibits in all facilities in the study dating back to 2015. Four such occurrences met the criteria and are summarized in **Table 2**.

Date	Species	Incident	Outcome	Corrective Measures
July 2021	Leopard	Adult patron climbed over wooden barrier fence. Fence height just under 4 feet. Put arm through netting of primary enclosure.	Leopard clawed the patron's arm causing multiple lacerations.	<ol style="list-style-type: none"> 1. Supplemental wire added above fence posts to increase height. 2. Designated attendant assigned at all times. 3. Monitoring camera installed with live feed.
July 2021	Elephant	Adult patron climbed over barrier and jumped down 8-10 feet onto the floor of the elephant barn. All attendants were at lunch.	Patron left without injury. Animals unharmed.	<ol style="list-style-type: none"> 1. Laser/light beam system installed to detect unauthorized entry and sound alarm. 2. Lunch shifts for attendants were staggered. 3. Video surveillance added.
May 2016	Gorilla	Child crawled through gaps in barrier fence, passed through vegetation and fell into moat of gorilla exhibit. Barrier height was 32 inches.	Gorilla was shot and killed. Child was rescued without serious injury.	<ol style="list-style-type: none"> 1. Barrier was reconstructed. Height now 42 inches. Wire mesh added to eliminate the gaps. 2. Vegetation was increased and distance from barrier to edge of moat increased from 40 inches to 61-70 inches.
April 2015	Cheetah	Child was held over a solid wood barrier fence on a viewing deck by parent and fell into the cheetah enclosure.	Child incurred a broken leg. Parents jumped into the enclosure and rescued the child. Animals unharmed.	<ol style="list-style-type: none"> 1. Plexiglass was installed above the existing wall of the barrier to prevent such mishaps.

Table 2: Summary of incidents involving breaches of barriers by the public at dangerous animal exhibits dating back to 2015.

Subject Matter Expert Assessment of Barrier Adequacy

All data and photographs were objectively and subjectively evaluated by APHIS' internal SMEs and the external SME (consultant) in determining the adequacy/effectiveness of all barriers to protect the public from harm and, conversely, protecting the animals from potential harm from the public.

Criteria utilized by internal SMEs in making such determination were multi-factorial, and included parameters as outlined in the Animal Welfare Regulations,^{5,6,7,8} the Animal Welfare Inspection Guide⁹ and as described in the study protocol (**Appendix A**).

Internal SMEs concluded that only 1 dangerous animal exhibit in the study had a public barrier deficiency that represented a risk of injury to the viewing public. This was a lion exhibit with the night house for the lions and a reptile house situated adjacent to the exhibit. An unprotected 21.5" space exists between the buildings that allows direct access to the wall of the primary enclosure (**Figure 3**).



Figure 3: Lion exhibit with an unprotected gap between the lion house and a reptile house allowing direct access to the primary enclosure. Arrow indicates the wall of the primary enclosure.

The external consultant created a scoring system to aid in their assessment of the barriers based on three criteria – barrier material, barrier distance (to primary enclosure) and barrier height/gaps. Each of

⁵9 CFR, § 2.131 (c)(1) Handling of animals.

⁶ 9 CFR, § 3.77 (g) Sheltered housing facilities.

⁷ 9 CFR, § 3.78 (c) Outdoor housing facilities.

⁸ 9 CFR, § 3.101 (a)(2) Facilities, general.

⁹ Chapter 4.14.7. Public Barriers, Animal Welfare Inspection Guide, December 2021.

the three parameters was scored as “0” (inadequate or substandard) or “1” (adequate), for a maximum possible score of “3” for each barrier (**Figure 4**). The consultant also reviewed all photographs in conjunction with the objective data on each barrier before making a final determination on adequacy.

1. Material (Score 1 point) Must be sturdy. Acceptable/suggested materials:
 - a. Metal, plastic, ropes, chains, wires, railings, concrete, the use of plantings/landscaping
 - b. Hot wire inside enclosure to keep the animal from interacting with the wall of the animal’s enclosure or escaping
 - c. Moat (wet or dry)
 - d. Barriers are not considered necessary when enclosure wall is constructed of appropriate solid unbreakable material such as glass or plexiglass variants
2. Distance (Score 1 point) Minimum distance chosen to be **42 inches** for dangerous animals.
3. Height/Deficits (Score 1 point) The public should not be able to pass fully under, over, or between elements of the barrier, increasing the possibility of contact with the animal within the enclosure.
 - a. Minimum height should be **42 inches**.
 - b. Any gaps must be less than **4 inches** wide.

Figure 4: Summary of the public barrier scoring system and parameters for each of the criteria used by the external consultant.

In total, the external consultant identified three exhibits with public barriers that scored less than 3/3 (3 out of 3). All three exhibits contained wolves and all 3 were located at different facilities. A maned wolf exhibit had a barrier that was 35” high and positioned 37” from the primary enclosure and was scored 1/3. A grey wolf exhibit had a barrier that was positioned 36” from the primary enclosure and was scored 2/3. And another grey wolf exhibit was scored 2/3 due to gaps through which an unattended child could easily pass (**Figure 5**).

In their report, the external consultant provided this summary conclusion on the adequacy of these 3 barriers: “Due to these three barriers providing VISUAL cues for a “reasonable adult” to not pass under, over or through the barriers, and due to the natural behavior of wolves to be shy and retreating, the barriers subjectively are considered passable (with minor improvements). It is in the interest of creating an objective and unified approach to evaluating barriers in front of dangerous animals (see DEFINED PARAMETERS [**Figure 4**]), that these three enclosures were identified.”



Figure 5: Public barrier at a grey wolf exhibit scoring 2 out 3. Gaps (arrow) between rails of this post and rail fence could allow an unattended child easy access to the primary enclosure.

Conclusion/Discussion

Modern zoological institutions have placed significant emphasis on modeling animal enclosures on the natural environments of the species they contain. This is important for the welfare of the animals, and for the enjoyment of the millions of visitors that attend U.S. zoos annually. Therein lies one of the challenges – the balancing of safety with style. Public safety and the safety of the animals is paramount, and therefore, irrespective of design, appropriate barriers must be established around animal enclosures to assure safety for all. The results of this study indicate that, with a few exceptions, the public barriers present around enclosures containing dangerous animals at exhibitors licensed under Animal Welfare Regulations are generally adequate and effective. **Based on stated criteria, only 4 barriers (1.9%) were deemed substandard, and only 1 of these 4 involved a complete absence of any barrier (in a narrow gap between buildings away from the primary viewing area).**

Yet, the documented incidents of barrier breaches at these facilities are a reminder that room for improvement exists. A guiding principle we employed in our evaluation of the barriers in this study was that an effective barrier should prevent a child from passing over, under, through or around it, and should prevent a reasonable adult from breaching it unintentionally or require considerable effort to breach it intentionally (i.e., more than simply stepping over or around it). The external consultant stated this concept about barriers in their report: “Barriers in front of dangerous animals should mitigate the risk of an unintentional aberrant behavioral action taken by either a member of the public (including children) or the animal housed in the enclosure resulting in unlikely but possible contact.” We feel it important to emphasize that barriers cannot be expected to counteract or offset all instances of poor judgment, misbehavior, or willful intent on the part of the public to enter a prohibited area.

APHIS took this assignment very seriously, and we made a good faith effort to carry it out objectively; including enlisting the participation of an external consultant to review the data and provide an

independent assessment. Discrepancies between the assessments and conclusions of APHIS' internal SMEs and the external SME are likely multifactorial in origin. APHIS SMEs first reviewed the data independently, and then held group discussions to go over any concerns they had about their interpretations of the images or measurements. In addition, APHIS SMEs had direct access to the study teams that collected the data and could ask follow-up questions for clarifications. The external consultant did not have those opportunities. This may explain, for instance, why the deficiency depicted in Figure 3 was not identified by the consultant. Further, experts in any field will always have slightly different interpretations of, and opinions on, certain information or situations. The fact that out of 212 public barriers under review, the internal and external SMEs differed only on 4 speaks to the integrity of this study and our conclusions.

We were pleased to find the mean and median values for barrier heights and distances from primary enclosures in this study exceeded the minimum standards of 42" for each, as proposed by the external consultant. In developing these criteria, the consultant relied on various resources, including building code standards, and human anatomical measurements – particularly as it applies to the distance someone can reach. Readers reviewing the measurements reported in Table 1 will no doubt be confused or concerned by the reported ranges reflecting heights and distances of some barriers being less than 42". We have chosen to report the data for all barriers, rather than break it out by type of construct, type of primary enclosure and other variables such as the presence or absence of attendants. Unforeseen variability in the way some study teams collected and recorded the measurements lead us to believe that trying to parse the data further would not be of value. From review of the raw data, we can state that barrier heights and distances from primary enclosures were on the lower end for primary enclosures with solid walls (e.g., glass or Plexiglas) and where attendants were continually present.

Future Directions

Concurrent with this study, APHIS-Animal Care put together a working group in 2021 to review our current regulations and standards for licensed exhibitors that pertain to the handling of dangerous animals, training requirements for the personnel that handle these animals, and environmental enrichment for all Subpart F species. This work culminated in a white paper outlining the topics of importance, our goals for strengthening these regulations and standards, and the rationale behind it. We have been given Administrator approval to pursue this endeavor, with the first step likely to be publication of an Advanced Notice of Proposed Rulemaking. The results of the study reported here, along with the report we received from our external consultant, are expected to be invaluable resources as we move forward.

Public Barrier Study – Dangerous Animal Exhibits

Purpose: The OIG Exhibitor Audit from 2020 made a recommendation to evaluate barriers at certain facilities that have dangerous animals during inspection

Goal of Study: Evaluate the public barriers at dangerous animal exhibits to determine if the barriers are adequate to prevent the public from coming into direct contact with the animals.¹ (*See definition of, and parameters for, an adequate public barrier below.*) If substantive deficiencies exist, the results of the study will be utilized to formulate a plan for corrective actions where needed.

For purposes of the study, dangerous animals include:

- Big cats – lions, tigers, hybrids (ligers etc.), cougars, leopards, jaguars, cheetahs
- Bears
- Great apes
- Elephants
- Hippo
- Rhinos
- Wolves

Facilities to be included: See Excel spreadsheet of facilities that were to be visited by OIG in 2020

AWO Inspectors Mission: During a scheduled, announced courtesy visit, evaluate each dangerous animal exhibit public barrier utilizing parameters provided to all inspectors to ensure uniformity in data collection. There may be multiple such exhibits in one facility.

- Obtain spreadsheet from species specialist for facility.
- Note species and number of animals that are contained in each dangerous animal enclosure.
- Photograph each public barrier. Note photo number(s) on spreadsheet for each barrier.
 - Take a minimum of 2 views (see attached photo examples).
 - One perpendicular to the barrier looking straight across the barrier to the primary enclosure with sufficient distance to see both the barrier and the primary enclosure fencing.
 - One parallel to the barrier (looking lengthwise along the barrier) that depicts the space between the barrier and the enclosure.
 - Additional photographs of any gaps, defects or deficiencies should be included (see below).
- Describe the type of each barrier and the nature of the materials (e.g. solid concrete wall, thick vegetation, chain link fence, combination, etc.).
- Describe the primary enclosure fencing type (e.g. piano wire, woven wire, plexiglass, etc.).
- Measure the height of each barrier and, if gaps or defects are present, note the number and dimensions of the gaps or defects (i.e. the width of the gap)
- Measure the distance from the external surface of the barrier to the primary enclosure.
- Specifically note if there are any areas where the public – using common sense and reasonable caution – isn't prevented from intentionally or unintentionally breaching the barrier and entering the enclosure, and document with photographs and description.

- Does the facility rely on attendants to replace the need for a barrier to prevent public contact with animals? What is ratio of attendants to the public in these cases?
- Submit findings to species specialists (Maginnis and Gage) and cc: SACS on SharePoint/OneDrive.

Species Specialists:

- Compile information from each facility and enter on spreadsheet.
- Provide internal assessment and summarize findings in a report (independent of consultant).
- National Policy Staff (NPS) collaborates on the report.
- Submit spreadsheet information and photos to outside consultant for an independent review and assessment.

Outside Consultant:

- Reviews the data for each public barrier for each facility.
- Determines if the barriers meet professionally accepted standards for public safety.
- If any are deemed inadequate, makes recommendations for corrections and improvements.
- Creates a report on findings and recommendations.
- Submits report to NPS.
- NPS integrates internal and external assessment and submits to Drs. Goldentyer, Sifford, Gibbens and Theodorson.

¹Public Barrier – Definition and Parameters for Purposes of this Study

During public exhibition, any animal must be handled so there is minimal risk of harm to the animal and to the public, with sufficient distance and/or barriers between the animal and the general viewing public so as to assure the safety of animals and the public.

Sufficient Distance and/or Barriers

In order to ensure the safety of animals and the public, an average adult must not be able to touch the primary enclosure or have unsanctioned contact with the animal. Means to effectively accomplish this would be one of the following:

- **Use of an adequate public barrier-**

There must be an appropriate distance between the enclosure containing the animals and the public barrier. A barrier should be located no less the average adult arm length away from the animal enclosure. Factors such as enclosure fencing materials that allow animals to reach outside of the enclosure, the presence of hot wire inside an enclosure to keep animals away from the fencing, or a moat will have an impact on what constitutes an appropriate distance for safety.

The barrier must also be constructed in such a way that a child cannot pass under, over, or between any of the elements making up the barrier. An adult should not be able to step over the barrier without making an extraordinary effort.

- **Solid sided primary enclosure-**

Use of solid primary enclosure materials such as tempered glass or plexiglass would be sufficient to prevent contact without the use of a public barrier.

- **Use of an attendant-**

Attendants may be used to ensure that members of the general viewing public do not have unsanctioned contact with dangerous animals.

There must be a sufficient number present to control the crowds and ensure the safety of public and animals.

Appendix B: Facility List

Facility	Certificate	State
BLANK PARK ZOO	42 C 0168	IA
CHEYENNE MOUNTAIN ZOOLOGICAL SOCIETY	84 C 0001	CO
CINCINNATI ZOO	31 C 0044	OH
CITY OF DODGE CITY/Wright Park Zoo	48 C 0140	KS
CLEVELAND METROPARKS ZOO	31-C-0003	OH
COUNTY OF MILWAUKEE/Milwaukee Zoo	35 C 0020	WI
FOREST PARK ZOOLOGICAL SOCIETY	14 C 0003	MA
GLOBAL RESOURCES FOR ENV. EDU. / Tiger Sanctuary	43 C 0221	MO
JACKSONVILLE ZOOLOGICAL SOCIETY	58 C 0002	FL
JUNGLE ADVENTURES INC	58 C 1048	FL
LEE CRUTCHFIELD/Aloha Training Center	55 C 0242	NC
OMAHA ZOOLOGICAL SOCIETY	47 C 0003	NE
PUEBLO ZOOLOGICAL SOCIETY	84 C 0153	CO
SAVE THE CHIMPS	58-C-0706	FL
SIERRA NEVADA ZOOLOGICAL SOCIETY	88 C 0204	NV
SKUNKIE ACRES INC	58 C 1238	FL
THE CARE FOUNDATION	58 C 1007	FL
THE WILD ANIMAL SANCTUARY	84 C 0019	CO
WILD ANIMALS, INC.	43 C 0301	MO
ZOOTASTIC OF LAKE NORMAN INC	55 C 0272	NC