BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, KANSAS

WEDNESDAY, OCTOBER 26, 2011
4:00 p.m.

-Consider need to extend Burn Ban

CONSENT AGENDA

(1)(a) Consider approval of Commission Orders;
(b) Consider for **CUP-12-8-10** (with revised conditions) as deferred from the October 19, 2011, for the Fraternal Order of Police shooting range, located at 768 E. 661 Diagonal Road. (Mary Miller);
(c) Consider granting permission to Colt Energy to use road right-of-way for oil pipeline facilities (Michael Kelly); backup to follow in Monday, October 24; and
(d) Acknowledge fee reports for September 2011

REGULAR AGENDA

(2) Announcement of Take Charge Challenge results (presentation by Eileen Horn)-No backup

(3) Presentation of Tri-County Food System Report (Douglas County Food Policy Council members) -No backup

(4) Executive Session to discuss road right-of-way acquisition

(5) Other Business
(a) Consider approval of Accounts Payable (if necessary)
(b) Appointments:
Building Code Board of Appeals - vacancy
Douglas County Advocacy Council on Aging – vacancy
Douglas County Community Corrections Advisory Board - 12/2011
Douglas County Senior Services, Inc. Board of Directors - 12/2011
Jayhawk Area Agency on Aging Tri-County Advisory Council - vacancy
Fire/EMS District No. 1 - 12/2011
(c) Public Comment
(d) Miscellaneous

(6) Adjourn

THURSDAY, OCTOBER 27, 2011
11:00 a.m.- Kansas River Bridge Luncheon at Holidome, Sponsored by KDOT. More than one Commissioner may attend. No County business will be conducted.

WEDNESDAY, NOVEMBER 2, 2011

WEDNESDAY, NOVEMBER 9, 2011

WEDNESDAY, NOVEMBER 16, 2011

WEDNESDAY, NOVEMBER 23, 2011
-No Commission Meeting

WEDNESDAY, NOVEMBER 30, 2011

4:00 p.m.

-Recognize Agamani Sen, P.E., Chief Design Engineer, for receiving the George C. Askew award from the Kansas Certified Public Manager program (Keith Browning)

WEDNESDAY, DECEMBER 7, 2011

6:35 p.m.-Kaw Valley Sand Dredging CUP- requesting the item to be remanded back to Lawrence-Douglas County Planning Commission (Sandy Day

***Note**: The Douglas County Commission meets regularly on Wednesdays at 4:00 P.M. for administrative items and 6:35 P.M. for public items at the Douglas County Courthouse. Specific regular meeting dates that are not listed above have not been cancelled unless specifically noted on this schedule.*

CONDITIONS OF APPROVAL FOR CUP-12-8-10
FRATERNAL ORDER OF POLICE CONDITIONAL USE PERMIT,
AS REVISED BY COUNTY COMMISSION -- OCTOBER 19, 2011
(**new language** ~~deleted text~~ *staff comment)*

1) The provision of a revised site plan with the following changes:
   a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
   b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.

2) Uses which are approved with this CUP include the following:
   a) Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events.
   b) Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering.
   c) The use of the firing ranges by the Fraternal Order of Police members and their guests.

3) The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points during a typical training event.
   ~~a) This testing shall be completed within 6 months of the CUP approval date.~~
   b) Copies of the testing report shall be provided to the Lawrence-Douglas County Planning Office (6 East 6th Street, Lawrence, KS 66044) and the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence, KS 66047).
   c) ~~If noise abatement measures are found to be necessary based on these tests, the Fraternal Order of Police shall provide a noise abatement plan to the Planning Office for approval within 1 year of the testing date~~. **The Fraternal Order of Police shall implement noise abatement measures within 1 year with a goal of reducing the noise level to 65 decibels at the closest receiving point during a typical training session.**

(The Fraternal Order of Police asked if it might be possible to get an extension, if necessary. Most changes to the conditions of a CUP require a public hearing before the Planning Commission so to clarify that this wouldn't be necessary, I will include the following statement in the action letter :

"The Board of County Commissioners may approve an extension if it determines that a good faith effort has been made to implement the abatement measures.")

4) SIGNAGE:
   a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress, **including Washington Creek**. The plan shall identify the approximate location of these signs.
   b) Signs shall be posted at all ranges with the following safety information:
      - Organized group or training activities must have a designated range safety officer on site
      - Eye and ear protection must be worn when firing.
      - Alcoholic beverages are prohibited on the firing ranges.
   c) A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies.
   ~~d) Similar identification signs shall be posted where Washington Creek crosses the property line for the benefit of recreational users of the Creek.~~

5) HOURS OF OPERATION:
   a) The FOP shall not allow range operations on New Year's Day, Easter, Thanksgiving, Christmas Eve, and Christmas Day.
   b) Law Enforcement Training and other groups on firing ranges.

i) The FOP shall limit use of shooting on its ranges by Law Enforcement, Hunter Safety and other similar activities to
Monday thru Friday: 7:00 a.m. to 7:00 p.m.;
Saturday: 9:00 a.m. to 7:00 p.m.; and
Sunday: 11:30 a.m. to 7:00 p.m.

ii) Law enforcement groups shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m.
The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur.
The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgment such modification is necessary for the proper training of Law Enforcement officers who have jurisdiction in Douglas County. When reasonably possible the Sheriff or Chief shall notify the Douglas County Zoning and Codes department in writing of this Decision.

c) Individual use of the ranges by FOP members
Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.

6) When there are training exercises involving the firing ranges, the range safety officer shall determine if any other activities may occur.

7) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.

8) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.

9) LEAD MANAGEMENT
   a) Soil shall be tested for pH levels within 6 months of CUP approval and annually thereafter to insure proper pH levels and to monitor any changes. (Note: The ideal pH should be between 6.5 and 8.5. Do not add lime if the pH is above 8.5) Tests shall be conducted in the following locations:
      i) Pistol Range berm area;
      ii) Area between the pistol range area and the nearest downgrade surface water; and
      iii) The trap shotfall area.
   b) The water in Washington Creek shall be tested within 6 months of CUP approval and annually thereafter to check for lead pollution.
   c) Records of all soil and water tests shall be provided to the Planning Office (6 East 6th Street, Lawrence KS 66044) for distribution to KDHE, the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence KS 66047) and kept on file at the FOP office.
   d) Lime or other amendments shall be added as recommended by the Douglas County Extension Office, or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges to maintain a proper pH balance.
   e) The Fraternal Order of Police shall provide a lead management plan to planning staff for approval within 1 year of the determination date if:
      i) It is determined from the soil tests that it is not possible to manage the pH level effectively with soil amendments, or
      ii) The water tests indicate lead pollution in Washington Creek.

10) The CUP shall be reviewed administratively **by the Director of Douglas County Zoning and Codes** every 5 years. **The purpose of this review to insure compliance with the CUP plan and conditions of approval.**

CONDITIONS OF APPROVAL FOR CUP-12-8-10
FRATERNAL ORDER OF POLICE CONDITIONAL USE PERMIT,
AS REVISED BY PLANNING COMMISSION -- SEPTEMBER 26, 2011

1) The provision of a revised site plan with the following changes:
   a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
   b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.

2) Uses which are approved with this CUP include the following:
   a) Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events.
   b) Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering.
   c) The use of the firing ranges by the Fraternal Order of Police members and their guests.

3) The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points during a typical training event.
   a) This testing shall be completed within 6 months of the CUP approval date.
   b) Copies of the testing report shall be provided to the Lawrence-Douglas County Planning Office (6 East 6th Street, Lawrence, KS 66044) and the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence, KS 66047).
   c) If noise abatement measures are found to be necessary based on these tests, the Fraternal Order of Police shall provide a noise abatement plan to the Planning Office for approval within 1 year of the testing date.

4) SIGNAGE:
   a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress. The plan shall identify the approximate location of these signs.
   b) Signs shall be posted at all ranges with the following safety information:
      - Organized group or training activities must have a designated range safety officer on site
      - Eye and ear protection must be worn when firing.
      - Alcoholic beverages are prohibited on the firing ranges.
   c) A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies.
   d) Similar identification signs shall be posted where Washington Creek crosses the property line for the benefit of recreational users of the Creek.

6) HOURS OF OPERATION:

a) Law Enforcement Training and other groups on firing ranges.

i) The FOP shall limit use of shooting on its ranges by Law Enforcement, Hunter Safety and other similar activities to

Monday thru Friday: 7:00 a.m. to 7:00 p.m.;
Saturday: 9:00 a.m. to 7:00 p.m.; and
Sunday: 11:30 a.m. to 7:00 p.m.

ii) Law enforcement groups shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m.

The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur.

The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgment such modification is necessary for the proper training of Law Enforcement officers who have jurisdiction in Douglas County. When reasonably possible the Sheriff or Chief shall notify the Douglas County Zoning and Codes department in writing of this Decision.

b) Individual use of the ranges by FOP members

Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.

7) When there are training exercises involving the firing ranges, the range safety officer shall determine if any other activities may occur.

8) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.

9) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.

10) LEAD MANAGEMENT

a) Soil shall be tested for pH levels within 6 months of CUP approval and annually thereafter to insure proper pH levels and to monitor any changes. (Note: The ideal pH should be between 6.5 and 8.5. Do not add lime if the pH is above 8.5) Tests shall be conducted in the following locations:
i) Pistol Range berm area;
ii) Area between the pistol range area and the nearest downgrade surface water; and
iii) The trap shotfall area.

b) The water in Washington Creek shall be tested within 6 months of CUP approval and annually thereafter to check for lead pollution.

c) Records of all soil and water tests shall be provided to the Planning Office (6 East 6th Street, Lawrence KS 66044) for distribution to KDHE, the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence KS 66047) and kept on file at the FOP office.

d) Lime or other amendments shall be added as recommended by the Douglas County Extension Office, or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges to maintain a proper pH balance.

e) The Fraternal Order of Police shall provide a lead management plan to planning staff for approval within 1 year of the determination date if:

   i) It is determined from the soil tests that it is not possible to manage the pH level effectively with soil amendments, or

   ii) The water tests indicate lead pollution in Washington Creek.

11) The CUP shall be reviewed administratively every 5 years.

STAFF RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	PLANNING COMMISSION REVISED CONDITIONS
1) The provision of a revised site plan with the following changes: a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops. b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.	1) The FOP shall submit a revised site plan showing the backdrops for the pistol and rifle firing ranges. The trap shooting range and the shooting house do not need to have backdrops. 8) The CUP is subject to conditions of approval of the Board of County Commissioners.	Use condition recommended by Staff.
2) Uses which are approved with this CUP include the following: a) Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events. b) Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering. c) The use of the firing ranges by the Fraternal Order of Police members and their guests.	--Omitted--	Use condition recommended by Staff.
3) The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points* during a typical training event. If the noise levels are above a certain level, noise abatement measures shall be utilized to reduce the noise level to an acceptable level. The FOP shall develop a noise abatement plan within 6 months of the noise measurements, if abatement is found to be necessary. The plan shall include measures for abatement as well as a proposed time frame and shall be provided to the County Commission for approval.	2. The FOP will cooperate with the county and the city to try and obtain a reduced noise level from the ranges.	3) The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points during a typical training event. a) This testing shall be completed within 6 months of the CUP approval date. b) Copies of the testing report shall be provided to the Lawrence-Douglas County Planning Office (6 East 6th Street, Lawrence, KS 66044) and the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence, KS 66047). c) If noise abatement measures are found to be necessary based on these tests, the Fraternal Order of Police shall provide a noise abatement plan to the Planning Office for approval within 1 year of the testing date.
4) Noise levels at the receiving point* shall be measured annually during typical training events and additional noise abatement measures implemented, if necessary. A record of the yearly noise levels shall be kept on file for review by the Douglas County Zoning and Codes Office.	--Omitted--	Omit
5) SIGNAGE: a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress. The plan shall identify the approximate location of these signs.	3. The FOP shall post no trespassing signs on any boundary area where it could reasonably be expected that persons might enter the property. Safety signage -- omitted	Use Staff's recommended condition and add the following: Similar identification signs shall be posted where Washington Creek crosses the property line for the benefit of recreational users of the Creek.

STAFF RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	PLANNING COMMISSION REVISED CONDITIONS
b) Signs shall be posted at all ranges with the following safety information: • Organized group or training activities must have a designated range safety officer on site • Eye and ear protection must be worn when firing. • Alcoholic beverages are prohibited on the firing ranges. c) A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies. (Conditions 5-7 combined)	4. The FOP will place three signs in close proximity to each other at the main gate off county road E -661. Those signs will read: "Keep Out!, High Noise Area! And Dangerous Area!"	
6) Hours of Operation*: The range shall not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. The range may operate at the following times: • 8 AM to 8 PM Monday through Friday; • 10:00 AM to 6:00 PM on Saturday and Sundays. • Night shooting events may occur up to 10 times a year, with a time limit of 10:00 PM. Neighbors within 1 mile must be notified of night shooting events at least 3 days in advance through either email, letter or phone call.	5. *The FOP shall not allow range operations on New Year's Day, Easter, Thanksgiving, Christmas Eve, and Christmas Day. 6. Restriction on hours of operation for the Firing Ranges. **Law Enforcement, Military Training and other groups on firing ranges.** The FOP shall limit use of shooting on its ranges by Law Enforcement, Military Training, Hunter Safety and other similar activities to Monday thru Friday 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 7:00 p.m., Sunday 11:30 a.m. to 7:00 p.m. Law enforcement and the Military shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m. The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur. The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgment such modification is necessary for the proper training of Law Enforcement officers who have jurisdiction in Douglas county. When reasonably possible the Sheriff or chief shall notify the Douglas county Zoning and Codes department in writing of this decision.	Use FOP proposed hours of operation.

STAFF RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	PLANNING COMMISSION REVISED CONDITIONS
	Individual use of the ranges by FOP members Individual use by FOP members. Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.	
7) When there are training exercises a involving the firing ranges, the range safety officer shall determine if any other activities may occur.	--Omitted--	Use Staff's recommended condition.
8) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.	7. The 94 acres included in the CUP shall remain in the FOP ownership to serve as a buffer area. Any reduction in the area will require an Amended CUP.	Use this condition.
9) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.	--Omitted--	Use Staff's recommended condition.
10) A lead management program shall be put into place which includes soil testing and amendments and lead removal when necessary. a) The property owner shall have the soil tested at the pistol range berm area, **in the area between the pistol range area and the nearest downgrade surface water,** and in the trap shotfall area at annual intervals to insure property pH levels and to monitor any changes. Copies of the soil tests shall be kept on file in the FOP office for review by Zoning and Codes Staff. b) Lime or other amendments shall be added as recommended by the Douglas County Extension Office, **or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges** to maintain a proper pH balance. c) If it is not possible to manage the pH level effectively with soil amendments, a professional lead recovery firm shall be contacted to remove lead from the site. A report shall be submitted to the Douglas County Zoning and Codes Office indicating who did the lead reclamation, how much lead was recovered and what was the final disposition of the lead.	--Omitted--	10. a) Soil shall be tested for pH levels within 6 months of CUP approval and annually thereafter to insure proper pH levels and to monitor any changes. (Note: The ideal pH should be between 6.5 and 8.5. Do not add lime if the pH is above 8.5) Tests shall be conducted in the following locations: i) Pistol Range berm area; ii) Area between the pistol range area and the nearest downgrade surface water; and iii) The trap shotfall area. b) The water in Washington Creek shall be tested within 6 months of CUP approval and annually thereafter to check for lead pollution. c) Records of all soil and water tests shall be provided to the Planning Office (6 East 6th Street, Lawrence KS 66044) for distribution to KDHE, the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence KS 66047) and kept on file at the FOP office. d) Lime or other amendments shall be added as recommended by the Douglas County Extension Office, or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges to maintain a proper pH balance. e) The Fraternal Order of Police shall provide a lead management plan to planning staff for approval within 1 year of the determination date if: I) It is determined from the soil tests that it is not possible to manage the pH level effectively with soil amendments, or II) The water tests indicate lead pollution in Washington Creek.

STAFF RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	PLANNING COMMISSION REVISED CONDITIONS
11) Soil pH levels shall be monitored on an annual basis to insure that the lead management plan is effective. The records shall be kept on file at the FOP office for review by staff of the Douglas County Zoning and Codes Office.	~~Omitted~~	Revised and included with condition 10
12) Crushed limestone shall be spread, and maintained, in front of all backstops **per the recommendations in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges.**	~~Omitted~~	Revised and included with condition 10
13) Documentation in the form of reports at each range will be kept as to management activities used to prevent lead migration. It will be the responsibility of the range master or property owner to compile this information and keep it on hand for review by the Douglas County Zoning and Codes Office personnel. All lead management activities shall be documented as follows: 1. Type of management activity 2. Date and time of activity 3. If lead was removed note the quantity, the company that removed the lead, where the lead was taken and what was done with it.	~~Omitted~~	Revised and included with condition 10
		11) Added: The CUP shall be reviewed administratively every 5 years.

Memorandum
City of Lawrence
Planning & Development Services

TO: **Planning Commission**

FROM: **Mary Miller, Planning Staff**

CC: **Scott McCullough, Planning and Development Services Director**
Sheila Stogsdill, Assistant Planning Director

Date: **For September 26, 2011 meeting**

RE: **Agenda Item No. 2: Conditional Use Permit for Fraternal Order of Police Shooting Range; 768 E 661 Diagonal Road**

Attachments:
Attachment A: Conditions proposed by the Fraternal Order of Police Board
Attachment B: Condition Comparison Chart

The Planning Commission considered the CUP referenced above at their April meeting and voted to defer it to allow staff and the applicant time to work together on the conditions. The conditions below have been revised following several discussions with the Fraternal Order of Police representative, Dan Affalter and his counsel, Mike Riling. The Fraternal Order of Police Board considered the conditions noted below and provided a set of conditions which are included as Attachment A with this memo. A comparison chart is included as Attachment B, which compares the conditions originally recommended by staff, staff's revised conditions, and those proposed by the Fraternal Order of Police Board.

REVISED CONDITIONS: Deleted text is shown as ~~struckthrough~~ and new text is in **bold** print. The conditions follow with all changes incorporated.

STAFF RECOMMENDATION: Staff recommends approval of the Conditional Use Permit for the FOP shooting range subject to the following conditions:

1) The provision of a revised site plan with the following changes:
   a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
   b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.
2) Uses which are approved with this CUP include ~~the use of the firing ranges and military and other training on the site that does not involve the firing of weapons~~. **the following:**
   a) **Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events.**

b) **Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering.**
c) **The use of the firing ranges by the Fraternal Order of Police members and their guests.**

~~3) Noise abatement measures shall be utilized in order to achieve an 'acceptable' sound level at the property boundary of 65 dB(A) for up to 8 hours out of 24.~~
~~a) Proposed abatement measures must be submitted and approved prior to release of the CUP to Douglas County Zoning and Codes Office.~~
~~b) Noise levels shall be measured at the property boundaries following the approval of the CUP and noise abatement measures shall be installed within 3 months of the approval of this CUP.~~

3) **The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points during a typical training event. If the noise levels are above an acceptable level, noise abatement measures shall be utilized to reduce the noise level to an acceptable level. The FOP shall develop a noise abatement plan within 6 months of the noise measurements, if abatement is found to be necessary. The plan shall include measures for abatement as well as a proposed time frame and shall be provided to the County Commission for approval.**

4) Noise levels shall be measured at the ~~property boundary~~ **receiving points** ~~yearly~~ **annually during typical training events** and **the sound management plan revised with** additional noise abatement measures **and time frame** ~~implemented~~, if necessary. A record of the yearly noise levels shall be kept on file for review by the Douglas County Zoning and Codes Office.

~~5) In addition to 'no trespassing', the signs posted around the perimeter of the range area shall also note that this is a 'firing range'. The colors of the sign shall be bold so as to be very visible in the wooded areas and they shall be placed at 100 ft intervals around the range perimeter.~~

~~6) Signs shall be posted at all ranges with the following safety information:~~
~~a) Range master must be present when there is firing on the range.~~
~~b) Noise protection must be worn when firing.~~
~~c) Alcoholic beverages are prohibited on the firing ranges.~~

~~7) A sign shall be posted on the main gate which identifies the area as a Fraternal Order of Police Firing Range and state that no admittance is restricted to FOP members and their guests. A contact number for a representative of the FOP who is available to respond during the hours of operation of the firing ranges shall be included on the sign.~~

(CONDITIONS 5 THROUGH 7 HAVE BEEN REVISED AND COMBINED INTO CONDITION 5)

5) **SIGNAGE:**

a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress. The plan shall identify the approximate location of these signs.

b) Signs shall be posted at all ranges with the following safety information:
- **Organized group or training activities must have a designated range safety officer on site**
- **Eye and ear protection must be worn when firing.**

- **Alcoholic beverages are prohibited on the firing ranges.**

c) **A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies.**

6) Hours of Operation: The range shall not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. The range may operate at the following times:
   - 8 AM to 8 PM Monday through ~~Thursday~~ **Friday**;
   - ~~8:00 AM to 5:00 PM on Friday; and~~
   - 10:00 AM to 6:00 PM on Saturday and Sundays.
   - Night shooting events may occur up to ~~3~~ **10** times a year, with a time limit of 10:00 PM. Neighbors within 1 mile must be notified of night shooting events at least 3 days in advance through either email, letter or phone call.

   --FOP PROPOSED HOURS:
   Group use:
   Monday – Friday 7:30 AM to 8:00 PM
   Saturday 9 AM to 7 PM
   Sunday 11:30 AM to 7 PM
   10 night shooting events a year with notification.

   FOP Individual use:
   8:00 AM to 9:30 PM everyday but holidays

7) When there are training exercises ~~at~~ **involving** the firing ranges, ~~no other *outdoor* events may occur on the property~~ **the range safety officer shall determine if any other activities may occur.**

8) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.

~~9) The following note shall be added to the CUP "*The CUP requires the retention of the 94 acres included in the approval. The wooded areas included in the parcels surrounding the range areas are to remain intact to serve as buffers. The only removal of trees that may occur are to remove dead or diseased trees, or to create trails through the wooded areas. Any other removal or reduction of trees shall require an amendment to the CUP.*"~~

9) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.

~~10) Military training is restricted to the use of weapons similar to those used by law enforcement agencies. A list of these weapons shall be provided for the file.~~

10) A lead management program shall be put into place which includes soil testing and amendments and lead removal when necessary.

a) **The property owner shall have the soil tested at the pistol range berm area, in the area between the pistol range area and the nearest downgrade surface water, and in the trap shotfall area at annual intervals to insure proper pH levels and to monitor any changes. Copies of the soil tests shall be kept on file in the FOP office for review by Zoning and Codes staff.**

b) **Lime or other soil amendments shall be added as recommended by the Douglas County Extension Office or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges to maintain a proper pH balance.**

c) **If it is not possible to manage the pH level effectively with soil amendments, a professional lead recovery firm shall be contacted to remove lead from the site. A report shall be submitted to the Douglas County Zoning and Codes Office indicating who did the lead reclamation, how much lead was recovered and what was the final disposition of the lead.** ~~A lead recycling program shall be put into place. Lead will be reclaimed and recycled when the estimate of rounds fired reaches 100,000 or every 7 years, whichever comes first. If lead has not been reclaimed within the past 7 years, it will be necessary to reclaim the lead within 3 months of the approval of the CUP. Lead reclamation and clean up will be done by a professional lead recovery company and a report shall be submitted to the Douglas County Zoning and Codes Office.~~

11) Soil pH levels shall be monitored on an annual basis to insure that the lead management plan is effective. The records shall be kept on file at the FOP office for review by staff of the Douglas County Zoning and Codes Office. ~~Lime shall be added to the soil annually, if necessary, to maintain the correct pH levels per the following ratios:~~

- ~~50 pounds (for sandy soils) or 100 lbs (for clayey soils) per 1000 sq ft of range will raise the pH approximately one pH unit. The ideal pH should be between 6.5 and 8.5.~~
- ~~Do not add lime if the pH is above 8.5~~

12) Crushed limestone shall be spread, and maintained, in front of all backstops **per the recommendations in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges**.

13) Documentation in the form of reports at each range will be kept as to ~~the number of rounds fired and the type of ammunition used as well as~~ the management activities used to prevent lead migration. It will be the responsibility of the range master or property owner to compile this information and keep it on hand for review by the Douglas County Zoning and Codes Office personnel.

~~All shooting activities at the range will be documented as to usage as follows:~~

~~1. Type of firearm used~~
~~2. Type of ammunition used~~
~~3. Number of rounds fired~~

All lead management activities shall be documented as follows:

1. Type of management activity
2. Date and time of activity
3. If lead was removed note the quantity, the company that removed the lead, where the lead was taken and what was done with it.

REVISED CONDITIONS WITH CHANGES INCORPORATED:

1) The provision of a revised site plan with the following changes:
   a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
   b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.

2) Uses which are approved with this CUP include the following:
   d) Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events.
   e) Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering.
   f) The use of the firing ranges by the Fraternal Order of Police members and their guests.

3) The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points during a typical training event. If the noise levels are above an acceptable level, noise abatement measures shall be utilized to reduce the noise level to an acceptable level. The FOP shall develop a noise abatement plan within 6 months of the noise measurements, if abatement is found to be necessary. The plan shall include measures for abatement as well as a proposed time frame and shall be provided to the County Commission for approval.

4) Noise levels shall be measured at the receiving points annually during typical training events and the sound management plan revised with additional noise abatement measures and time frame, if necessary. A record of the yearly noise levels shall be kept on file for review by the Douglas County Zoning and Codes Office.

5) SIGNAGE:
   a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress. The plan shall identify the approximate location of these signs.
   b) Signs shall be posted at all ranges with the following safety information:
      - Organized group or training activities must have a designated range safety officer on site
      - Eye and ear protection must be worn when firing.
      - Alcoholic beverages are prohibited on the firing ranges.
   c) A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies.

6) Hours of Operation: The range shall not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. The range may operate at the following times:
   - 8 AM to 8 PM Monday through Friday;
   - 10:00 AM to 6:00 PM on Saturday and Sundays.

- Night shooting events may occur up to 10 times a year, with a time limit of 10:00 PM. Neighbors within 1 mile must be notified of night shooting events at least 3 days in advance through either email, letter or phone call.

7) When there are training exercises involving the firing ranges, the range safety officer shall determine if any other activities may occur.

8) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.

9) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.

10) A lead management program shall be put into place which includes soil testing and amendments and lead removal when necessary.

   d) The property owner shall have the soil tested at the pistol range berm area, in the area between the pistol range area and the nearest downgrade surface water, and in the trap shotfall area at annual intervals to insure proper pH levels and to monitor any changes. Copies of the soil tests shall be kept on file in the FOP office for review by Zoning and Codes staff.

   e) Lime or other soil amendments shall be added as recommended by the Douglas County Extension Office or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges to maintain a proper pH balance.

   f) If it is not possible to manage the pH level effectively with soil amendments, a professional lead recovery firm shall be contacted to remove lead from the site. A report shall be submitted to the Douglas County Zoning and Codes Office indicating who did the lead reclamation, how much lead was recovered and what was the final disposition of the lead.

11) Soil pH levels shall be monitored on an annual basis to insure that the lead management plan is effective. The records shall be kept on file at the FOP office for review by staff of the Douglas County Zoning and Codes Office.

12) Crushed limestone shall be spread, and maintained, in front of all backstops per the recommendations in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges.

13) Documentation in the form of reports at each range will be kept as to the management activities used to prevent lead migration. It will be the responsibility of the range master or property owner to compile this information and keep it on hand for review by the Douglas County Zoning and Codes Office personnel.

   All lead management activities shall be documented as follows:

   - Type of management activity
   - Date and time of activity
   - If lead was removed note the quantity, the company that removed the lead, where the lead was taken and what was done with it.

FOP CONDITIONAL USE PERMIT FOR OPERATION OF FIRING RANGES

1. The FOP shall submit a revised site plan showing the backdrops for the pistol and rifle firing ranges. The trap shooting range and the shooting house do not need to have backdrops.

2. The FOP will cooperate with the county and the city to try and obtain a reduced noise level from the ranges.

3. The FOP shall post no trespassing signs on any boundary area where it could reasonably be expected that persons might enter the property.

4. The FOP will place three signs in close proximity to each other at the main gate off county road E-661. Those signs will read: "Keep Out!, High Noise Area! And Dangerous Area!"

5. The FOP shall not allow range operations on New Year's Day, Easter, Thanksgiving, Christmas Eve, and Christmas Day.

6. Restriction on hours of operation for the Firing Ranges.

Law Enforcement, Military Training and other groups on firing ranges.

The FOP shall limit use of shooting on its ranges by Law Enforcement, Military Training, Hunter Safety and other similar activities to Monday thru Friday 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 7:00 p.m., Sunday 11:30 a.m. to 7:00 p.m.

Law enforcement and the Military shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m. The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur. The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgement such modification is necessary for the proper training of Law

Enforcement officers who have jurisdiction in Douglas County. When reasonably possible the Sheriff or Chief shall notify the Douglas County Zoning and Codes department in writing of this Decision.

Individual use of the ranges by FOP members

Individual use by FOP members. Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.

7. The 94 acres included in the CUP shall remain in the FOP ownership to serve as a buffer area. Any reduction in the area will require an Amended CUP.

8. The CUP is subject to conditions approval of the Board of County Commissioners.

COMPARISON OF CONDITIONS RECOMMENDED BY STAFF WITH THOSE PROPOSED BY THE FRATERNAL ORDER OF POLICE

ORIGINAL RECOMMENDED CONDITIONS	REVISED RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	STAFF COMMENTS
1) The provision of a revised site plan with the following changes: a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops. b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.	1) The provision of a revised site plan with the following changes: a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops. b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.	1) The FOP shall submit a revised site plan showing the backdrops for the pistol and rifle firing ranges. The trap shooting range and the shooting house do not need to have backdrops. 8) The CUP is subject to conditions of approval of the Board of County Commissioners.	These conditions are very similar. Staff recommends that the note regarding the conditions of approval be placed on the plan as notification that the shooting range is subject to conditions which are listed elsewhere.
2) Uses which are approved with this CUP include the use of the firing ranges and military and other training on the site that does not involve the firing of weapons.	2) Uses which are approved with this CUP include the following: g) Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events. h) Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering. i) The use of the firing ranges by the Fraternal Order of Police members and their guests.	--Omitted--	Many uses currently exist on this property, and this condition is intended to clarify the uses that are being approved or regulated with this CUP. Military training was not included with the staff recommendation as this is a very vague category. If military training is to occur on the site, more information on the type of training should be provided and limitations on the types of weapons established.
3) Noise abatement measures shall be utilized in order to achieve an 'acceptable' sound level at the property boundary of 65 dB(A) for up to 8 hours out of 24. a) Proposed abatement measures must be submitted and approved prior to release of the CUP to Douglas County Zoning and Codes Office. b) Noise levels shall be measured at the property boundaries following the approval of the CUP and noise abatement measures shall be installed within 3 months of the approval of this CUP.	3) The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points* during a typical training event. If the noise levels are above a certain level, noise abatement measures shall be utilized to reduce the noise level to an acceptable level. The FOP shall develop a noise abatement plan within 6 months of the noise measurements, if abatement is found to be necessary. The plan shall include measures for abatement as well as a proposed time frame and shall be provided to the County Commission for approval.	2. The FOP will cooperate with the county and the city to try and obtain a reduced noise level from the ranges.	Noise is the principal impact upon the neighboring properties. The first step to dealing with the impact is to measure the noise levels that currently exist and determining what noise abatement measures would be necessary and feasible. If it is determined that no abatement measures are feasible, it may be necessary to reduce the hours to minimize the negative impact. *The Commission recommended measuring the sound levels at the receiving points, but measuring at the property boundary provides a set location for measurements. Acceptable noise levels could be established for the boundary.
4) Noise levels at the property boundary shall be measured yearly and additional noise abatement measures implemented, if necessary. A record of the yearly noise levels shall be kept on file for review by the Douglas County Zoning and Codes Office.	4) Noise levels at the receiving point* shall be measured annually during typical training events and additional noise abatement measures implemented, if necessary. A record of the yearly noise levels shall be kept on file for review by the Douglas County Zoning and Codes Office.	--Omitted--	This condition insures that acceptable noise levels will be maintained if the use at the range intensifies or different weapons are used.

COMPARISON OF CONDITIONS RECOMMENDED BY STAFF WITH THOSE PROPOSED BY THE FRATERNAL ORDER OF POLICE

ORIGINAL RECOMMENDED CONDITIONS	REVISED RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	STAFF COMMENTS
5) In addition to 'no trespassing', the signs posted around the perimeter of the range area shall also note that this is a 'firing range'. The colors of the sign shall be bold so as to be very visible in the wooded areas and they shall be placed at 100 ft intervals around the range perimeter.	5) SIGNAGE: a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress. The plan shall identify the approximate location of these signs. b) Signs shall be posted at all ranges with the following safety information: • Organized group or training activities must have a designated range safety officer on site • Eye and ear protection must be worn when firing. • Alcoholic beverages are prohibited on the firing ranges. c) A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies. (Conditions 5-7 combined)	3. The FOP shall post no trespassing signs on any boundary area where it could reasonably be expected that persons might enter the property. Safety signage — omitted 4. The FOP will place three signs in close proximity to each other at the main gate off county road E - 661. Those signs will read: "Keep Out!, High Noise Area! And Dangerous Area!"	Staff recommends noting the location of the 'no trespassing' signs on the plan to assist in the enforcement of this requirement. (5a) Safety signage is recommended to insure that safety precautions are taken by all users of the range. (5b) Signage is recommended on the main gate along with the CUP number so interested parties can contact the planning office for more information on the use. The FOP contact number is provided in the case of non-compliant activities or emergencies. (5c)
6) Signs shall be posted at all ranges with the following safety information: a) Range-master must be present when there is firing on the range. b) Noise protection must be worn when firing. c) Alcoholic beverages are prohibited on the firing ranges.			
7) A sign shall be posted on the main gate which identifies the area as a Fraternal Order of Police Firing Range and state that no admittance is restricted to FOP members and their guests. A contact number for a representative of the FOP who is available to respond during the hours of operation of the firing ranges shall be included on the sign.			
8) Hours of Operation*: The range shall not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. The range may operate at the following times: • 8 AM to 8 PM Monday through Thursday; • 8:00 AM to 5:00 PM on Friday; and • 10:00 AM to 6:00 PM on Saturday and Sundays. • Night shooting events may occur up to 3 times	6) Hours of Operation*: The range shall not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. The range may operate at the following times: • 8 AM to 8 PM Monday through Friday; • 10:00 AM to 6:00 PM on Saturday and Sundays. • Night shooting events may occur up to 10 times a year, with a time limit of 10:00 PM. Neighbors within 1 mile must be notified of night shooting events at least 3 days in advance through either email, letter	5. *The FOP shall not allow range operations on New Year's Day, Easter, Thanksgiving, Christmas Eve, and Christmas Day. 6. Restriction on hours of operation for the Firing Ranges. **Law Enforcement, Military Training and other groups on firing ranges.** The FOP shall limit use of shooting on its ranges by Law Enforcement, Military Training, Hunter Safety and other similar activities to Monday thru Friday 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 7:00	* For clarity, the operating hours are provided in a table following this chart. Staff recommends one set of operating hours, as the noise from shooting is dependent on the activity, not the user (whether it be the FOP or a training event). Enforcement would be very difficult with 2 different operating hours.

COMPARISON OF CONDITIONS RECOMMENDED BY STAFF WITH THOSE PROPOSED BY THE FRATERNAL ORDER OF POLICE

ORIGINAL RECOMMENDED CONDITIONS	REVISED RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	STAFF COMMENTS
a year, with a time limit of 10:00 PM. Neighbors within 1 mile must be notified of night shooting events at least 3 days in advance through either email, letter or phone call.	or phone call.	p.m., Sunday 11:30 a.m. to 7:00 p.m. Law enforcement and the Military shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m. The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur. The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgment such modification is necessary for the proper training of Law Enforcement officers who have jurisdiction in Douglas county. When reasonably possible the Sheriff or chief shall notify the Douglas county Zoning and Codes department in writing of this decision. **Individual use of the ranges by FOP members** Individual use by FOP members. Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.	
9) When there are training exercises at the firing ranges, no other outdoor events may occur on the property.	7) When there are training exercises a involving the firing ranges, the range safety officer shall determine if any other activities may occur.	–Omitted–	This condition is intended to assign responsibility for insuring safety when scheduling other events on the property when the firing range is in use. The FOP indicated that the range safety officer is currently responsible for the scheduling, so the condition was revised to reflect the current practice.
10) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.	8) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.	7. The 94 acres included in the CUP shall remain in the FOP ownership to serve as a buffer area. Any reduction in the area will require an Amended CUP.	Same conditions
11) The following note shall be added to the CUP "*The CUP requires the retention of the 94 acres included in the approval. The wooded areas included in the parcels surrounding the range areas are to remain intact to serve as buffers. The only removal of trees that may occur are to*	9) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.	–Omitted–	Vegetation is a principal sound deadening component, so the limited cutting of trees in the buffer area is an important condition.

COMPARISON OF CONDITIONS RECOMMENDED BY STAFF WITH THOSE PROPOSED BY THE FRATERNAL ORDER OF POLICE

ORIGINAL RECOMMENDED CONDITIONS	REVISED RECOMMENDED CONDITIONS	FOP PROPOSED CONDITIONS	STAFF COMMENTS
remove dead or diseased trees, or to create trails through the wooded areas. Any other removal or reduction of trees shall require an amendment to the CUP."			
12) Military training is restricted to the use of weapons similar to those used by law enforcement agencies. A list of these weapons shall be provided for the file.	–Omitted–	–Omitted–	If military training is to occur on this property, it would be important to add this note or to limit military training events as military training could have different noise impacts than local law-enforcement
13) A lead recycling program shall be put into place. Lead will be reclaimed and recycled when the estimate of rounds fired reaches 100,000 or every 7 years, whichever comes first. If lead has not been reclaimed within the past 7 years, it will be necessary to reclaim the lead within 3 months of the approval of the CUP. Lead reclamation and clean-up will be done by a professional lead recovery company and a report shall be submitted to the Douglas County Zoning and Codes Office.	10) A lead management program shall be put into place which includes soil testing and amendments and lead removal when necessary. a) The property owner shall have the soil tested at the pistol range berm area, **in the area between the pistol range area and the nearest downgrade surface water,** and in the trap shotfall area at annual intervals to insure property pH levels and to monitor any changes. Copies of the soil tests shall be kept on file in the FOP office for review by Zoning and Codes Staff. b) Lime or other amendments shall be added as recommended by the Douglas County Extension Office, **or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges** to maintain a proper pH balance. c) If it is not possible to manage the pH level effectively with soil amendments, a professional lead recovery firm shall be contacted to remove lead from the site. A report shall be submitted to the Douglas County Zoning and Codes Office indicating who did the lead reclamation, how much lead was recovered and what was the final disposition of the lead.	–Omitted–	This condition was revised so that lead recovery is conducted only when soil tests indicate it is necessary. When enough lead has accumulated in the ground, the lead recovery should be low cost, or even profitable, to the property owner. The language in bold print in paragraph a was added to address the issue of runoff to nearby surface waters. Language was added to the condition in paragraph b to allow the EPA recommendations to be used as well as the recommendations of the Douglas County Extension Office.
14) Soil pH levels shall be monitored on an annual basis to insure that the lead management plan is effective. The records shall be kept on file at the FOP office for review by staff of the Douglas County Zoning and Codes Office. Lime shall be added to the soil annually, if necessary, to maintain the correct pH levels per the following ratios: • 50 pounds (for sandy soils) or 100 lbs (for clayey soils) per 1000 sq ft of range will raise the pH approximately one pH unit.	11) Soil pH levels shall be monitored on an annual basis to insure that the lead management plan is effective. The records shall be kept on file at the FOP office for review by staff of the Douglas County Zoning and Codes Office.	–Omitted–	The soil tests are important to document the impact the lead from the firing range is having on the soil. The Douglas County Extension Office will provide 10 free soil tests for any property.

COMPARISON OF CONDITIONS RECOMMENDED BY STAFF WITH THOSE PROPOSED BY THE FRATERNAL ORDER OF POLICE			
ORIGINAL RECOMMENDED CONDITIONS	**REVISED RECOMMENDED CONDITIONS**	**FOP PROPOSED CONDITIONS**	**STAFF COMMENTS**
The ideal pH should be between 6.5 and 8.5. • Do not add lime if the pH is above 8.5			
15) Crushed limestone shall be spread, and maintained, in front of all backstops	12) Crushed limestone shall be spread, and maintained, in front of all backstops **per the recommendations in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges.**	–Omitted–	The Commission requested more specific guidance as to the amount and location of limestone that should be added to the site to maintain the property pH. This is provided in the EPA Best Management document.
16) Documentation in the form of reports at each range will be kept as to the number of rounds fired and the type of ammunition used as well as the management activities used to prevent lead migration. It will be the responsibility of the range master or property owner to compile this information and keep it on hand for review by the Douglas County Zoning and Codes Office personnel. All shooting activities at the range will be documented as to usage as follows: 1. Type of firearm used 2. Type of ammunition used 3. Number of rounds fired All lead management activities shall be documented as follows: 1. Type of management activity 2. Date and time of activity. 3. If lead was removed note the quantity, the company that removed the lead, where the lead was taken and what was done with it.	13) Documentation in the form of reports at each range will be kept as to management activities used to prevent lead migration. It will be the responsibility of the range master or property owner to compile this information and keep it on hand for review by the Douglas County Zoning and Codes Office personnel. All lead management activities shall be documented as follows: 1. Type of management activity 2. Date and time of activity 3. If lead was removed note the quantity, the company that removed the lead, where the lead was taken and what was done with it.	–Omitted–	Enforcement of the lead management program would be difficult. The documentation provides the information needed to determine that lead is being managed in accordance with the CUP.

PLANNING COMMISSION REPORT
Regular Agenda

PC Staff Report
04/25/11

ITEM NO.2 : CONDITIONAL USE PERMIT FOR FRATERNAL ORDER OF POLICE SHOOTING RANGE; 768 E 661 DIAGONAL RD (MKM)

CUP-12-8-10: Consider a Conditional Use Permit for the Fraternal Order of Police shooting range, located at 768 E 661 Diagonal Road. Submitted by Dan Affalter, for Fraternal Order of Police, property owner of record.

STAFF RECOMMENDATION: Staff recommends approval of the Conditional Use Permit for the FOP shooting range subject to the following conditions:

1) The provision of a revised site plan with the following changes:
   a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
   b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.
2) Uses which are approved with this CUP include the use of the firing ranges and military and other training on the site that does not involve the firing of weapons.
3) Noise abatement measures shall be utilized in order to achieve an 'acceptable' sound level at the property boundary of 65 dB(A) for up to 8 hours out of 24.
   a) Proposed abatement measures must be submitted and approved prior to release of the CUP to Douglas County Zoning and Codes Office.
   b) Noise levels shall be measured at the property boundaries following the approval of the CUP and noise abatement measures shall be installed within 3 months of the approval of this CUP.
4) Noise levels at the property boundary shall be measured yearly and additional noise abatement measures implemented, if necessary. A record of the yearly noise levels shall be kept on file for review by the Douglas County Zoning and Codes Office.
5) In addition to 'no trespassing', the signs posted around the perimeter of the range area shall also note that this is a 'firing range'. The colors of the sign shall be bold so as to be very visible in the wooded areas and they shall be placed at 100 ft intervals around the range perimeter.
6) Signs shall be posted at all ranges with the following safety information:
   a) Range-master must be present when there is firing on the range.
   b) Noise protection must be worn when firing.
   c) Alcoholic beverages are prohibited on the firing ranges.
7) A sign shall be posted on the main gate which identifies the area as a Fraternal Order of Police Firing Range and state that no admittance is restricted to FOP members and their guests. A contact number for a representative of the FOP who is available to respond during the hours of operation of the firing ranges shall be included on the sign.
8) Hours of Operation: The range shall not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. The range may operate at the following times:
   - 8 AM to 8 PM Monday through Thursday;
   - 8:00 AM to 5:00 PM on Friday; and

- 10:00 AM to 6:00 PM on Saturday and Sundays.
- Night shooting events may occur up to 3 times a year, with a time limit of 10:00 PM. Neighbors within 1 mile must be notified of night shooting events at least 3 days in advance through either email, letter or phone call.

9) When there are training exercises at the firing ranges, no other *outdoor* events may occur on the property.

10) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.

11) The following note shall be added to the CUP "*The CUP requires the retention of the 94 acres included in the approval. The wooded areas included in the parcels surrounding the range areas are to remain intact to serve as buffers. The only removal of trees that may occur are to remove dead or diseased trees, or to create trails through the wooded areas. Any other removal or reduction of trees shall require an amendment to the CUP.*"

12) Military training is restricted to the use of weapons similar to those used by law enforcement agencies. A list of these weapons shall be provided for the file.

13) A lead recycling program shall be put into place. Lead will be reclaimed and recycled when the estimate of rounds fired reaches 100,000 or every 7 years, whichever comes first. If lead has not been reclaimed within the past 7 years, it will be necessary to reclaim the lead within 3 months of the approval of the CUP. Lead reclamation and clean-up will be done by a professional lead recovery company and a report shall be submitted to the Douglas County Zoning and Codes Office.

14) Soil pH levels shall be monitored on an annual basis to insure that the lead management plan is effective. The records shall be kept on file at the FOP office for review by staff of the Douglas County Zoning and Codes Office. Lime shall be added to the soil annually, if necessary, to maintain the correct pH levels per the following ratios:
    - 50 pounds (for sandy soils) or 100 lbs (for clayey soils) per 1000 sq ft of range will raise the pH approximately one pH unit. The ideal pH should be between 6.5 and 8.5.
    - Do not add lime if the pH is above 8.5

15) Crushed limestone shall be spread, and maintained, in front of all backstops

16) Documentation in the form of reports at each range will be kept as to the number of rounds fired and the type of ammunition used as well as the management activities used to prevent lead migration. It will be the responsibility of the range master or property owner to compile this information and keep it on hand for review by the Douglas County Zoning and Codes Office personnel.

    All shooting activities at the range will be documented as to usage as follows:
    1. Type of firearm used
    2. Type of ammunition used
    3. Number of rounds fired

    All lead management activities shall be documented as follows:
    1. Type of management activity
    2. Date and time of activity
    3. If lead was removed note the quantity, the company that removed the lead, where the lead was taken and what was done with it.

Reason for Request: *"To gain compliance for a shooting range which has been in existence for over 40 years."*

KEY POINTS

- Per Section 12-319-4.11 of the Zoning Regulations for the Unincorporated Territory of Douglas County, a shooting range requires approval through a Conditional Use Permit.
- The shooting range is existing but does not have an approved Conditional Use Permit; therefore, this application has been submitted to bring the range into compliance with the Douglas County Zoning Regulations.
- The area is encumbered with the floodplain, including the regulatory floodway and floodway fringe of Washington Creek.

ATTACHMENTS

A – Public Communications received prior to printing of this staff report.
B – Applicant information regarding history of the shooting range
C – Plans

DESCRIPTION OF USE

Property is owned by the Fraternal Order of Police and contains a lodge and an office building for their use. This CUP has been submitted for approval of the following firing ranges:

- A rifle range with one shooter station that can accommodate multiple shooters;
- A trap range with 5 shooter stations;
- A pistol/rifle range with 8 shooter stations; and
- A 'shoot house', a wooden structure that is located within the woods and is used for urban training.

(The location of these ranges is noted in the plan and Figure)

The ranges are used primarily for training of law enforcement personnel and conducting hunter safety courses. Occasionally, the range will be used for training of military personnel but the applicant indicated that these do not usually involve the firing ranges. The property owner, the Fraternal Order of Police members, and their guests also use the ranges.

ASSOCIATED CASES/OTHER ACTION REQUIRED

- Approval by Board of County Commissioners.
- Noise abatement measures approved and implemented.
- Conditional Use Permit Plan released to the Zoning and Codes Office for CUP permit.
- Lead recycling program initiated and carried out per schedule.

PUBLIC COMMENT RECEIVED PRIOR TO PRINTING

- Copy of letter sent to landowners in the area by Bill Roth notifying them of the CUP application and providing background information. (Nov 1, 2010)
- Email from nearby property owner, Scott Mesler, recommending restricted hours and expressing concern with the noise generated. (Jan 6, 2011)
- Email from nearby property owner, Lorel Lewis, indicating no concerns with the shooting range operations or the CUP application. (Jan 7, 2011)
- Letter from Bill Roth with list of recommendations for the CUP. (Jan 10, 2011)
- Email from Jim Lock in support of the shooting range.

GENERAL INFORMATION

Current Zoning and Land Use:	A (Agricultural), F-W (Floodway Overlay) and F-F (Floodway Fringe Overlay) Districts; shooting range with lodge.

Surrounding Zoning and Land Use:	A (County Agricultural) District in all directions. Agriculture, woodlands, and rural residences. F-W (Floodway Overlay) and F-F (Floodway Fringe Overlay) Districts to the north and south, along the Washington Creek; agriculture and woodlands.

Site Summary:	
Subject Property:	94 acres
Proposed Buildings:	No new buildings are being proposed.
Off Street Parking Required:	1 space per 5 attendees, Section 12-316-1 requirement for recreational area without fixed seating
Off Street Parking Provided:	30 parking spaces available in the graveled parking lot and overflow parking area on the adjacent grassed area.

I. ZONING AND USES OF PROPERTY NEARBY

Staff Finding – The subject property is located in the northeast quarter of Section 11 in Township 14 South, Range 18 East of Douglas County (southeast of the intersection of N 775 Road and E 661 Diagonal Road). The property is located on the east of, and takes access from, E 661 Diagonal Road approximately 1/2 mile north of Lone Star Lake. The property is within the A (Agriculture) and floodplain overlay zoning districts. The surrounding area is zoned for agricultural uses with floodplain overlay zoning following the path of the Washington Creek to the lake. Agriculture, open space, and rural residences are the principal land uses in the area. The nearest residences are located approximately 1/4 mile from the firing ranges. A map showing the approximate locations of residences in the area is included in Figure 5. A recreational area, Lone Star Lake is located approximately one-half mile to the south. (Figure 1)

II. CHARACTER OF THE AREA

The Fraternal Order of Police owns approximately 94 acres which is being included in this CUP request. The property contains the Washington Creek and its associated floodplain. (Figure 2)The parcel containing the shooting ranges slopes from the east to the west. The buffer areas contain very steep grades, which are used as backdrops. (Figure 3) The property is developed with a Fraternal Order of Police lodge and office building and is used for lodge activities as well as a shooting range used primarily for law enforcement training. The remainder of the property consists primarily of wooded hills and open space. The surrounding area consists of woodlands, agricultural uses with scattered rural residences. A recreational area, Lone Star Lake, is located approximately one-half mile to the south.

Staff Finding – This is an agricultural area which also contains rural residences and woodlands as well as a recreational area. This range has been in existence for over 40 years and contributes to the character of the area; however, the noise generated by the shooting range could negatively impact the nearby residences. It will be necessary to regulate the hours and provide noise abatement measures to minimize any negative impacts.

III. SUITABILITY OF SUBJECT PROPERTY FOR THE USES TO WHICH IT HAS BEEN RESTRICTED

Applicant's response:
"The property is ideally suited and has been improved for over 40 years to accommodate the shooting range."

While this use has been in place for over 40 years, it is not a 'grandfathered' or 'non-conforming' use as it was installed after the adoption of the 1966 Zoning Regulations for unincorporated Douglas County and a CUP was required for a shooting range at that time. In 2006, it came to Zoning and Code's attention that the shooting range did not have a CUP and was not a grandfathered use. This CUP was submitted to bring the shooting range into compliance with the Code. All the shooting ranges discussed in this report are existing ranges. No new construction is being proposed. Any new construction would require either a site plan or an amendment to the CUP depending on the degree of change.

Staff Finding – A Conditional Use Permit (CUP) does not change the base, underlying zoning; therefore, the suitability of the property for agricultural uses will not be altered. The 52 acre parcel is developed with a lodge and shooting ranges which are used primarily for law-enforcement training exercises and hunter safety courses. The property owner also owns 3 other adjacent parcels totally approximately 49 acres which are intended to buffer surrounding areas from the shooting range. A 'shoot house' is located within this buffering acreage, and is used occasionally for specialized training operations. The property is heavily wooded and has significant grade changes (Figure 3). These features may limit the agricultural options for the property.

The large acreage available for this use and the wooded areas serve as a buffer which makes the property suitable for a use of this type. The topography provides hillsides to use as backstops for the shooting ranges. The bullets used at the ranges contain lead, and the fact that some of the shooting occurs within the regulatory floodway or regulatory floodway fringe could present environmental hazards. Best management practices should be utilized to minimize the potential for ground or water pollution from the lead. With proper noise and lead management, the property is suited to the proposed (existing) use.

IV. LENGTH OF TIME SUBJECT PROPERTY HAS REMAINED VACANT AS ZONED

Staff Finding – The property is not vacant. The applicant indicated that the lodge and shooting ranges were instituted in the 1960s and have been in use since that time.

V. EXTENT TO WHICH REMOVAL OF RESTRICTIONS WILL DETRIMENTALLY AFFECT NEARBY PROPERTY

Applicant's Response:
"The condition already exists; however, there have been complaints about the noise."

Section 19-01 of the County Zoning Regulations recognize that "*Certain uses may be desirable when located in the community, but that these uses may be incompatible with other uses permitted in a district...when found to be in the interest of the public health, safety, morals and general welfare of the community may be permitted, except as otherwise specified in any district from which they are prohibited.*" The proposed use falls under Use 11: Recreation Facility listed in Section 12-319-4.11 Conditional Uses Enumerated, of the Zoning Regulations for the Unincorporated Territory of Douglas

County. This shooting range will not be used as a recreational facility but a shooting range is permitted under this use category. While the purpose of this shooting range is training rather than recreation, the impact would be the same as for a recreational shooting area. The limited scope of this shooting range should provide more compatibility with the surrounding properties as the activity can be more controlled, since the general public is not permitted, and training sessions are usually scheduled in advance.

Approval of the CUP will allow the applicant to continue the current use of the firing ranges. Conditions shall be applied with the Conditional Use Permit to limit the intensity of the use, mitigate the impact of the noise on the neighbors, and address environmental concerns such as lead pollution located within the floodplain and the Washington Creek.

The property is located on a paved road and has access from a continuous network of paved roads. (Figure 4) Dust generated by traffic to this site is not an issue.

Public comment has been provided to the Planning Office and is included with this staff report. Some neighbors indicated they had no issues with the noise generated or the activity itself while others indicated concern with noise, hours of operation, safety (particularly signage), and lead pollution to the Washington Creek.

Staff Finding – The shooting range currently negatively impacts nearby properties through noise and possible lead-pollution of the Washington Creek or groundwater. Proper noise abatement measures, restrictions on hours of use and an effective lead management program should minimize these impacts. These measures are discussed in detail in the 'Staff Review' portion of this report.

VI. RELATIVE GAIN TO THE PUBLIC HEALTH, SAFETY AND WELFARE BY THE DESTRUCTION OF THE VALUE OF THE PETITIONER'S PROPERTY AS COMPARED TO THE HARDSHIP IMPOSED UPON THE INDIVIDUAL LANDOWNERS

Applicant's Response:
"The taxpayers of Douglas County are relieved of the financial burden of buying and developing property to be used as a firing range."

Evaluation of the relative gain weighs the benefits to the community-at-large vs. the benefit of the owners of the subject property. In Staff's opinion, denial of the request for a Conditional Use Permit would affect the individual landowner by prohibiting the use of the property for the shooting range which would then create the need for Douglas County law enforcement agencies to find another site for their training. Denial of the CUP request may benefit the area property owners by eliminating the use and the associated noise.

Staff Finding – Approval of the Conditional Use Permit would benefit the community by maintaining a training facility for the County's law enforcement personnel. With safeguards to prevent water pollution, it should not harm the public health, safety and welfare; however the noise associated with the shooting facility may have a negative impact on the surrounding residents. Restrictions on the hours and number of the events and appropriate noise mitigation measures should be implemented to minimize any negative impact.

VII. CONFORMANCE WITH THE COMPREHENSIVE PLAN

The subject property is not located within an identified urban growth area. The comprehensive plan recommends that agricultural uses continue to be the predominant land use within the areas of the

county beyond the designated urban growth areas. Uses permitted in the rural area should continue to be limited to those which are compatible with agricultural production and uses.

Horizon *2020* does not address Conditional Use Permits as a tool to achieve specific policies.

Staff Finding – The Comprehensive Plan encourages uses which provide incentives to retain agricultural land in production in the rural area of the county (outside any Urban Growth Area). A Conditional Use Permit allows development to occur in harmony with the surrounding area. The subject property is not well-suited for agricultural production, given the woodlands and steep slopes, but the CUP will encourage the retention of the natural features and protect the rural character of the area. The shooting range, as conditioned, is consistent with the Comprehensive Plan.

STAFF REVIEW

The shooting range provides a valuable community function, the training of law enforcement personnel and hunter safety courses. While this is a necessary and valuable service to the community, the range can create negative impacts on surrounding properties and the environment. The Zoning Regulations are intended to promote the safety, order, convenience, prosperity, and general welfare of the citizens of Douglas County; therefore, the CUP has been reviewed with consideration for the safety of the facility as well as minimizing negative off-site impacts.

The property contains a lodge which has 2 bathrooms and a kitchen. A septic system which was approved when the building was constructed is utilized for wastewater management. Other structures on the property include a garage, five-bay barn, shelter house, trap house, footbridge, low-water bridge, and obstacle course containing 12 obstacles in an approximate one-quarter mile loop. There is also a structure called a 'shoot house' that is used for an urban range. The structures and the ranges are shown on the plan. Figures 8 through 14 illustrate the areas of the range.

The applicant indicated that they allow simultaneous use of the shooting ranges and lodge facilities for other activities as long as no safety issues are raised. Staff has concerns that the concurrent use of the facilities for shooting and other activities could result in accidents and recommends that no other outdoor activities occur when the shooting range is in operation.

PARKING
A 16,200 sq ft gravel parking area is located adjacent to the garage and lodge building. The applicant indicated that the parking area could accommodate 30 cars and an additional row of vehicles can park in the middle if needed. There is also a grass overflow parking area. The NRA recommends 1.5 parking spaces per firing point. The applicant's information indicates that the pistol range is limited to 8 persons at a time, the rifle range to 8, trap area to 5 and the urban shooting area to 10. This would equal 31 firing points, or 47 parking spaces. This is not a parking requirement of the Zoning Regulations, but it does appear that the gravel area would be able to accommodate 47 parking spaces. The Zoning Regulations require 1 parking space per 5 seats, or persons, in assembly or amusement type uses without fixed seats or 7 parking spaces (31/5). The location and amount of parking provided is compliant with the Zoning Regulations and recommendations of the NRA.

SAFETY
The National Rifle Association Range Source Book contains information on planning and implementing shooting ranges. The book makes the following recommendations:

- Range caution signs should be posted at 100 ft intervals around the range perimeter. Colors should be highly visible.
- A contact number for a representative of the FOP who is available to respond during the hours of operation of the firing ranges should be provided for file and posted on the fence/gate to the FOP facility.
- Natural hill backstop should have a slope of at least 1.5 to 1 (33-34 degrees) and the height should be at least the same as for a manmade backstop
- NRA recommends 1.5 parking space per firing point
- OSHA – the Occupational Safety and Health Administration – has determined that a sound level of 90 dBA is the threshold for hearing conservation programs. Because firearms easily exceed this level of sound, users must wear hearing protection. Hearing protection should be a requirement for all users who are within 50 ft of the firing line. (NRA Range Source Book, Section 3.0-3.10.1)

In addition, no alcohol should be allowed on the firing ranges. Signs prohibiting alcoholic beverages should be posted on each range,

BUFFER

The FOP owns several parcels surrounding the main shooting area that they utilize as buffers. In order to insure that these remain effective buffers, a note should be added to the CUP that the wooded areas on the site are to remain intact to serve as buffers. The only removal of trees that may occur are to remove dead or diseased trees, or to create trails through the wooded areas. Any other removal or reduction of trees would require an amendment to the CUP.

LIGHTING

The applicant's information indicates that there are 5 lights on power poles that are approximately 27 ft high. These lights are located within the interior of the site. Any changes to the existing lights would require a revised site plan which would note the location, wattage and steps taken to prevent glare onto neighboring properties.

USES

The property is owned by the Fraternal Order of Police (FOP) and is used for lodge meetings and various FOP activities that are not related to this CUP such as gatherings, social events and other activities for the members of the FOP. These uses are not being considered with this CUP application. The only uses for which approval has been requested are the activities associated with the shooting ranges. The military training which makes use of the open space areas, but does not involve the firing of weapons is also being considered with this CUP. Uses which are permitted in the A (Agricultural) District may occur on the site; however, it is important that no other outdoor uses occur when the shooting ranges are in operation, for safety considerations. Uses which are not permitted in the A District and are not included in this CUP require approval through the CUP process.

According to information provided by the applicant, Attachment B, the shooting ranges are used for various law enforcement agencies including the Douglas County Sheriff and the Lawrence Police Department, Hunter Safety Courses, as well as training for military, civilian or other groups of individuals with or without the use of the firing ranges. Military training is usually limited to orienteering, map and compass and other activities which require a type of outdoor terrain and facilities which are available at this site. A note should be added to the plan which restricts military training to the use of weapons similar to those used by law enforcement agencies. A list of these

weapons should be provided for the file. The training uses associated with the firing ranges are the only uses which are being considered with this CUP.

ACCESS
The shooting facility is located on a hard-surfaced road which is classified as a collector and has good access from the collector/arterial road network. Traffic to and from the site should not create any negative impacts on surrounding properties.

NOISE
The noise generated by the shooting activities may negatively impact nearby properties. The following information, taken from the National Rifle Association Source Book, explains how to measure the noise level, what levels of noise are acceptable and suggests several noise abatement measures:

"*Range owners/operators should implement sound abatement programs into their yearly planning. These noise plans must actively pursue the goal of a sound abatement plan: preventing conflict before it occurs.*" (NRA Range Source Book, Section 1.02.3)

Many of the recommendations in the Range Source Book are geared toward new sites. I reviewed the information for recommendations which are applicable to an existing site. The first step would be to determine the level of sound which is created by the range.

1. **Measuring the sound level at the property line during a typical firing event** Section 3.03.5 of the Range Book provides the following guidance for a sound measurement:
   a. Take the measurement at the property line and in direct line with the receiver
   b. Select measuring points that are clear of interfering objects (other than naturally occurring ones).
   c. Describe the surface area over which the sound travels. Certain surface area configurations, such as a good grass cover affects the rate of decay for sound.
   d. Intervening distance between a point source and a receiver is also an attenuating factor. As a rule, each time the distance is doubled the sound pressure level is reduced by one-half, or reduced by about 6 dB.
   e. Terrain features are also important, for example a noise source in a depression is provided barriers that will redirect sound and is not as serious as one at a higher elevation. Therefore, a range located in a valley presents less of a problem than one at the same general elevation as the surrounding area. Ranges that are elevated above a receiver will have the advantage of atmospheric attenuation, with addition components attenuated via wind. Wind tends to cause sound waves traveling with the wind to appear louder, and those traveling against the wind to appear quieter. (noise would be less in areas to the south and louder in areas to the north, as a rule given our southern prevailing winds)

Section 3.03.3.1 of the NRA Range Source Book provides the following information as a general guide for noise levels:

A. **Unacceptable:** If the sound level exceeds 90 dB(A) for 1 hour out of 24 or exceeds 85 dB(A) for 8 hours out of 24 and the receiver is less than ¼ mile from the sound source.
B. **Discretionary:** Normally acceptable if the level exceeds 80 dB(A) for 8 hours out of 24 or if there are 'loud' impulsive sounds (referring to sonic booms, artillery, etc) on site and the distance from the property boundary and the receiver is one mile or more.
C. **Discretionary:** Normally acceptable if the level does not exceed 75 dB(A) at the property boundary more than 6 hours out of 24 hours and distance from the boundary and the receiver is over 2 miles.

D. **Acceptable:** If the sound levels at the receiver do not exceed 65 dB(A) more than 8 hours out of 24 or activities do not extend into the nighttime hours of 10 pm through 7 am. **Note:** Law Enforcement activities may have exemptions to the above recommendations. Live fire night exercises may be required to maintain the proficiency and update training of police officers.

The map in Figure 5 shows the locations and distances of the nearby residences. It appears there are 2 residences within ¼ mile of the sound source. Figure 6 shows the general elevations of the range and nearby residences.

Noise levels should be taken during a normal firing event to determine if the amount of noise generated is considered acceptable per the info in the Range Book. Given the distance to the nearby residences an acceptable noise level for this range would be: "**If the level does not exceed 65 dB(A) at the property boundary more than 8 hours out of 24 hours.**"

3.03.10.2 Sound abatement shields or barriers should be installed on ranges where neighbors are within ¼ mile of the facility unless significant natural barriers exist. Any fixtures or terrain features must serve either to redirect or capture sound. There are a few neighbors just within the ¼ mile area.

Lead Management

Lead pollution is an issue with shooting ranges as the lead can leach into the soil and percolate through to the ground water or flow through runoff into nearby streams. In this case, the proximity of the regulatory floodplain and Washington Creek, which flows to Lone Star Lake, makes proper lead management even more important. Figure 7 shows the general location of each shooting range and the direction of fire.

The Kansas Department of Health and Environment had responded to a complaint regarding the shooting activity within the floodway and determined that if the EPA Best Management Practices are followed, lead pollution should not be an issue with this range (Attachment C). Based on this information, the shooting ranges may remain in their current locations; however, if any new ranges are proposed in the future, staff recommends locating them outside of the floodway to prevent future pollution issues. The following information and recommendations for an effective lead management program were taken from the EPA's Best Management Practices for Lead at Outdoor Shooting Ranges and the NRA Range Source Book:

1) Control and contain lead bullets and fragments
2) Prevent migration of lead to the subsurface and surrounding surface water bodies
3) Remove the lead from the range and recycle
4) Documenting activities and keeping records

1) Control and Contain Lead Bullets and Fragments

Earthen berms and backstops, such as are used at this range, are one recommendation for controlling and containing bullets. These should be shown and noted on the plan. They should be between 15 and 20 ft high with as steep a slope as possible. The layer (to a depth of one to 2 ft) exposed to the shooting activity should be free of rock and debris. (ricochets and bullet fragmentation)

2) Prevent Lead Migration

Soil treatment

- Soil pH levels will be monitored on an annual basis. Lead migration increases in acidic conditions since the acid of the soil contributes to the lead break down. The ideal soil pH level should be between 6.5 and 8.5. Spread lime around the earthen backstops, sand traps, trap and skeet shotfall zones, and any other areas where the bullets/shots or lead fragments/dust accumulate.
- Spreading bags of 50 pounds (at ranges with sandy soils) or 100 lbs (at ranges with clayey soils) per 1000 sq ft of range will raise the pH approximately one pH unit for a period of between 1 and 4 years.
- If the soil pH range is 4.5 or less addition of lime may only raise the pH to about 5. In this case additional measures should be used. If soil pH range is above 8.5 do NOT add lime.

- Also, to avoid lead mobilization from rainwater, crushed limestone will be spread in front of all backstops. The crushed limestone will help trap any lead particles that may migrate from the berm. The spreading of limestone in front of the shooting area and the spreading of lime over the berm area are easy and low cost methods of controlling the migration of lead. It is also a very easy and cost effective method of minimizing the potential for the lead to degrade.

3) Removal of lead

Implementation of a regular lead reclamation program is very important. Ranges with acidic soils or high precipitation may require more frequent reclamation. To insure that lead is not considered 'discarded' or 'abandoned' on the range (within the meaning of the RCRA statute, i.e. a hazardous waste) periodic lead removal activities should be planned for and conducted.

- Lead will be reclaimed and recycled when the estimate of rounds fired reaches 100,000 or every 7 years, whichever comes first. If lead has not been reclaimed within the past 7 years, it will be necessary to reclaim the lead within 3 months of the approval of the CUP. Lead reclamation and clean up will be done by a professional lead recovery company.

4) Documentation

Documentation in the form of reports at each range will be kept as to the number of rounds fired and the type of ammunition used as well as the management activities used to prevent lead migration. It will be the responsibility of the range master or property owner to compile this information and keep it on hand for review by the Douglas County Zoning and Codes Office personnel.

All shooting activities at the range will be documented as to usage as follows:

4. Name of individual who used the range
5. Date and time of use
6. Type of firearm used
7. Type of ammunition used
8. Number of rounds fired

All lead management activities shall be documented as follows:

4. Type of management activity (lime, phosphate, etc)
5. Date and time of activity
6. If lead was removed and if so, in what quantity
7. Who removed the lead
8. Where was the lead taken and what was done with the lead

HOURS

The applicant proposes the following hours for the shooting range:

Training and Education:

- 7:30 AM to 8:00 PM Monday through Friday,
- 9:00 AM to 7:00 PM on Saturday,
- 11:30 AM to 7:00 PM on Sunday for use by organized groups including Law Enforcement agencies

Individual use by FOP members:

- to operate from 8:00 AM to 9:30 PM every day of the week except for the following holidays: Christmas Eve; Christmas, Thanksgiving, and Easter

Based on concerns from the neighboring property owners, staff recommends one set of hours for the operation of the shooting range. The range should not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. Times of operation should be limited to the following hours:

The hours should range from 8 AM to 8 PM Monday through Thursday; 8:00 AM to 5:00 PM on Friday; and 10:00 AM to 6:00 PM on Saturday and Sundays. Night shooting events may occur up to 3 times a year, with a time limit of 10:00 PM. Neighbors within 1 mile must be notified of night shooting events at least 3 days in advance through either email, letter or phone call.

Conclusion

Approval of a CUP can be tailored to address specific issues such as intensity or frequency of use, include time limitations, and provide screening requirements. The recommended conditions respond to the specific nature of this request. With the conditions regarding hours of operation, sound abatement and lead management, the shooting range should be compatible with the nearby land uses.

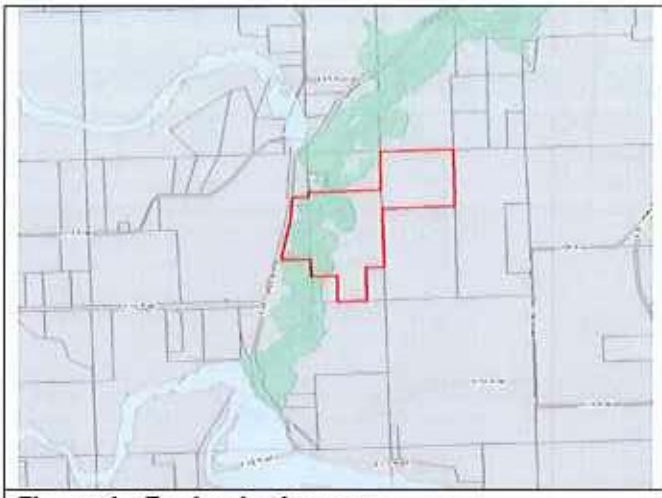
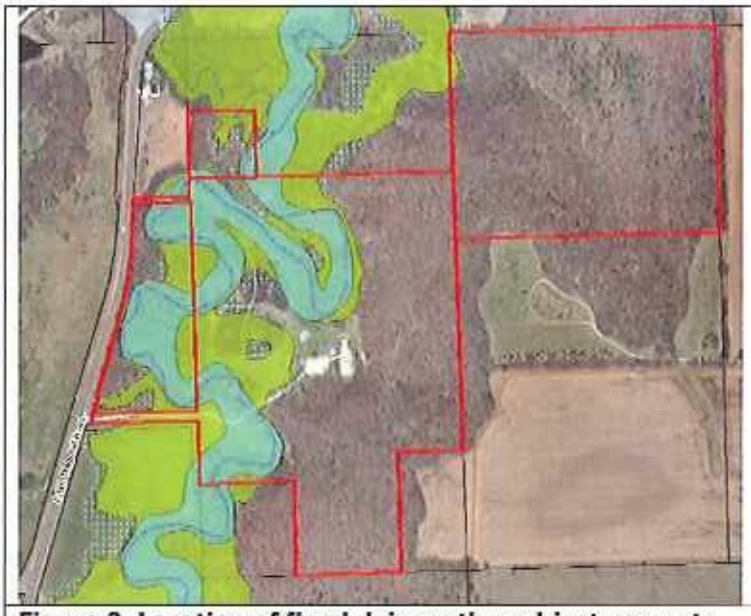


Figure 1. Zoning in the area.
(subject property outlined in red)

- Blue: A (Agricultural),
- Bright turquoise: Regulatory Floodway
- Light turquoise and light blue: Regulatory Floodway Fringe

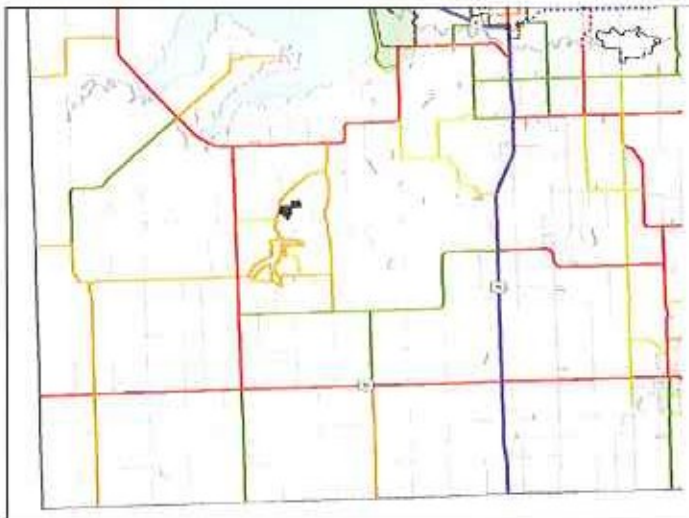
Land Use in the Area
(subject property outlined in red)
Woodland, agriculture and rural residential
Recreation area (Lone Star Lake) to the south



- The subject property is outlined in red.
- Regulatory floodway is shown in blue
- Regulatory floodway fringe is shown in green.
- Washington Creek is marked with a dashed line within the floodway.

Figure 2. Location of floodplain on the subject property.

Figure 3. Topography
Parcel where the majority of the shooting occurs is marked with a ●.



- Subject property shown in black
- Blue: Principal arterial/freeway
- Red: Principal arterials
- Green: Minor arterials
- Orange: Collector
- Yellow: Minor Collector

Figure 4. Road Network

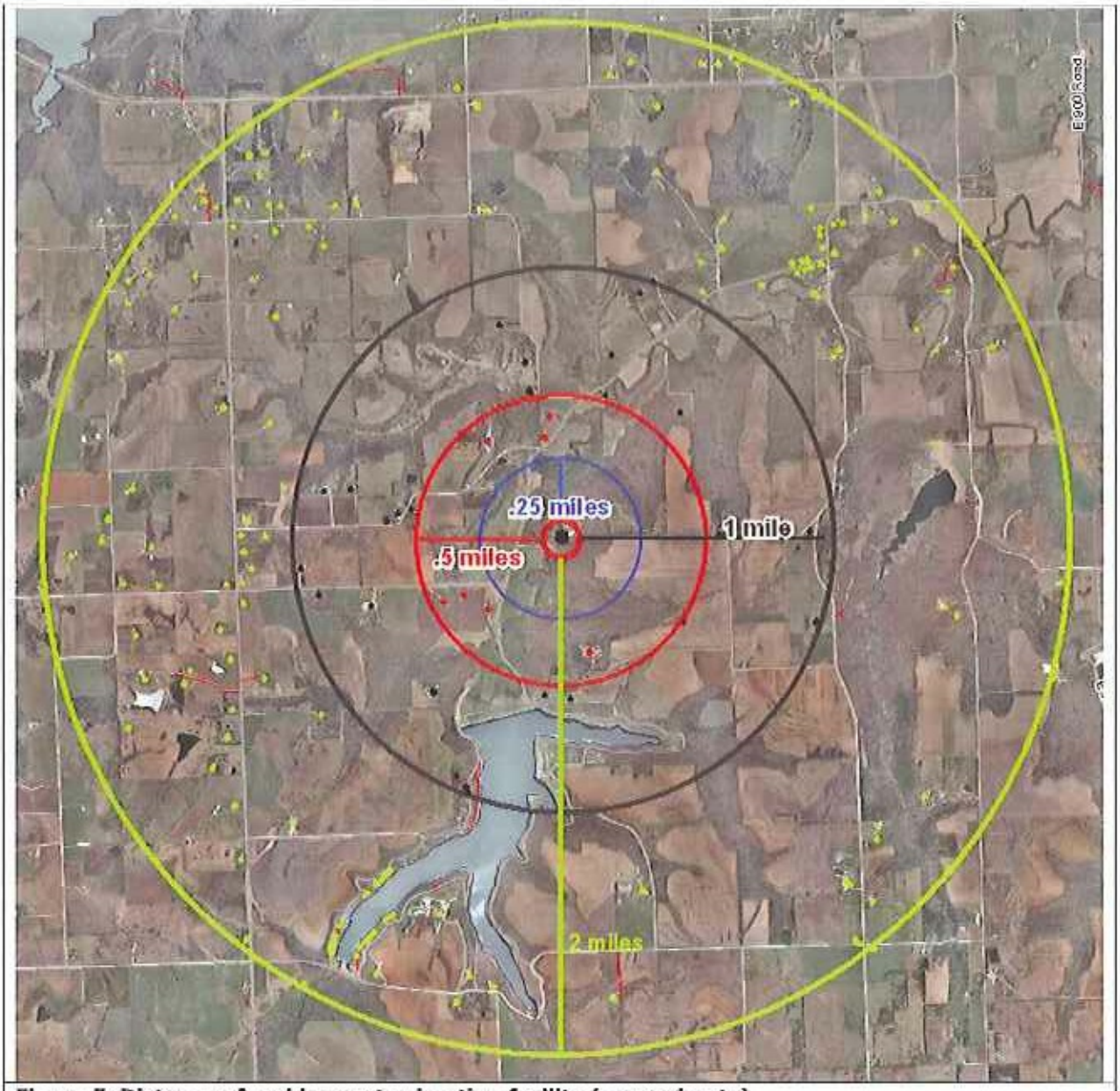


Figure 5. Distance of residences to shooting facility (approximate)
Blue ring is .25 mile radius: 2 residences
Red ring is .5 mile radius: 6 residences (+2 in .25 radius)=8 residences total
Black ring 1 mile radius: 25 residences (+ 8)=33 residences total
Green ring 2 mile radius: >125 (+33)=>158 residences total

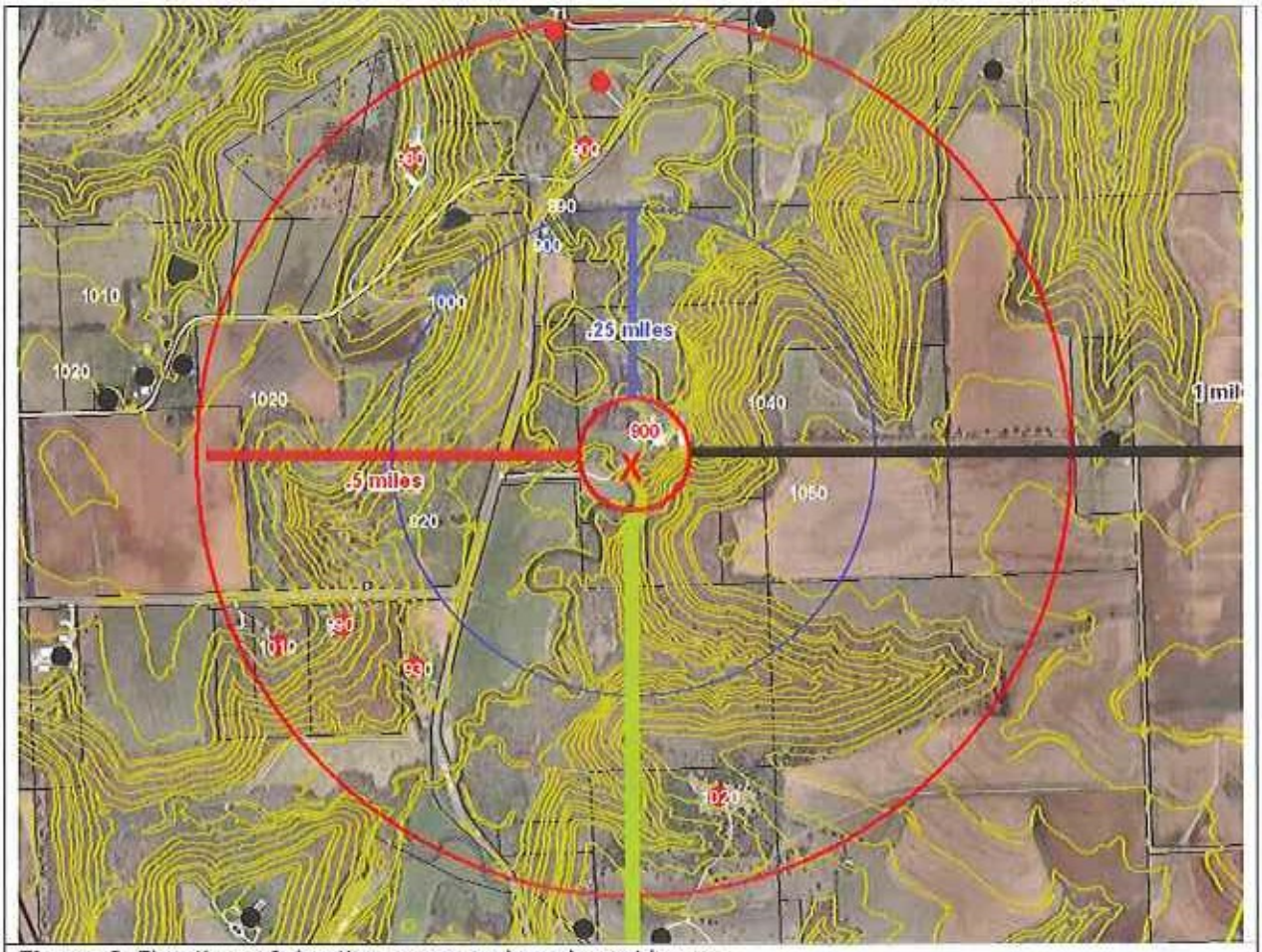


Figure 6. Elevations of shooting ranges and nearby residences

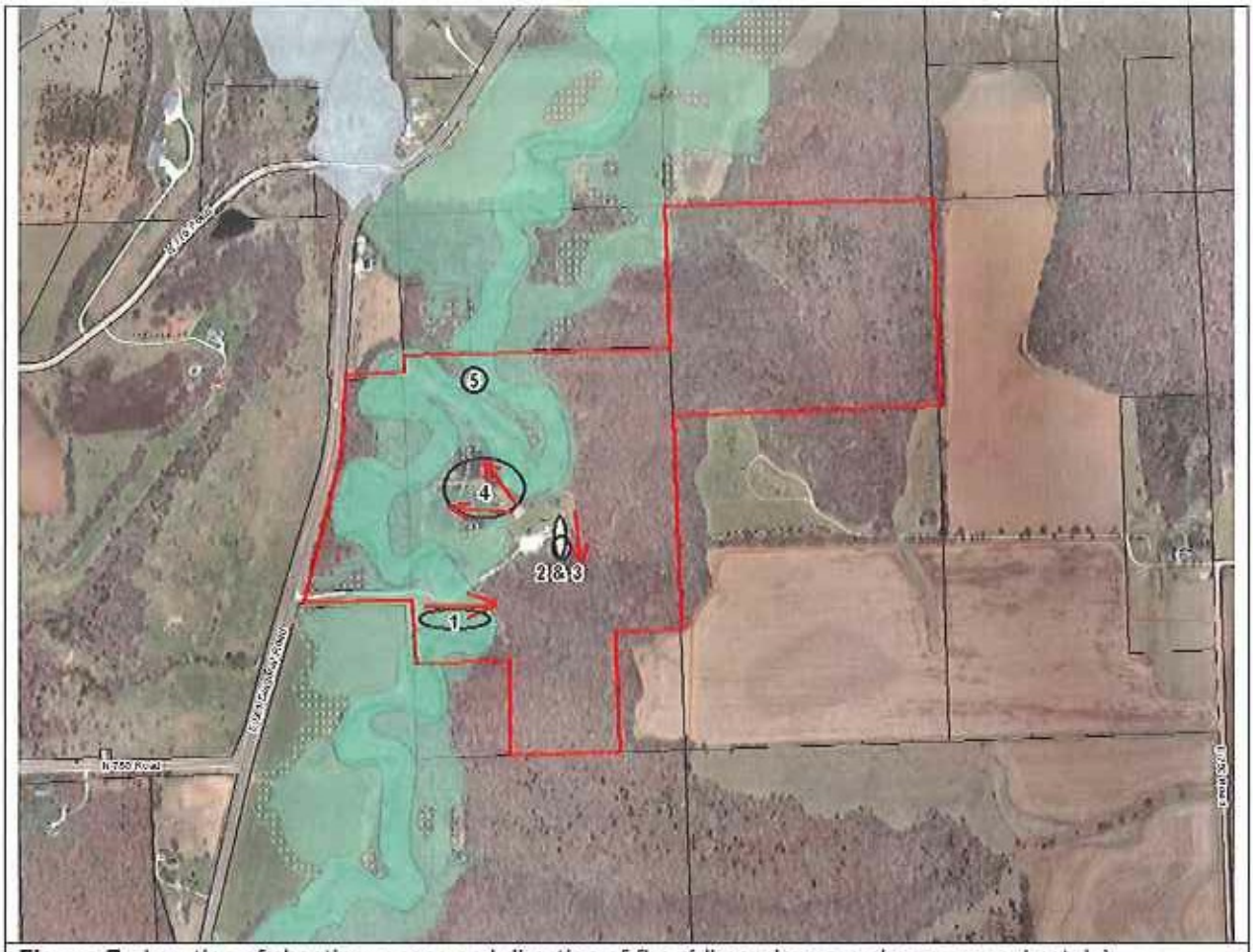


Figure 7. Location of shooting ranges and direction of fire, (dimensions are shown approximately)

1. 100 yard rifle range. Shooting to the east into wooded bank. 8 shooters.
2. 30 yard pistol range. Shooting to the south into wooded bank. 8 shooters.
3. 80 yard rifle/pistol range. Shooting to the north into wooded bank. Extended range '2'..no addtl shooters.
4. Trap range. Shooting to the northwest with a 150 yard safe fall zone. 5 shooters—shotgun only
5. 100 yard urban shooting range. Shooting within or into the structure. 10 shooters.

Figure 8 Entrance from E 661 Diagonal Road

Figure 9 Rifle range near road...target in front of very steep hill used as backdrop.

Figure 10 Drive up to the lodge buildings

Figure 11 Trap shooting area.

Figure 12 Shoot house. Firing is usually within the house, or occasionally into the house

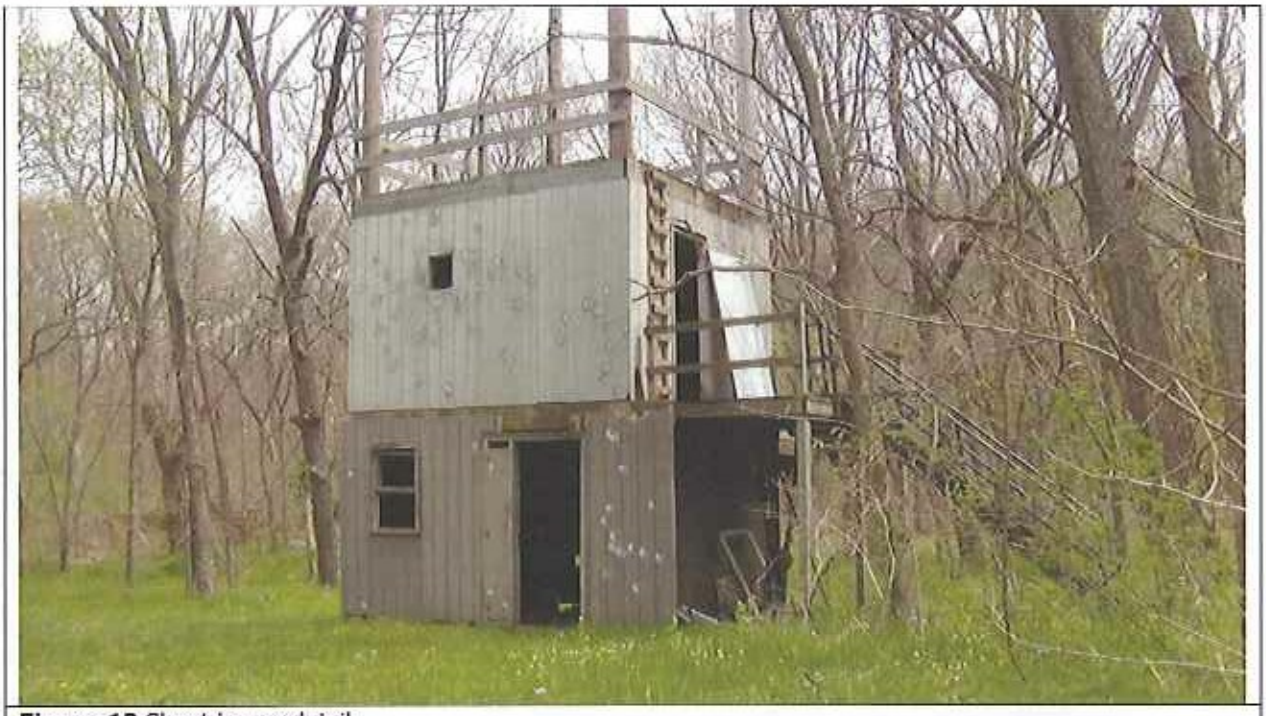


Figure 13 Shoot house detail

Figure 14 Pistol/rifle range. This range can be 30 or 80 yards. Hill provides backdrop

FOP CONDITIONAL USE PERMIT FOR OPERATION OF FIRING RANGES

1. The FOP shall submit a revised site plan showing the backdrops for the pistol and rifle firing ranges. The trap shooting range and the shooting house do not need to have backdrops.

2. The FOP will cooperate with the county and the city to try and obtain a reduced noise level from the ranges.

3. The FOP shall post no trespassing signs on any boundary area where it could reasonably be expected that persons might enter the property.

4. The FOP will place three signs in close proximity to each other at the main gate off county road E-661. Those signs will read: "Keep Out!, High Noise Area! and Dangerous Area!"

5. The FOP shall not allow range operations on New Year's Day, Easter, Thanksgiving, Christmas Eve, and Christmas Day.

6. Restriction on hours of operation for the Firing Ranges.

Law Enforcement, Military Training and other groups on firing ranges.

The FOP shall limit use of shooting on its ranges by Law Enforcement, Military Training, Hunter Safety and other similar activities to Monday thru Friday 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 7:00 p.m., Sunday 11:30 a.m. to 7:00 p.m.

Law enforcement and the Military shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m. The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur. The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgement such modification is necessary for the proper training of Law

Enforcement officers who have jurisdiction in Douglas County. When reasonably possible the Sheriff or Chief shall notify the Douglas County Zoning and Codes department in writing of this decision.

Individual use of the ranges by FOP members

Individual use by FOP members. Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.

7. The 94 acres included in the CUP shall remain in the FOP ownership to serve as a buffer area. Any reduction in the area will require an Amended CUP.

8. The CUP is subject to conditions approval of the Board of County Commissioners.

Sept. 26, 2011

To: City/County Planning Staff

The following comments are provided for your Memo for the FOP CUP for September 26, 2011 Planning Meeting, Staff Recommendations:

1)"Other similar events" must be more clearly defined. Perhaps "officially sanctioned county/city training activities" would be appropriate.
2) The first sentence needs to have a stipulation that defines when the noise specialist is to be hired. Perhaps "within 60 days of the County Commissioner's decision," would be the proper language.
3) "Receiving Point" should be defined. Is this where the firing is conducted, the boundaries of the property, or some other location?
4) "Around the perimeter at appropriate locations" is open to interpretation. Perhaps "but not less than every 200 yards (although this is much more lenient than either NRA or DOD requirements)" would be a reasonable stipulation.
5) The hours of operation for night Shooting should be limited to no latter than 9:30. 10:00 Is too late, particularly when kids need to go to school the next day. On Sundays recreational shooting should be limited to 12:00PM till 5:00PM. (It is assumed that Law Enforcement personnel will not be training on Sunday, and local church services will be over by noon. Individual use is recreational shooting and there is little justification for causing the neighborhood to be subjected to this type of disturbance.
6) No Comment
7) No Comment
8) No Comment
9) Add "Lead levels should be measured in Washington Creek annually to assure that leaching from the range is not contaminating the waterway."
10)No Comment
11)No Comment
12)A stipulation should be added that Helicopter operations at this location are to be limited to actual Emergency requirements.

Mary Miller

From: Jim Lock [jim.lock@sas-midwest.com]
Sent: Tuesday, September 13, 2011 2:11 PM
To: Mary Miller
Cc: Sheila Stogsdill; jim.lock@sas-midwest.com
Subject: Community Support for FOP, 9-11-2011

Follow Up Flag: Follow up
Due By: Wednesday, September 14, 2011 8:00 AM
Flag Status: Flagged

Dear Mary Miller:

Thank you for your Sept. 1, 2011 letter informing us of the Sept 26, Planning Commission meeting where the Conditional Use Permit for the FOP will be discussed. I will not be able to be at the Planning Commission meeting Monday, Sept. 26, however I wanted to send you a brief message letting you know that our family supports the FOP being in our community.

My wife and I have lived in our home at 643 N 750 Rd, raising our five kids, since 8-15-1984, over 27 years, and have loved living in this beautiful part of our county and state. I think our home is one of the 3 or 4 closest homes to the FOP Lodge. We can see the FOP directly east of our home.

I can truthfully tell you that we have never been bothered by gun shot noise that comes from the FOP. We know that it is necessary for our police forces to get their training, and we greatly appreciate the work and protection the police from the city, county and state provide for all of us. We feel that their presence in our Lone Star community provides us added security, and we want to give them our support.

I believe that there are many other families living in our area who feel the same way that we feel, however we have not tried to organize our response; we just want to be good neighbors with all other families who live out here and also with the FOP.

Since the FOP had its lodge and practice area out here long before most of us who live out here, I think it inappropriate for us to put undue pressure or demands on them. We knew the FOP was here when we chose to move our here. I would like to recommend that the city/county regulation bodies move to give the FOP all the legal standing they need to continue their work in our community. And I would like to see all who live in our area out here have a good living relationship with the FOP and each other.

Please feel free to use the above letter as you see fit, and let me know if there is anything further I can do to help promote the above solution.

Thank you for your help in this area.

Sincerely,

Jim Lock
643 N 750 Rd.
Lawrence, KS 66047
785-748-0809

September 15, 2011

To: Chairman
Douglas County Planning Committee

The Conditional Use Permit which has been offered by the Fraternal Order of Police for a shooting range operation is fraught with errors, omissions, and red herrings. It would appear that the CUP as written by the FOP Executive Committee would have little chance of being approved and it is therefore suggested that the planning committee utilize its time on more fruitful efforts.

Examples of a few of the problems in their document; there is no commitment by the FOP to take any action to mitigate - any of the issues previously identified as environmental concerns (lead and noise pollution), safety, and accommodation of the neighbors' stated issues with hours of operation and use by non-county personnel.

The allusion to use by the Military is a total red herring. If the applicants will check the Department of Defense Regulations regarding the use of non DOD ranges (see Army Regulation 385-63 para. 2-6. page 7, Use of non-DOD property) they will realize that approval by the MACOM (Major Command) is a prerequisite and that SDZs (Surface Danger Zones) must meet the requirements of the regulation and be updated and prepared according to DA Pam 385-63. The obvious conclusion is that the range does not comply with DOD requirements. Any commander who had his troops conduct firing operations at this range would be court-martialed.

In the past when there have been proposals to establish shooting facilities in the county, they have been disapproved based upon neighbor's objections and safety and environmental concerns. If this request had been made by a company that wanted to establish a club as a for profit business to provide a range for customers to discharge firearms, have social events which included the consumption of alcohol, and be open for business to anyone who wanted to use the shooting facility, to include hunting for game, the Planning Board would listen to the neighbors, hear the opinions and recommend to the County Commissioners that the CUP be disapproved. This is exactly what happened to the request for a country shooting club that was proposed in the northwest part of the county. That proposal was withdrawn because the applicant saw that the chances for it to be approved were almost non existent, even though he had offered several operational constraints to mitigate the neighbors concerns as well as the environmental impact.

Had the professional Law enforcement community stipulated their requirements to the City and County Commissioners, the current situation would not exist. Funding for design, construction, and maintenance would have been identified and proper planning would have provided professional training facilities. This actually was done, except that the facility could not meet OSHA requirements, and was therefore never used. Instead the law enforcement personnel took a coures of action which had few obstacles, and they have never forced themselves to address the need to establish a proper training

facility. To do so would have required manpower and funding resources which the departments chose to utilized in other areas.

As there has been a stated need by the Chief of Police and the Sheriff's Department to have a facility to conduct firearms training, the neighbors suggest that the Planning Department conduct a meeting with representatives from the Lawrence Police Department, the Sheriff's Office and several of the local landowners who live in the impacted area surrounding the FOP shooting facility. The purpose of the meeting would be to determine if a plan can be developed which would allow training activities to continue to be conducted at this site until a suitable facility can be constructed. If an arrangement can be made which is tolerable to both parties, then the FOP could submit a CUP which had procedures and commitments which meet the Law Enforcement training requirements. Specifically, this is envisioned to mean that sound mitigation techniques would be incorporated to meet NRA standards, the hours of operation would be no more that those required for law enforcement training, and the usage would be limited to FOP membership and their defined guests. Of course the FOP Executive Committee could add any other requests they desired, so long as they did not exceed the Law Enforcement requirements.

Should an agreement between the Law Enforcement agencies and the landowners not be reached, then the FOP and the County would be placing themselves in jeopardy of not meeting the court order and subjecting themselves to state and federal investigations into strict compliance with environmental regulations..

Sincerely,

/s/ William E. Roth

Mary Miller

From: Bill Roth [wroth@hughes.net]
Sent: Tuesday, September 20, 2011 3:25 PM
To: Mary Miller
Subject: Re: Letter concerning the FOP CUP

Mary-

Apparently my letter was not clear enough. What I feel is the situation, is that that the FOP has a flawed CUP which will prevent it from being approved. Their appears to be a concern that if this CUP is not approved a training facility for our law enforcement personnel will not be locally available. A way to provide a facility where our law enforcement personnel can train, is to find a way for the FOP to present an acceptable CUP.

The purpose of my letter was to try to determine what the Law enforcement personnel need to fulfill their training requirements. The intent of my proposed meeting is to try to determine if there is a way for those requirements to be met within parameters which the neighbors feel they can tolerate. Once these parameters are defined then the FOP can make their request within those parameters, and the neighbors cognizant of the training needs of our law enforcement personnel would be willing to make the civic sacrifice to accommodate the need.

At the present time the manner in which the CUP has been written makes it appear that the CUP is some type of group which has no consideration for any requirements other than a country club to suit themselves. The neighbors feel no need to agree to this non conforming requirement.

If the FOP desired to include in their CUP additional areas of usage within the Law enforcement defined parameters, they could them be addressed as possible areas for consideration.

There are several neighbors who would be willing to see if their are operating parameters that meet the law enforcement needs and could be tolerated until such future time when a proper training facility can be constructed..

Bill Roth

On Sep 15, 2011, at 2:10 PM, Mary Miller wrote:

> Bill,
> I don't believe we could arrange a meeting before the Planning Commission meeting. You suggested meeting to discuss relocating the range, and up to this point relocation hasn't been considered necessary. You've suggested relocating the range in your letter, and you could bring it up at the Commission meeting. If the Planning Commission votes to recommend relocation, we would start working in that direction.
> Thanks,
> Mary
>
> Mary K Miller, AICP, City/County Planner- mmiller@lawrenceks.org
> Planning Division | www.lawrenceks.org/pds P.O. Box 708, Lawrence,KS
> 66044 Office (785) 832-3147 | Fax (785) 832-3160
>
>
> -----Original Message-----
> From: Bill Roth [mailto:wroth@hughes.net]

Mary Miller

From: Karl Birns [kblrns@gmail.com]
Sent: Wednesday, August 03, 2011 9:29 AM
To: Mary Miller
Cc: 'Bill Roth'; 'Terry Shistar'
Subject: Comments on FOP CUP, addendum
Attachments: bmp3_7.pdf; bmp4_7.pdf; bmp5_7.pdf; bmp6_7.pdf; bmp7_7.pdf; Range_Design_Criteria.pdf; range-manual.pdf; sabsstd.pdf; shootingrangeregulationsoct4.pdf; SMART-2.pdf; 2011_year_for_Troy_Acoustics.pdf; bmp2_7.pdf

To: mmiller@lawrenceks.org

Addendum to comments on the FOP CUP

From Karl Birns and Terry Shistar, Residents

809 East 661 Diagonal Road

This is a follow-up to our letter to you of last month commenting on the proposed CUP for the FOP. Consideration of the CUP at the July meeting of the County Commission was postponed allowing more time for research. We did a simple internet search and found hundreds of documents relation to shooting ranges: design, operation, regulation, health impacts, etc. We have attached some of the more relevant ones to this document for your information. These include design manuals from US DOE, Canada, New Zealand; a county ordinance from North Carolina that regulates range design and operation and includes enforceable standards; a survey of state statutes done by Connecticut and a couple of documents on health and environmental effects from range operations prepared by EPA and the US Air Force. Of course there was also the NRA design document, but you already have that.

The ease with which this information was obtained leads us to believe that we're not dealing here with questions of technology, but rather with public policy. The FOP ranges do not come near meeting current design standards. The shot gun range shoots in the direction of County Road 1; the long rifle range shoots over a creek and the hand gun range is beside it. There are occupied residences bordering the property and less than 100 yards from the drop zone for shot. It seems that there are a number of policy issues here:

1. Does the commission (along with the Lawrence City commission) believe that they have a responsibility to provide local law enforcement officers with a facility that meets current best practices for design and operation procedures that ensure the safety and health of the officers and surrounding citizens and environment?

22 2. If so, both governing bodies should start the process to secure such a facility in the future. Concurrently, an interim permit with limited conditions would be warranted at the FOP as a transition to a new facility.

3. If not, than the FOP facility should be required to upgrade to meet current best design standards and a CUP issued that incorporates these standards and practices. We recognize that because of the current manner in which the FOP has arranged their shooting facility, this would be extremely difficult to do. It should be noted that to fire rifles at distances greater than 100 yards, the shooter must fire either over or very close to the edge of the FOP property. This is at the entry way on the south west corner, an inherently risky practice. Noise abatement when conducting eight station pistol training and simulated house to house firing is far in excess of what is customary when individuals are shooting on their property for private recreational shooting, or when what sounds like the FOP members are doing recreational shooting.

The fact that there has been no limit on who can use the range is open ended. There seems to be no specified limit to the number of "guest " who can be invited. Does this mean the Wyandotte Muzzle Loaders who are friends of some of members or is this limited to family members?

4. Further, the CUP should be written in such a way that the standards are enforceable and with pre-designation of monitoring and triggers for implementation of remedial action if the standards are contravened. There should be a public agency (health department?) charged with this function.

4. 5. The county should consider adopting an ordinance for future range development by private parties that clearly sets out design and operational standards (similar to Vance County, NC).

The conflict between the neighbors and the FOP goes back over six years. At that time some of the area residents approached the FOP regarding excessive noise and operating hours. The FOP has greatly increased its shooting activities over the years since it was first operating and now even includes military operations with helicopters, and out-of-county officers and private shooters as well as local law enforcement. A list of requests was prepared and submitted to the FOP, but it met a stone wall. The dispute escalated and eventually the county and the question of zoning arose. At this point the lawyers were brought in and posturing began. In particular, the issue of the authority of the county to require a CUP at the facility came into question. We're now in the comment period of the variance process and more posturing is occurring to protect future positions if litigation is necessary. This reflects a shift in societal values from cooperation for the common good, to concern only for ego and power. If this appears as a microcosm of the Capital budget debate in Washington, it is.

We would welcome the opportunity to sit down with the FOP and again try to work out our differences in a cooperative manner. Perhaps, the county could broker such a meeting and temporarily put the CUP on hold? Enough muscle has been flexed. It's time to use our heads. If the FOP would agree to incorporate our original list of requests into the CUP while the county pursues options for an up-to-date facilities, we would consider any further action unnecessary.

Chapter I: Environmental and Regulatory Concerns at the Shooting Range

1.0 Background

Outdoor shooting ranges provide recreational facilities for millions of shooting sports enthusiasts in the United States. Recently, there has been a growing public concern about the potential negative environmental and health effects of range operations. In particular, the public is concerned about potential risks associated with the historical and continued use of lead shot and bullets at outdoor ranges.

This concern is not unfounded. An estimated 9,000 non-military outdoor ranges exist in the United States, collectively shooting millions of pounds of lead annually. Some ranges have operated for as long as several generations. Historical operations at ranges involved leaving expended lead bullets and shot uncollected on ranges. Many of these ranges continue to operate in the same manner as in the past.

It is estimated that approximately four percent (4%) (80,000 tons/year) of all the lead produced in the United States in the late 1990's (about 2 million tons/year), is made into bullets and shot. Taking into account rounds used off-range, and rounds used at indoor ranges, it is clear that much of this 160,000,000 pounds of lead shot/ bullets finds its way into the environment at ranges.

Since the mid-1980's, citizen groups have brought several lawsuits against range owners and have urged federal and state agencies to take action against owners and operators of outdoor shooting ranges. The citizen groups argued that range owners improperly managed discharged lead bullets and shot. Federal courts have supported parts of these suits, requiring range owners/operators to clean up lead-contaminated areas. Concurrent with the increased citizen suit activity, the federal EPA, the Centers for Disease Control and Prevention (CDCP), and a large number of states have identified human exposure to all forms of lead as a major health concern in the United States.

Lead management practices at ranges across the United States remain inconsistent. Some range owners/operators have examined the impact of range operations on human health and the environment and have implemented procedures to manage and/or remove accumulated lead from ranges. Other range owners/operators are just beginning to characterize and investigate their ranges in order to design an environmental risk prevention and/or remediation program(s) specific to their sites. A third group of ranges has adopted a "wait and see" policy – taking no action until specifically required to do so by law or clear guidance is in place. Finally, a fourth, small, but important group of range owners/operators remain unaware of lead's potential to harm human health and the environment, and of existing federal and state laws.

To manage lead, many owners and operators have successfully implemented Best Management Practices (BMPs) at their ranges. These range owners and operators have realized many benefits from sound lead management including:

- stewardship of the environment, natural resources and wildlife,
- improved community relations,
- improved aesthetics of the range/good business practices,
- increased profitability through recovery/ recycling lead, a valuable and finite resource, and
- reduced public scrutiny.

Shooting sports organizations [e.g., National Rifle Association (NRA) and the National Shooting Sports Foundation (NSSF)] promote lead management throughout the United States. These organizations have researched different methods to effectively address potential and actual lead mobility and exposure without detracting from the enjoyment of the sport. The NRA, NSSF, and a number of other shooting sports organizations strongly encourage range

owners/operators to develop a BMP program that contains elements discussed later in this manual. Contact the NRA and NSSF for additional guidance materials available on lead management practices.

By implementing appropriate lead management at outdoor shooting ranges, range owners and operators can reduce the environmental and health risks associated with lead deposition, meet legal requirements and realize quantifiable benefits.

1.1 Lead Contamination's Impact on Human Health and the Environment

Exposure Routes

Historically, the three major sources for human exposure to lead are lead-based paint, lead in dust and soil and lead in drinking water. Typically, human exposure occurs through ingestion, which is the consumption of lead or lead-contaminated materials, or by inhalation. The main human exposure to lead associated with shooting ranges is through lead-contaminated soil. However, other pathways are discussed below, along with lead's detrimental effects on humans and animals.

Lead can be introduced into the environment at shooting ranges in one or more of the following ways. Each of these pathways is site-specific and may or may not occur at each individual range:

- Lead oxidizes when exposed to air and dissolves when exposed to acidic water or soil.
- Lead bullets, bullet particles, or dissolved lead can be moved by storm water runoff.
- Dissolved lead can migrate through soils to groundwater.

<u>Lead oxidizes when exposed to air and dissolves when exposed to acidic water or soil</u>

When lead is exposed to acidic water and/or soil, it breaks down by weathering into lead oxides, carbonates, and other soluble compounds. With each rainfall, these compounds may be dissolved, and the lead may move in solution in the storm runoff waters. Decreases in water acidity (i.e., increases in its pH) will cause dissolved lead to precipitate out of solution. Lead concentrations in solution are reduced by this precipitation. At pHs above 7.5, very little lead remains in solution. Increased time of contact between lead and acidic water generally results in an increase in the amount of dissolved lead in the storm runoff water. The five factors which most influence the dissolving of lead in water are summarized below:

Annual Precipitation Rate - The higher the annual precipitation rate, the faster the lead weathers. Also, during prolonged rains, the contact time between water and lead is increased. In general, the higher the precipitation rate, the higher the potential risk of lead migration off-site in solution.

pH of Rain and Surface Water - The acidity of the rainwater decreases as basic (alkaline) minerals in the soil are dissolved. If sufficient minerals such as calcium, magnesium, and iron are present in local soils, then the lead may quickly precipitate out of solution entirely as these other minerals are dissolved. The pH of shallow surface water is an indicator of the presence or absence of basic minerals in the local soil and in gravel within the stream beds through which the water has moved. The water in deeper streams and lakes is more likely to be composed of acidic rainwater that is not neutralized.

Contact Time - The contact time between acidic surface water and lead is a factor in the amount of lead that is dissolved. For example, lead shot deposited directly into a lake has a longer contact time then lead shot deposited in upland areas.

Soil Cover - Organic material will absorb lead and remove it from a water solution. The thicker the organic leaf and peat cover on the soil, the lower the lead content in solution in water leaving the shot area. Organic material has a strong

ability to extract lead out of solution in water.

pH of Groundwater - During periods of no rainfall, the water flowing within most streams comes from groundwater discharging into the stream channel. Therefore, the acidity of the groundwater affects the acidity of the surface water, and hence, affects the solubility of any lead particles carried into the stream during storm runoff.

Lead bullets, bullet particles or dissolved lead can be moved by storm water runoff

The ability of water to transport lead is influenced by two factors: velocity of the water and weight or size of the lead fragment. Water's capacity to carry small particles is proportional to the square of the water's velocity. Clear water moving at a velocity of 100 feet per minute can carry a lead particle 10,000 times heavier than water moving at a velocity of 10 feet per minute. Muddy water can carry even larger particles. The five factors that most influence velocity of runoff are described below:

Rainfall Intensity - The greater the volume of rainfall during a short period of time, the faster the velocity created to carry the rainfall off-site. The higher the annual rainfall, the greater the number of periods of heavy rainfall.

Topographic Slope - Generally, the steeper the topographic slope, the faster the velocity of stormwater runoff.

Soil Type - More rainfall will soak into sandy soils then into clay soils. Hence, for a given rainfall intensity, the volume of runoff will be greater from areas underlain by clays or other low permeable soils than from permeable sandy soil.

Velocity - Velocity tends to decrease as stream width increases. Merging streams, eddy currents, and curves in streams are other factors that may reduce the velocity. Generally, the shorter the distance from the lead deposit to the property line, the more likely it is that the lead fragments in suspension will be transported off-site.

Vegetative Cover and Man-made Structures - Structures such as dams and dikes reduce the water's velocity and greatly reduce the size and weight of the lead particles the water can carry. Since lead particles are heavy compared to the other suspended particles of similar size, they are more likely to be deposited under the influence of anything that reduces velocity of the storm runoff. Grass and other vegetation reduce runoff velocity and act as a filter to remove suspended solids from the water.

Dissolved lead can migrate through soils to groundwater

Acidic rainwater may dissolve weathered lead compounds. A portion of the lead may be transported in solution in groundwater beneath land surfaces. Groundwater may transport lead in solution from the higher topographic areas to the lower areas such as valleys, where it is discharged and becomes part of the surface water flow. If the water flowing underground passes through rocks containing calcium, magnesium, iron, or other minerals more soluble then lead, or through minerals that raise the pH of the water, then the lead in solution may be replaced (removed) from the solution by these other metals. However, if the soil is a clean silica sand and gravel, fractured granite, or similar type material, then the lead may move long distances in solution. The factors most likely to affect the amount of lead carried by the groundwater in solution are discussed below:

Annual Precipitation - Generally, high precipitation rates result in heavy dew, more frequent rainfall, numerous streams, shallow depth to groundwater, shorter distance of travel, and more rapid rates of groundwater flow. Also, the greater volumes of rainfall over geologic time probably have reduced the amount of calcium and other soluble basic minerals that could raise the water pH and cause lead to precipitate (settle) out of solution from the groundwater.

Soil Types - Clays have a high ionic lead bonding capacity and more surface area to which the lead can bond. Also, groundwater movement in clay is very slow, which increases the contact time for lead to bond to the clay.

Low permeability reduces the amount of historical leaching and increases the probability of the presence of basic (pH-increasing) minerals that can precipitate out of solution in groundwater or cause the lead to bond to the clay. All of the basic calcium and related minerals generally will have been removed from the clean silica sand and gravel soils, so the lead in solution in groundwater in these type soils can move long distances (miles) through the ground relatively unchanged.

Soil Chemistry - The more basic minerals like calcium and magnesium that are present in soils along the pathways through which the groundwater moves, the greater the lead precipitation (removal) rate. Lead should move in solution only a short distance (a few feet) through a sand composed of calcium shell fragments, but could move in solution long distances (miles) through clean quartz sand.

Depth to Groundwater - In areas of groundwater discharge such as river flood plains and most flat areas, the groundwater surface is often a few feet below the surface. Remember, the shorter the distance traveled, the greater the risk that the lead will migrate into the environment. Shallow depth to groundwater is indicative of higher risk for lead to reach the water.

pH of Groundwater - Although other factors influence solubility of lead in water, a good rule of thumb is that lead will precipitate out of solution when the pH or alkalinity of water is greater then about 7.5. But, lead dissolved in acid groundwater may travel many miles without change.

Health Effects of Lead Exposure on Ranges

Lead poisoning is a serious health risk. At higher concentrations, it is dangerous to people of all ages, leading to convulsions, coma and even death. At even very low concentrations, it is dangerous to infants and young children, damaging the developing brain and resulting in both learning and behavioral problems. Figure 1-1 describes the effects of exposure to lead on children and adults.

Federal, state and local actions, including bans on lead in gasoline, paint, solder and many other lead-containing products, have resulted in significant reductions in average blood-lead levels. Despite these advances, the number of lead-poisoned children remains alarmingly high. Children living in older homes may be exposed to lead in peeling paint or paint dust. Children can also come in contact with lead in soil and with lead dust carried home on the clothing of parents.

On ranges, inhalation is one pathway for lead exposure since shooters are exposed to lead dust during the firing of their guns. Because wind is unlikely to move heavy lead particles very far, airborne dust is generally considered a potential threat only when there are significant structures that block air flow on the firing line. Under such conditions, the hygiene and other practices proposed by the NRA for indoor shooting ranges in their "Source Book" are applicable to outdoor ranges.

Range workers may also be exposed to lead dust while performing routine maintenance operations, such as raking or cleaning out bullet traps. Owners/operators may want to protect these workers by requiring them to wear the proper protective equipment or dampening the soil prior to work.

Another exposure route for lead at outdoor ranges is ingestion by direct contact with lead or lead particles. For example, lead particles generated by the discharge of a firearm can collect on the hands of a shooter. These particles can be ingested if a shooter eats or smokes prior to washing his/her hands after shooting. **The relative risk of lead exposure to people in a well managed facility is low.**

Detrimental effects due to elevated lead levels can also be found in animals. Excessive exposure to lead, primarily from ingestion, can cause increased mortality rates in cattle, sheep and waterfowl. For example, waterfowl and other birds can ingest the shot, mistaking it for food or grit. Waterfowl, in particular, are highly susceptible to lead ingestion. This is a concern at ranges where shooting occurs into or over

Effects on the Human Body from Excessive Exposure to Lead

If not detected early, **children** with relatively low levels of lead (as low as 10 microgram/deciliter for children) in their bodies can suffer from:

- damage to the brain and nervous system,
- behavior and learning problems (such as hyperactivity and aggressiveness),
- slowed growth,
- hearing problems,
- headaches, and
- impairment of vision and motor skills.

Adults can suffer from:

- difficulties during pregnancy,
- reproductive problems in both men and women (such as low birth weight, birth defects and decreased fertility),
- high blood pressure,
- digestive problems,
- neurological disorders,
- memory and concentration problems,
- muscle and joint pain, and
- kidney dysfunction.

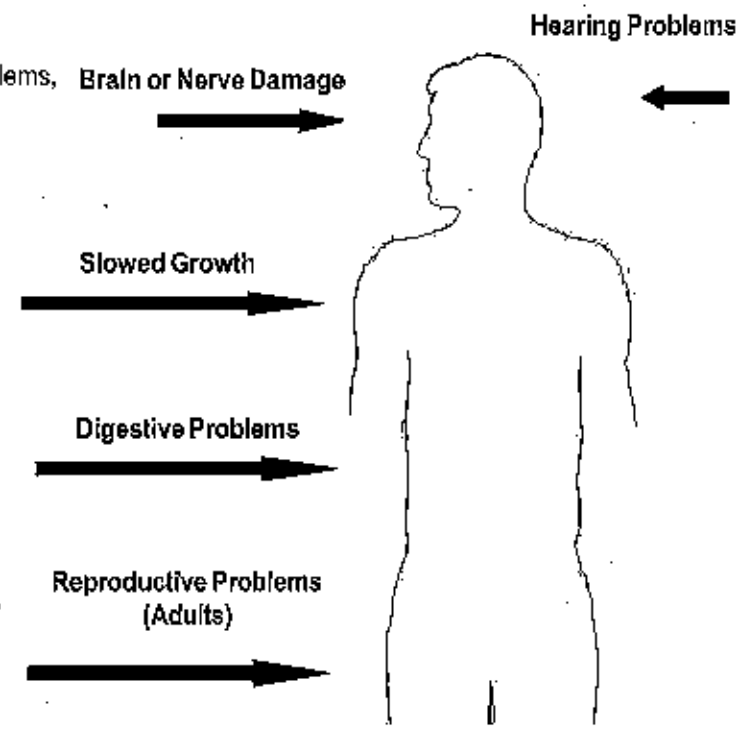


Figure 1-1: Effects on the Human Body from Excessive Exposure to Lead

water. Many of the legal and government actions that have been brought against ranges are based on elevated levels of lead and increased mortality in waterfowl. For example, in one case, an upland area of a range became a temporary pond after a thunderstorm. Waterfowl used the pond to feed and shortly thereafter, there was a waterfowl die-off (increase in bird mortality), apparently from lead ingestion.

1.2 Legal Requirements & Court Rulings

To date, most litigation concerns have been at shotgun ranges where the shotfall zone impacts water or wetland areas. The potential environmental and human health risks are greater at these ranges. However, all ranges, including those not located near water bodies, may be subject to legal and government action if proper range management programs are not implemented. Range owners/operators should expect greater scrutiny as ranges become more visible to regulators, environmental groups and the general public.

Citizen groups have been the driving force behind most legal actions taken against outdoor ranges. These groups have sued range owners/operators under federal environmental laws. Two of EPA's most comprehensive environmental laws, the Resource Conservation and Recovery Act (RCRA) and the Clean Water Act (CWA), specifically provide citizens with the right to sue in cases in which the environment and human health are threatened. These citizen suits have been highly effective in changing the way ranges operate, even when out-of-court settlements have been reached. The decisions of the United States Court of Appeals for the Second Circuit in *Remington Arms* and *New York Athletic Club* set a legal precedent in the application of RCRA and/or the CWA to outdoor ranges. Lead management programs at outdoor ranges must comply with both laws. Actions have also been taken under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) commonly know as Superfund. State and local statutes and regulations may also apply. To ensure environmental laws are being followed, range owners/operators must understand the legal issues and requirements.

1.2.1 Resource Conservation and Recovery Act (RCRA)

RCRA provides the framework for the nation's solid and hazardous waste management program. Under RCRA, EPA developed a "cradle-to-grave" system to ensure the protection of human health and the environment when generating, transporting, storing, treating and disposing of hazardous waste. RCRA potentially applies to many phases of range operation because lead bullets/shot, if abandoned, may be a solid and/or a hazardous waste and may present an actual or potential imminent and substantial endangerment.

Connecticut Coastal Fishermen's Association v. Remington Arms Company, et al.

In the late 1980s, the Connecticut Coastal Fishermen's Association filed a lawsuit against Remington Arms Company as the owner of the Lordship Gun Club. The Lordship Gun Club (a.k.a. Remington Gun Club) is a 30-acre site in Stratford, Connecticut, located on the Long Island Sound at the mouth of the Housatonic River. In the mid-1960s, the Lordship Gun Club was reconstructed to its final configuration of 12 combined trap and skeet fields and one additional trap field. Over the years, the Lordship Gun Club became known as one of the premier shooting facilities on the East Coast.

The Connecticut Coastal Fishermen's Association filed a lawsuit, alleging that lead shot and clay targets are hazardous waste under RCRA. The Complaint alleged that because the lead shot and clay targets were hazardous wastes, the gun club was a hazardous waste storage and disposal facility subject to RCRA requirements. The plaintiff also sought civil penalties and attorney's fees.

Remington moved for a summary judgment dismissing the complaint, and the Connecticut Coastal Fisherman's Association cross-moved for a partial summary judgment on the issue of liability. On September 11, 1991, the United

States District Court for the District of Connecticut ruled on the case.

Regarding the plaintiff's claims under RCRA, the District Court ruled in favor of the Connecticut Coastal Fishermen's Association, holding that the lead shot and clay targets were "discarded materials" and were "solid waste;" therefore, the materials were subject to regulation under RCRA. The court further stated that the discharged lead shot was a "hazardous waste," but declined to rule on whether the clay target fragments were also hazardous waste. Remington petitioned the United States Court of Appeals for the Second Circuit Court to review the lower court's ruling.

On June 11, 1992, both parties presented oral arguments before the court. Subsequent to oral arguments, the appellate court requested that EPA file an amicus brief "addressing whether lead shot and clay target debris deposited on land and in the water in the normal course of trap and skeet shooting is 'discarded material'... so as to constitute 'solid waste' under RCRA."

On March 29, 1993, the United States Court of Appeals for the Second Circuit reached its decision. With respect to RCRA, the court both reversed and affirmed the lower court's opinion in part.

Briefly, the decision affects currently operating and future gun clubs, and the following key points are of primary concern:

1. With respect to RCRA, the court agreed with EPA's amicus brief, which had argued that shooting at gun clubs is not subject to regulatory (as opposed to statutory) requirements. In other words, during routine operations, gun clubs are not viewed as facilities that manage hazardous wastes subject to RCRA regulations and, as such, do not require RCRA permits.

2. Another argument in the EPA's amicus brief with which the court agreed was the view that the RCRA statute allows citizen suits to be brought if a gun club's shooting activities pose an "imminent and substantial endangerment to health or the environment." Although gun clubs are not subject to RCRA regulations, EPA or any state, municipality, or citizen group can take legal action under the statutory provisions of RCRA against gun clubs for actual or potential environmental damage occurring during, or even after, the operation of the club. Under RCRA, the plaintiff would be eligible to recover its legal fees as well.

3. The court concluded that lead shot and clay targets meet the statutory definition of solid waste because these materials were "discarded (i.e. abandoned)" and "left to accumulate long after they have served their intended purpose." Further, the court concluded that based upon toxicity testing and evidence of lead contamination, the lead shot was a hazardous waste subject to RCRA.

The important point to consider here is that if lead shot and clay target debris are discarded (i.e. abandoned), these materials are considered a solid waste as defined in the statute and the facility may be subject to governmental or citizen suits.

If, on the other hand, the discharged lead shot is recovered or reclaimed on a regular basis, no statutory solid waste (or hazardous waste) would be present and imminent hazard suits would be avoided.

Thus, the Remington Arms case is an important legal precedent. Even though regulations have not been issued regarding gun club operations and environmental protection, gun clubs are still at risk of legal action under RCRA if they fail to routinely recover and reclaim lead, do not take steps to minimize lead release or migration, or if they abandon lead in berms.

Gun clubs where there is shooting into water, wetlands, rivers, creeks, and other sensitive environments have the highest degree of litigation risk. Conversely, gun clubs that have the lowest risk of environmental litigation or government action are those clubs that do not shoot into water or wetlands and which have an active program to recover lead.

The following describes how RCRA may apply to outdoor shooting ranges.

How Is Lead Shot Regulated Under RCRA?

Lead shot is not considered a hazardous waste subject to RCRA at the time it is discharged from a firearm because it is used for its intended purpose. As such, shooting lead shot (or bullets) is not regulated nor is a RCRA permit required to operate a shooting range. However, spent lead shot (or bullets), left in the environment, is subject to the broader definition of solid waste written by Congress and used in sections 7002 and 7003 of the RCRA statute.

With reference to reclaiming and recycling lead shot, the following points should serve as guidance in understanding RCRA and how it applies to your range. (A more detailed discussion of the underlying RCRA rules applicable to lead shot removal at ranges is included in Appendix D)

- **Removal contractors or reclaimers should apply standard best management practices, mentioned in this manual, to separate the lead from soil. The soil, if then placed back on the range, is exempt from RCRA. However, if the soil is to be removed off-site, then it would require testing to determine if it is a RCRA hazardous waste.**

- **Lead, if recycled or reused, is considered a scrap metal and is, therefore, excluded from RCRA.**

- Collected lead shot and bullets are excluded from RCRA regulation, and need not have a manifest, nor does a range need to obtain a RCRA generator number (i.e., the range is not a hazardous waste "generator"), provided that the lead is recycled or re-used. The reclaimer does not need to be a RCRA transporter. **However, it is recommended that ranges retain records of shipments of lead to the receiving facilities in order to demonstrate that the lead was recycled. Records should also be kept whenever the lead is reused (as in reloading.) The range should be aware that it ultimately may be responsible for the lead sent for reclamation. Therefore, only reputable reclaimers should be utilized.**

- Lead from ranges destined for recycling may be temporarily stored on range property after separation from soil if the lead is stored in closed, sealed containers, the containers are stored in a secure location and routinely inspected by range staff, and records of inspections are maintained.

- Sections 7002 and 7003 of the RCRA statute allow EPA, states or citizens to use civil lawsuits, to compel cleanup of or other action for "solid waste" (e.g., spent lead shot) posing actual or potential imminent and substantial endangerment. Such actions can be sought whether the range is in operation or closed, and is based solely on a determination that harm is being posed or may be posed by the range to public health and/or the environment. Since the risk of lead migrating increases with time, making ranges that have not removed lead more likely candidates for government action or citizen lawsuits under RCRA Section 7002 and 7003, ranges are advised to maintain a schedule of regular lead removal.

- With time, lead in soil can become less desirable to reclaimers and smelters, thereby potentially reducing or eliminating financial returns from lead removal. Moreover, such soil may be subject to more expensive treatment to separate the lead for recycling.

- Lead removal will allow the range to: avoid contamination of the site and potential impacts to human health and the environment; reduce liability with regard to potential government agency or citizen suit action; and, possibly, benefit economically from the recycling of lead. Additional guidance on reclaiming lead is provided in other parts of this manual.

- Soil from berms and shotfall zones may be moved to another area of the range for such reasons as addressing potential environmental impacts (e.g., runoff), altering the layout to address safety concerns or allowing different types of shooting activities, or adding or removing shooting positions. However, removal of lead prior to such

movement of soil is normal practice and highly advised because it extends the usable life of the materials and reduces the possibility of release of lead into the environment. If lead is not first removed, it will be further dispersed and will be more difficult to remove in future reclamation. Written records of all such activity should be maintained indefinitely, as they will be necessary in subsequent construction or range closure.

- This RCRA summary applies to operating and non-operating ranges, and the use of BMPs at operating ranges is highly recommended. However, because of increased risk if lead is not actively managed, such application may not preclude the need for remediation, as appropriate and/or as required by states' regulations, when a range is permanently closed, on-site lead is abandoned, or the land use changes. Introductory guidance for remediation can be found at www.epa.gov/epaoswer/osw or www.epa.gov/superfund. Look under the sections "Cleanup" or "Resources," or use the Search function.

1.2.2 - Clean Water Act

The goal of the Clean Water Act (CWA) is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The most common allegation against ranges by the EPA and citizen groups, is that they violate the CWA if they do not have permits that allow spent ammunition to be discharged into water. The CWA prohibits "the discharge of any pollutant by any person" into the waters of the United States without a National Pollution Discharge and Elimination System (NPDES) permit. There have been two court cases that have applied the provisions of the CWA to civilian shooting ranges. To understand how the CWA can apply to shooting ranges, a summary of the cases follows. Also see Table 1-1.

To understand the application of the CWA to outdoor ranges, one must know the definitions of key terms and how they have been applied to shooting activities. See Table 1-1.

In the *Remington Arms* and the *New York Athletic Club* lawsuits, citizen groups argued that the defendants violated the CWA by discharging pollutants from point sources into the Long Island Sound without a NPDES permit. Application of the CWA requires the violations to be ongoing. Consequently, the court in *Remington Arms* dismissed the CWA charge against the range because it had ceased operating before the lawsuit was filed.

However, in the *New York Athletic Club* case, the club was still in operation during the time of litigation, but had switched to steel shot. EPA's opinion on this case also addressed the CWA violation. EPA argued that certain trap/skeet ranges can convey pollutants, via point sources, to water in violation of the CWA if a NPDES permit is not obtained. Although some shooting organizations have disagreed with the EPA position, the United States District Court for the Southern District of New York specifically found that:

- The mechanized target throwers, the concrete shooting platforms, and the shooting range itself are considered point sources as defined by the CWA;

- Expended shot and target debris, including non-toxic shot, such as steel shot, left in water, are pollutants as defined by the CWA.

Although the New York district court's decision in the *New York Athletic Club* case is not controlling in any other district, range owners and operators of outdoor ranges that shoot over or into wetlands or other navigable waters of the United States should be aware of it. Based on the court's decision in the *New York Athletic Club* case, any range whose shot, bullets or target debris enter the "waters of the United States" could be subject to permitting requirements as well as governmental or citizen suits. "Waters of the United States" or "navigable waters of the United States" are waters of the United States, including territorial seas that include any body of water that has any connection to, or impact on, interstate waters or commerce. The waters may include lakes,

Table 1-1: Application of Key Terms to Outdoor Ranges

Key Term	Statutory Definition	Application to *New York Athletic Club*
Discharge of a Pollutant	"any *addition* of any pollutant to navigable waters from any point source" (emphasis added) 33 U.S.C. § 1362 (12)	Shooting into water (including wetlands) constitutes a discharge. In the *New York Athletic Club*, the range did not dispute that its shooting operations resulted in the deposition of spent shot and other debris into the waters of the United States.
Point Source	"any discernible, confined, and discrete conveyance... from which pollutants are or may be discharged" into the Nation's waters. 33 U.S.C. § 1362 (14)	In *New York Athletic Club*, the court found that shooting ranges act to systematically channel pollutants into regulated waters and that mechanized target throwers convey pollutants directly into water. Specifically, it stated, "A trap shooting range... is an identifiable source from which spent shot and target fragments are conveyed into navigable waters of the United States." The court also determined that the concrete shooting platforms can be seen as separate "point sources" under the CWA or as one facet of the shooting range that systematically delivers pollutants (e.g. shot and wadding) into the water.
Pollutant	"dredged spoil, solid waste,... munitions... discharged into water" 33 U.S.C. § 1362 (6)	In *New York Athletic Club*, shot and target residue constitute a form of "solid waste" subject to regulation under the CWA as a "pollutant." Based on these determinations, the court supported EPA's contention that the ranges were discharging pollutants from a point source without a permit, in violation of the CWA.

ponds, rivers, streams, wetlands, or even guts that are frequently dry, which may not be obvious to range owners/operators. These ranges may be required to remediate contaminated sediments and soils, which could be both difficult and expensive, and to cease operations over waters and wetlands. **It is essential that these ranges change the direction of shooting, to avoid shooting over or into wetlands or other navigable waters of the United States, and initiate lead removal and recycling activities, where feasible.**

In addition, these ranges can cause a substantial impact on wildlife and wetlands, which range owners/operators may be required to restore under other federal laws (e.g., CERCLA, discussed below). Lead shot entering a water body substantially increases the potential risk of contaminating surface and groundwater which, in turn, threatens human health and the environment. Finally, as *New York Athletic Club*, *Remington Arms* and similar cases show, neighbors have the most leverage when range activity affects wetlands and waterways.

For ranges located away from coastal areas or whose operating areas are situated wholly over land, compliance with the CWA can be achieved by obtaining a NPDES permit for piped or channeled runoff from the range into water[1].

Shooting ranges impacting wetland areas may be subject to other regulations found in Section 404 of the CWA. This section is the principal federal regulatory program protecting the Nation's remaining wetland resources. Any plan by range owners/operators to dredge and/or fill wetlands may require a permit and will come under close scrutiny by federal, state and local governments and citizen groups. Owners and operators must comply with the CWA for range design, redesign, construction, reclamation or remediation occurring in wetland areas.

[1] The term "land" in this instance refers specifically to terrain recognized as "non-wetland" areas.

1.2.3 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), imposes liability on past and present owners or operators of properties where a release of a hazardous substance into the environment exists. CERCLA is used to ensure that an owner/operator cleans a contaminated site or to seek reimbursement from past owners/operators or disposers (potentially responsible parties or PRPs) when a party, either the government or private party, has cleaned up the contamination. Under CERCLA, lead is considered a hazardous substance.

EPA has the authority to order a PRP to clean up a site or conduct the cleanup and recover its costs from the PRP under CERCLA. Responsible parties may be held liable for all cleanup costs, which can be substantial. Under CERCLA, shooting ranges may be liable for government costs incurred during the cleanup of ranges, natural resources damages, and health assessments and/or health effects studies. The following two examples illustrate how shooting ranges (including one operated by the federal government) can be affected by CERCLA.

Southern Lakes Trap and Skeet Club Site, Lake Geneva, Wisconsin, et al.

In 1992, the US Fish and Wildlife Service (USFWS) began an investigation to determine the cause of death of over 200 Canada geese. The geese died as a result of acute lead poisoning after ingesting lead shot, which research indicated came from the Southern Lakes Trap and Skeet Club. The USFWS, in its role as Natural Resource Trustee, took action to recover the cost of damage to the natural resources (i.e., migratory geese) under CERCLA. In addition, EPA pursued a separate action under the Agency's CERCLA response authority. The club had leased the property from the property owners to operate a shooting range. Shortly after EPA sent out the notice of potential liability to the current and former owners and

operators of the club site, the club closed permanently.

In 1994, EPA issued an Administrative Order on Consent (AOC) against one current and one former owner of the property where the now closed Southern Lakes Trap and Skeet Club was located. The AOC required the owners to perform a site assessment, which included an evaluation of the costs to restore the wetlands. In 1998, EPA completed activities to clean up the site and restore some of the natural resources and wetlands. In a negotiated settlement, EPA recovered $1 million of the cost of the cleanup.

Walter L. Kamb v. United States Coast Guard, et al.

In another CERCLA action, Mr. Kamb (court appointed property guardian) sued the U.S. Coast Guard, California Highway Patrol, City of Fort Bragg, and the County of Mendocino (the defendants) for recovery of cleanup costs under CERCLA. Mr. Kamb had been appointed by the Mendocino County Superior Court to sell the property on behalf of the property owners. The property was formerly used by defendants as a rifle, pistol and trap range. Soil analysis indicated the presence of lead in the form of leadshot, bullets, pellets, and dust. The court found the defendants were "responsible parties" (liable for cleanup costs) under CERCLA. No apportionment of liability was made and the final determination of each parties' pro rata share of the response cost was deferred.

This case shows that range activity need not affect a water body to trigger CERCLA liability. CERCLA is a powerful statutory authority that can greatly impact current and former range owners/operators. The statute allows for recovery of damages to natural resources, the cost of any health assessment studies and all cleanup costs. Liability may extend to past owners and operators long after a range ceases operation.

1.2.4 Additional Laws and Regulations

Shooting ranges may also be subject to state and local laws and regulations. Many states have adopted their own environmental laws, which are based on federal laws. Specifically, these states have laws and regulations that mirror the CWA and RCRA program laws. EPA-approved state program laws must be as stringent as the federal laws and may be more stringent. Activities at shooting ranges may also be subject to local laws, ordinances and regulations addressing issues such as noise, zoning, traffic, wetlands and nuisance. Often, citizens or neighbors of outdoor shooting ranges can initiate noise nuisance claims against range owners/operators. Because many states have passed legislation protecting ranges from noise nuisance lawsuits, these may turn into claims of environmental violations under the laws discussed above due to the presence of lead and other products at ranges.

1.3 Benefits of Minimizing Lead's Environmental Impact

All ranges will benefit from proactively implementing successful BMPs. Even if range activities currently do not cause adverse public health and environmental impacts, by developing and promoting active lead management programs, ranges will benefit in the following ways:

- **Through a sound lead management program, shooting sports enthusiasts can reduce the potential of lead exposure and contamination to humans, animals and the environment.**

- **A lead management program will result in improved public relations for the range and the shooting sports.** Ranges can promote and publicize their successful BMP programs to improve their public image. Since many of the legal and governmental actions begin with or are due to citizen groups, an active lead management program may improve the public image of the range with these citizen groups.

- **The removal of spent lead from the range presents a clean, well maintained facility, which will increase customer satisfaction.**

- **Lead is a recyclable and finite resource and can be recovered from the active portion of ranges and sold to lead reclaimers.** Frequently, reclaimers do not charge range owners/operators to recover lead from ranges, and owners and operators may receive a percentage of the profit from the sale of reclaimed lead. This factor drives recycling efforts at many ranges.

- **By reducing or eliminating a potential source of lead migration in soil, surface water and groundwater, range owners/ operators may avoid costly and lengthy future remediation activities.**

- **Finally, implementing a BMP program for lead may eliminate or greatly reduce the risk of citizen lawsuits and the legal costs associated with these lawsuits.** Through management and removal practices, lead may no longer represent a threat upon which citizen lawsuits are based.

Range owners/operators may question whether the benefits of a regular and timely BMP program outweigh the efforts of implementing and maintaining a program. The questions may arise especially for ranges at which shooting activities involve waterways, since national attention has focused on ranges located adjacent to water (e.g., *Remington Arms* and the *New York Athletic Club*). However, all outdoor ranges may be subject to legal actions under RCRA and CERCLA authority. All of the benefits for adopting best management practices are available and worthwhile for every range owner and operator.

The following sections provide information that will assist the range owner or operator in implementing a BMP program for recovery and recycling of lead shots and bullets.

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Chapter II: Range Characteristics & Activities to Consider When Implementing Best Management Practices (BMP)

2.0 Background

Since each firing range site is unique, BMPs for lead must be selected to meet site-specific conditions in order to achieve maximum success. A range's physical characteristics and the operational aspects (e.g., volume of shooting, shooting patterns and operating schedules) will effect which BMPs may apply and how they will be implemented. Accordingly, whether designing a new outdoor range or operating an existing range, it is important that BMPs incorporate techniques appropriate for the range's individual characteristics.

Section 2.1 of this chapter identifies the physical characteristics that must be considered when evaluating your range. A summary of common physical characteristics at ranges is also presented in Table 2-1. These factors include:

- Range Size (primarily for shotgun ranges)
- Soil Characteristics
- Topography/Runoff Direction
- Annual Precipitation
- Ground and Surface Water
- Vegetation
- Accessibility

Section 2.2 discusses the operational aspects that must be considered. These factors include:

- Lead Volume
- Size of Shot/Bullets
- Operating Schedule
- Shooting Direction and Pattern
- Range Life Expectancy

In addition, Section 2.3 discusses issues that are specific to implementing BMPs when planning a new range.

2.1 Physical Characteristics

Physical characteristics of ranges, relative to lead management issues, are discussed below.

Range Size

Shotgun range design and type affects the ease of lead shot collection. Larger ranges typically tend to have lead shot that is dispersed over a wider area, while smaller ranges tend to concentrate lead shot in a smaller area. Reducing the area of the shotfall zone will concentrate the shot within a smaller area, allowing for easier cleanup and reclamation. BMP techniques for reducing the shotfall zone at trap and skeet ranges, as well as sporting clay ranges, are discussed in Chapter III.

Soil Characteristics

Spent lead bullets and shot are most often deposited directly on and into soil during shooting. When lead is exposed to air and water, it may oxidize and form one of several compounds. The specific compounds created, and their rate of migration, are greatly influenced by soil characteristics, such as pH and soil types. **Knowing the soil characteristics of an existing range site is a key component to developing an effective lead management plan.**

Soil pH

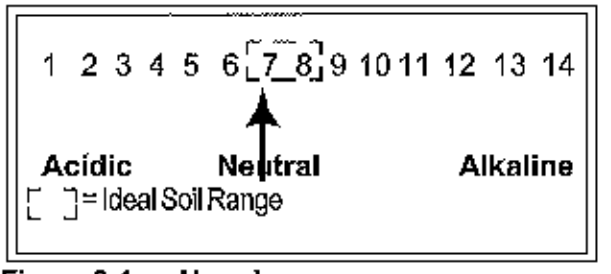

Figure 2-1 – pH scale

Soil acidity is measured as pH on a scale (illustrated as Figure 2-1) between 1 (most acidic) and 14 (most alkaline, or basic), where 7 is termed neutral. Ideal soil pH for shooting ranges is 6.5 to 8.5.[1]

1 National Shooting Sports Foundation, "Environmental Aspects of Construction and Management of Outdoor Shooting Ranges," June 1997.

Lead reacts more readily and may become more mobile under acidic (pH < 6) or higher alkaline (pH>8) conditions. This means that spent lead shot left in or on such soils may eventually break down and contaminate underlying soil. In moderately alkaline soils (pH 7 - 8.5), the lead precipitates out of solution and binds to the soil. This "binding" effect prevents the lead from migrating to the subsurface. In general, soils in the eastern part of the United States tend to be acidic, whereas western soils tend to be more alkaline.

Soil Physical Characteristics

The migration rate of specific lead compounds is affected by the physical characteristics of soil. For example, dense soils, consisting of heavy clays, will prevent the lead compound from moving quickly through the subsurface. Any "free" lead ions become attached to clay particles, with this bond helping to prevent migration. However, with denser soils, the amount of surface runoff increases.

Although clay soils inhibit migration, lead reclamation by contemporary removal machinery tends to be more difficult in clayey conditions. Clayey soils tend to clog the screens and "bind" with shot and bullets. This situation may require additional traditional screening, or perhaps screening using water to enhance separation.

In contrast, sandy soils or gravel may not impede migration because the open pores of these soils allow lead compounds to percolate quickly. Fortunately, lead reclamation activities are more easily conducted in sandy soils. With this in mind, ranges located in sandy soils should remove lead more frequently.

Annual Precipitation

One of the most important factors that influences lead degradation (i.e., chemical reactions) and migration is precipitation. Water, most often in the form of rain, provides the means by which lead is transported. In general, ranges located in areas with high annual/seasonal rainfall[2] have a higher risk of lead migration than those located in arid regions. This is especially true of outdoor ranges using "Steel Bullet Traps."

Steel bullet traps build up a layer of lead residue; these particles are extremely small and more easily transported by rain/water. Also, the smaller the particle, the quicker it will degrade. A bullet trap needs to have a means to collect contact water, or be covered to prevent water from reaching it, and to minimize releases and degradation.

Topography/Runoff Directions

The topography of your range impacts both the ease of lead reclamation and the mobility of the lead. For example, lead reclamation is more successful at ranges where the shotfall zone is relatively flat, since many lead reclamation companies use heavy machinery that cannot operate on slopes or steep hills.

Another important characteristic is the direction in which your range topography slopes. During and after periods of rain, stormwater runoff may wash lead particles or lead compounds off the range. If there are surface water bodies such as lakes, rivers, or wetlands downgradient, the potential for lead to adversely affect the surrounding environment is even greater. Therefore, it is important to identify and control the direction of surface water runoff at your range. BMPs for modifying and controlling runoff are described in detail in Chapter III.

Groundwater

Groundwater depth should be considered when developing a lead management plan since the closer the groundwater is to the surface, the greater the potential for dissolved lead to reach it.

Vegetation

Vegetative ground covers can impact the mobility of lead and lead compounds. Vegetation absorbs rainwater, thereby reducing

2 Heavy annual rainfall is anything in excess of the average annual rainfall, which for the northeast United States (e.g. New York, New Jersey) is between 40 and 45 inches.

Table 2-1 – Common Physical Characteristics at Ranges – Potential Risks and Benefits Associated with Range Operations

Physical Characteristics	Potential Risk to Environment	Potential Benefits in Preventing/Managing Contamination
Clay, acidic soils	Acidic soils contribute to lead dissolution -- increasing the potential for lead contamination -- may increase run-off Difficult to reclaim lead via sifting/raking	May impede percolation of water through contaminated soil Binds "free" lead ions May benefit growth of vegetative covers
Sandy, alkaline soils	Contaminated rainwater can easily percolate through soil and groundwater Extremely alkaline soil will not support vegetation	Alkaline soils may inhibit lead dissolution Easier to reclaim lead via sifting/raking
Sandy, acidic soils	Acidic soils contribute to lead dissolution -- increasing the potential for lead contamination Contaminated rainwater percolates quickly through sandy soils	Easier to reclaim lead via sifting/raking
Steep Rolling Terrain	May promote off-site drainage or drainage to on-site surface water bodies Can impede reclamation of expended shot via raking	None
Flat Terrain	Rainwater may "pond" in areas, promoting lead dissolution and contamination	Expended shot easily recovered Off-site drainage minimized
Wooded areas	May impede lead reclamation activities making equipment difficult to maneuver May provide habitat for wildlife - increasing exposure to lead	None
On-site or contiguous surface water bodies	VERY high potential for contamination when shot fall zone is located over or adjacent to water; increased wildlife exposure; increased lead dissolution. This is NOT an option for successful range location and may be more likely subject to litigation and/or governmental action if lead is deposited into water bodies	None
Vegetation	Lead may be absorbed into grasses, other wildlife food sources	Ground covers slow down surface water run-on and run-off Some vegetation can extract lead ions from the soils

the time that the lead is in contact with water. Vegetation also slows down surface water runoff, preventing the lead from migrating off-site. However, excessively wooded areas (such as those often used for sporting clay ranges) inhibit lead reclamation by making the soils inaccessible to some large, lead-removal machinery. Understanding the type, concentration and variety of vegetation on your range is necessary for developing your lead management program and implementing BMPs at your range.

Accessibility

Accessibility to shotfall zones and backstops is extremely important for lead reclamation activities. A range that is not accessible to reclamation equipment will have difficulty implementing lead reclamation practices.

2.2 Operational Aspects

Operating practices can have a great affect on the volume and dispersion of lead at your range.

Lead Volume

Keeping records of the number of rounds fired over time at your range is important. The number of rounds fired provides a realistic estimate of the quantity of lead available for reclamation. This information helps to determine when reclamation is necessary in order to prevent accumulation of excess amounts of lead, thereby decreasing the potential for the lead to migrate off-site.

Size of Shot/Bullets

Knowledge of the size shot/bullets used on your range may be helpful. Lead reclamation companies generally use physical screening techniques to separate lead shot and bullets from soil. These screens come in a variety of sizes. Knowing what size shot/bullets have been used at your range will allow the reclaimer to maximize the yield of lead shot/bullets at your range.

Shooting Direction and Patterns

Shooting directions and patterns are important to consider when determining the effectiveness of bullet containment devices. For example, many bullet traps are effective in containing bullets fired from specific directions. It is vital that you utilize bullet containment devices that match your range's specific shooting patterns and manufacturers specifications. Understanding the shooting direction and patterns will also help to correctly identify the shotfall zone at trap and skeet ranges.

Shooting into Water Bodies

Shooting into water bodies or wetlands should not occur. Besides the environmental impacts discussed previously, the introduction of lead to surface water bodies will likely cause a range to be susceptible to litigation and/or governmental action. Shooting into water bodies or wetlands is NOT an option for ranges that want to survive in the future.

Range Life Expectancy and Closure

The life span of your range may be impacted by many factors, including financial and environmental issues, noise, and encroachment on residential areas. If your range is slated for closure, contact your local state or EPA representatives for guidance.

2.3 Planning a New Range

As discussed in the previous sections, site characteristics and operational aspects affect lead migration, degradation and reclamation activities at ranges. **If you are planning on opening a new range, you should select and/or design a site in consideration of the factors discussed in this manual.** This will allow you to minimize the potential of lead impacting your site or adjacent properties. A new range owner has the advantage of being able to design a successful lead management program in full consideration of the site characteristics and recommended BMPs. This advanced understanding of operational aspects

and requirements will allow you to minimize the potential for lead migration prior to opening.

The most important site selection criteria to consider when selecting a new range location include: topography; surface water flow patterns; and depth to groundwater. If possible, ranges should be developed on flat terrain, as it facilitates reclamation and reduces the chance of off-site migration due to surface water runoff as compared with highly sloped terrain. When considering a prospective location for a range, ask yourself: What is the direction of surface water runoff? Does the site drain to surface water (e.g., streams, rivers) on-site? Off-site? Can the range design be modified to minimize potential runoff? Is reclaimation equipment accessible to the area to clean the range?

By selecting an appropriate location and designing a lead management program in consideration of site characteristics, new shooting ranges can be developed to minimize the potential for lead contamination. Other important site characteristics can be modified. For example, a new shotgun range can be designed to concentrate the shotfall area, vegetation can be added or altered, and the most advantageous shooting direction can be selected. These modifications are BMPs, and are discussed in further detail in Chapter III.

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Chapter III: Best Management Practices (BMPs) For Outdoor Ranges

3.0 Background

To operate an outdoor range that is environmentally protective requires implementing an integrated lead management program, which incorporates a variety of appropriate BMPs. These BMPs create a four step approach to lead management:

- Step 1 - **Control and contain lead bullets and bullet fragments**
- Step 2 - **Prevent migration of lead to the subsurface and surrounding surface water bodies**
- Step 3 - **Remove the lead from the range and recycle**
- Step 4 - **Documenting activities and keeping records**

An effective lead management program requires implementing and evaluating BMPs from each of the four steps identified above and illustrated as Figure 3-1. The BMPs discussed in Sections 3.1 and 3.2 should not be considered alternatives to lead reclamation, but rather practices that should be followed between lead reclamation events.

It is important to note that the cost and complexity of these BMPs vary significantly. **It is your range's individual characteristics that will determine which BMPs should be implemented.** The specific BMPs are described more fully below.

3.1 Bullet and Shot Containment Techniques (Step 1)

3.1.1 Bullet Containment

Knowing where spent lead is allows the appropriate BMP to be used. The single most effective BMP for managing lead in these areas is by bullet containment. Owners/operators should employ a containment system that allows for the maximum containment of lead on-site. The containment systems mentioned in this section are for reference only. Each containment design for a range is site specific. Each owner/operator must look at the various factors in determining which containment system is best for his or her range. Some factors include: overhead, cost of installation, maintenance (e.g., creation of lead dust from steel containment systems). Range owner/operators should consult with various contractors to determine which containment system is best for their range.

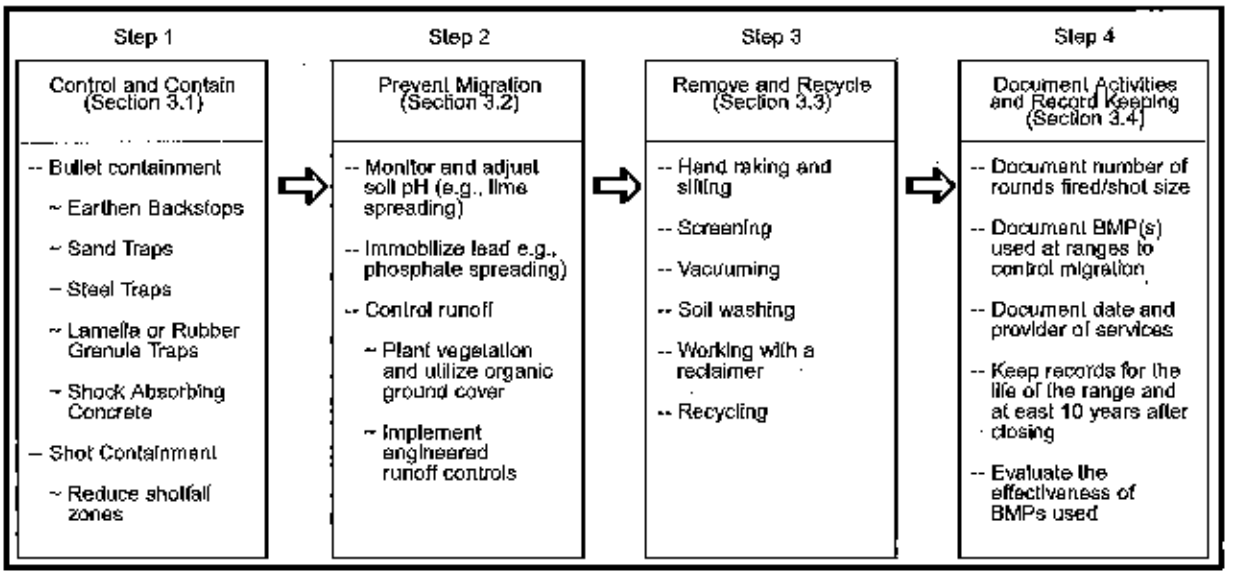

Figure 3-1 – 4 Steps to Build a Successful Lead Management Program Utilizing a Variety of BMPs

This section discusses BMPs for controlling spent lead bullets and fragments in a "controlled" and well-defined area behind the target area. Containing bullets and bullet fragments is critical to successfully managing lead.

There are a variety of containment device options available that serve as BMPs to control lead. The principle behind all of them is trapping and containing the actual bullet. They include:

- Earthen Berms and Backstops
- Sand Traps
- Steel Traps
- Lamella or Rubber Granule Traps
- Shock Absorbing Concrete

For each type of trap, design variations have been developed to fit the specific needs of an individual range. Below are discussions of each general category of trap. Some bullet containment devices are so comprehensive that they virtually eliminate lead's contact with the environment.

However, it is important to discuss all types of bullet containment devices because they are part of comprehensive BMPs for managing lead at rifle and pistol ranges.

EPA does not endorse any bullet containment design as being "better" than another. Different containment designs attempt to eliminate lead's contact with the environment, however, additional BMPs may be required for lead management.

EPA recommends that you discuss your range's bullet containment needs with a variety of vendors before deciding what type of containment device to use. This manual does identify the possible advantages and disadvantages associated with each containment device in Table 3-1, at the back of this chapter.

Earthen Berms and Backstops

Perhaps the most common bullet containment system at rifle and pistol ranges is the earthen backstop (earthen material, i.e., sand, soil, etc., which is located directly behind the targets). The earthen backstop is generally between 15 and 20 feet high with a recommended slope as steep as possible[1]. In many instances, backstops may be naturally occurring hillsides. When using an earthen berm or backstop, ensure that the uppermost layer (to a depth of one to two feet) exposed to the shooting activity is free of large rocks and other debris. These materials tend to increase ricochet and bullet fragmentation, which will, in turn, make lead reclamation activities more difficult, not to mention possible safety issues.

Removal of lead from earthen backstops may require lengthy reclamation (see Section 3.3) of the soil to remove the lead. Continued use of the backstop without removing the lead may result in increased ricochet of bullets and fragments. In addition, the backstop may lose its slope integrity because of "impact pockets" that develop. Once the lead has been removed from the earthen backstop, the soil can be placed back on the range and used again. Adding lime and phosphate during the rebuilding process is recommended as appropriate (see Section 3.2). However, other bullet containment techniques, including those listed below, should be considered prior to reestablishing an earthen backstop.

Sand Traps

A variation of the earthen backstop is the sand trap. Sand traps range from those that are simply mounds of sand or soil located directly behind the bullet targets, which serve as backstops to a sand trap that employs a system designed to contain, collect and control lead and contact water. This sand trap uses a grade of sand that is ballistically acceptable. Regular maintenance must be performed to remove larger particles (bullets) from the impact area. These traps are placed so that bullets fired across the range pass through the targets and become embedded in the sand. These traps are typically 15 to 20 feet high with a slope as

1. National Rifle Association, "The NRA Range Source Book: A Guide to Planning and Construction," June 1998

steep as possible. The most important design criterion for these traps is that the uppermost layer (to a depth of 1 to 2 feet) be free of large rocks and other debris to reduce ricochet and bullet fragmentation, and to facilitate reclamation efforts. There may also be an impermeable layer (e.g., clay or liner) under the sand to prevent lead from contacting the soil underlaying the trap.

Sand traps come in various designs and levels of complexity. The sand trap may be ballistic grade sand contained in a high backstop, or a more complex "Pit and Plate" system. The Pit and Plate system uses an angled, steel deflection plate cover that helps to direct bullets and bullet fragments to the top layer of sand only. Some of the more sophisticated sand traps incorporate lead recovery devices. However, the Pit and Plate may increase the surface-to-mass ratio of the bullet splatter and, therefore, may increase environmental risk of lead migration.

Regardless of the type of sand trap that is used, the traps become saturated with bullets/bullet fragments. Once this happens, the sand must be sifted (see Section 3.3) to remove the bullets. The recovered bullets can then be sold to a lead recycler (this is discussed in more detail later in the chapter). After sifting, the sand can be returned to the trap. Continued use of the trap, without removing the lead, may result in an increased risk of ricocheting off the backstop and thus creating an increased safety hazard. Furthermore, the sand trap will become unstable over time. Sand traps may be located over an impermeable liner, to prevent lead from contacting soil underlying the trap. This will provide additional protection to soil and groundwater.

Steel Traps

Steel traps are located directly behind the targets so that expended bullets, along with bullet particles, are directed into some form of deceleration chamber. Once inside the chamber, the bullets decelerate until the bullets/ bullet particles fall into collection trays at the bottom of the deceleration chamber. When the trap is full, or on a more frequent basis, the spent lead can easily be reclaimed for recycling.

With some steel traps, expended lead bullets may not come in direct contact with soils, thereby possibly minimizing lead's contact with the environment. Consequently, the need for other BMPs (e.g., lime spreading, and/or engineering controls), such as those required at ranges with unlined earthen backstops or unlined sand traps, may be avoided if this trap design is selected for the range's bullet containment device. In addition, bullet removal is somewhat easier than from a sand trap, and may only require emptying the bucket or tray containing the bullets and/or bullet fragments. However, an increase of lead dust and fragmented lead may be an additional environmental concern. Therefore, understanding the amount of lead dust and fragments is important to a successful lead management program. Also, some steel trap designs are not intended for shooting at different angles, therefore limiting the shooter to shooting straight on (no action shooting).

As with sand traps, steel traps vary in design and complexity. For example, the Escalator Trap has an upward sloping deflection plate that directs bullets into a spiral containment area at the top. The Vertical Swirl Trap is a modular, free standing trap with four steel plates that funnel the bullets into a vertical aperture in which they spin, decelerate, and become trapped in a bullet collection container. The Wet Passive Bullet Trap is equipped with steel deflection plates that slope both upward and downward. The upwardly sloped deflection plate is covered with an oil/water mixture to help reduce the occurrence of ricochet and bullet fragmentation. The bullet follows its own path in the round deceleration chamber for bullet recycling.

Lamella and Rubber Granule Traps

The Lamella Trap uses tightly-hanging, vertical strips of rubber with a steel backing to stop bullets. This trap is located directly behind the targets and, in many cases, the targets may actually be mounted to the trap. Lead removal

requires mining the bullets from the rubber. The Rubber Granule Trap uses shredded rubber granules, housed between a solid rubber front and a steel backing, to stop bullets once they pass through the target. For both traps, the bullets remain intact, thus eliminating lead dust and preventing lead and jacket back splatter. Depending on the design of the rubber trap, the bullet either remains embedded in the rubber strip or falls to the bottom of the trap, from which the bullets are removed for recycling.

These traps, when properly installed, are intended to increase safety by decreasing the occurrence of back splatter and eliminating the introduction of the lead dust into the air and ground. However, there are several concerns over their use, since they may:

- require additional maintenance;
- in some cases, present a fire threat under extremely high volume use (due to heat from friction created upon bullet impact);
- not withstand weather elements over the long term; and
- cause the rubber particles to melt to the lead bullets, making reclamation more difficult.

With the availability of fire-resistant rubber and gels (see Appendix A), these issues are becoming less of a concern than in earlier models.

Shock Absorbing Concrete

In addition to the bullet containment devices discussed above, there are new designs and innovations continually being developed. One of these innovative bullet containment devices is Shock Absorbing Concrete (SACON). SACON, which has been used as a bullet containment device since the 1980s and was extensively field tested by the military, has become commercially available in the past several years as a backstop material for small arms ranges. For conventional rifle and pistol ranges, SACON may provide a means to easily reclaim lead. Additionally, crushed, lead-free SACON can be recycled (recasted) after bullet fragments have been removed by adding it to other concrete mixtures for use as sidewalks, curbs, etc.

3.1.2 Shot Containment

Reducing the Shotfall Zone

Unlike rifle and pistol ranges, the area impacted by lead shot fired at trap, skeet and sporting clays ranges is spread out and remains primarily on the surface. **Knowing where spent lead is allows the appropriate BMP to be used. The single most effective BMP for managing lead in these areas is reducing shotfall zones.**

Concentrating the lead shot in a smaller area by modifying the shooting direction facilitates lead management by providing a smaller and more dense area of lead to both manage in-place and reclaim, thereby making the management and reclamation process simpler and more effective.

Sporting Clays Courses

Technologies have been developed to assist in reducing the range size of trap and skeet, and sporting clays facilities. The National Sporting Clays Association (NSCA) supports and promotes the Five-Stand Sporting Clays compact course design for shooting sporting clay targets, invented by Raymond Forman of Clay-Sport International, Cochrane, Alberta, Canada. The targets are directed over a smaller area than in English Style Sporting Clays (conventional sporting clays). It was originally designed to be overlaid on a conventional trap or skeet field and to be an alternative to earlier designs, which cover a much larger area. Another design, known as the National Rifle Association (NRA) Clays, is a portable target throwing unit which concentrates 15 rail-mounted machines on a two-story flatbed trailer. The NRA has also developed "compact sporting," which is specifically for sporting clay facilities. This practice alters the angle that the target is thrown to concentrate the shotfall zone.

Skeet Fields

The typical single skeet field has a shotfall zone that is fan-shaped. For skeet fields with multiple stands side-by-side, the shotfall zones would overlap creating a shotfall zone that has a concentration of shot near the center of the fan.

Trap Fields

One way to reduce the shotfall zone at trap fields is to build the fields at an angle to one another. This will make the shape of the shooting dispersal pattern smaller and more concentrated. However, if you do decide to choose this option, be aware of safety issues when designing the overlapping shotfall zones.

For a range with only one trap field, one way to minimize the shotfall zone is to keep trap machines set in as few holes as possible (e.g., the number two or three hole setting). This reduces the area of lead concentration by limiting the angles for pigeon throwing, and therefore the area for lead shot fall. However, when two or more trap fields are positioned side by side, the shotfall zone will be continuous regardless of the "hole" setting.

Shot Curtains

Another method to consider for concentrating lead shot is the use of a shot curtain. This device is emerging as a potentially effective tool to keep lead shot out of selected areas of the range and, thereby, reduce the size of the shotfall zone and corresponding cost of reclamation. Different designs and material have been utilized in shot curtains and a number are in operation. The effectiveness of shot curtains is site specific and their long term viability and expense have yet to be fully determined.

3.2 BMPs to Prevent Lead Migration (Step 2)

This section discusses BMPs for preventing lead migration. These BMPs include:

- **Monitoring and adjusting soil pH**
- **Immobilizing lead**
- **Controlling runoff**

These BMPs are important for all outdoor ranges.

3.2.1 Monitoring and Adjusting Soil pH and Binding Lead

Lime Addition

The BMP for monitoring and adjusting soil pH is an important range program that can effect lead migration. Of particular concern are soils with low pH values (i.e., acidic conditions), because lead mobility increases in acidic conditions since the acid of the soils contributes to the lead break down. **The ideal soil pH value for shooting ranges is between 6.5 and 8.5.** This BMP is important because many soils in the eastern United States have pH values lower than 6.[2]

To determine the pH of your soil, purchase a pH meter at a lawn and garden center. The pH meters are relatively inexpensive but valuable tools in the management of lead at your range. If the soil pH is determined to be below 6, the pH should be raised by spreading lime. **It is recommended that the pH be checked annually.**

One way to control lead migration is by spreading lime around the earthen backstops, sand traps, trap and skeet shotfall zones, sporting clays courses and any other areas where the bullets/shots or lead fragments/dust accumulate. For example, lead mobilized in rainwater from the lead that spatters in front of backstops after bullet impacts can be effectively controlled by extending a limestone sand layer out about 15 feet in front of the backstop. Likewise, spreading lime over the shotfall zone will help to raise the pH of the very top soil layer to a pH closer to ideal levels and reduce the migration potential of lead. This is an easy, low cost method. Spreading lime neutralizes the acidic soils, thus minimizing the potential for the lead to degrade. Lime can be easily spread by using a lawn fertilizer drop spreader available at any lawn and garden center.

Smaller forms of limestone (powdered, pelletized, and granular) are better suited

2 National Shooting Sports Foundation, "Environmental Aspects of Construction and Management of Outdoor Shooting Ranges," June 1997

because they dissolve and enter the soil more quickly then larger forms. However, the smaller forms of lime must be replenished more often. Conversely, limestone rock dissolves more slowly but does not need to be replenished as often. The larger rock form is better suited for drainage ditches, where it can decrease lead mobility by raising the pH of the storm water runoff.

Another way to control lead migration in earthen backstops is to break the capillarity within the base of the backstop. Most porosity in the soil material used in backstop is of capillary size, and, as a result, water is pulled upward into a capillary fringe within the base of the backstop. The height to which the water will rise in an earthen backstop depends on the soil material in the backstop. Water will rise more then 6 feet in clay, 3.3 feet in silt, 1.3 feet in fine sand, 5 inches in coarse sand, and only 2 inches in gravel.

Because of capillarity, the spent bullets may be in contact with acidic rainwater for a longer period of time, hence more lead is dissolved. Breaking the capillarity by adding a layer of limestone or gravel to the base of the backstop should reduce the rate of deterioration of spent bullets, the erosion of the backstop, and the amount of lead going into solution in the water in the backstop. Also, any lead dissolved should precipitate out of solution as the acids are neutralized and the pH raised from the water passing through and reacting with the limestone.

Lime spreading is an especially important method for implementing this BMP at sporting clays ranges where heavily wooded areas are less accessible to conventional lead removal equipment. These types of ranges also tend to have more detritus (e.g., leaves, twigs, etc.) on the ground, which can increase soil acidity as they decompose. **In these areas, semiannual monitoring of the soil pH levels is suggested.**

Spreading bags of 50 pounds (at ranges with sandy soils) or 100 pounds (at ranges with clayey soils) per 1,000 square feet of range will raise the pH approximately one pH unit for a period of between one and four years, respectively. The market price of lime in either the granular or pelletized form commonly ranges from approximately $2.00 to $4.00 per fifty pound bag.

Table 3-2 provides information for raising pH levels of clay soils in temperate climates (i.e., Mid-Atlantic/Northeast). Additional information on the amount of lime to apply may also be found on the bags of the purchased lime and/or from the local lawn and garden center. It should be noted that if the soil pH is below 4.5, the addition of lime may only raise the soil pH to approximately 5. In this situation, other BMPs should be used as well. If the soil pH is above the ideal range upper value (8.5), do not add lime. Adding lime to a soil of this pH could result in mobilization of the lead. Lime spreading may be done at anytime during the year, except when the ground is frozen.

Additionally, it is important to remember to monitor the soil pH annually, as the effectiveness of the lime decreases over time. Additional routine applications will be necessary throughout the life span of most ranges.

Table 3-2 – Calculating Weight of Lime to Increase Soil pH Values*

		Current pH							
		4.0	4.3	4.5	4.8	5.0	5.5	6.0	6.5
Desired pH	5.0-6.0	14	11	8	5	3	-	-	-
	6.5-8.5	-	-	-	20	17	11	7	-

* Lime requirements stated as pounds of lime/100 square foot of problem area for clay soils in temperate climates (i.e., Mid-Atlantic/Northeast US).

Phosphate Addition

In addition to lime spreading, another way to control lead migration is phosphate spreading. This method is recommended where lead is widely dispersed in range soils, a range is closing, or there is a high potential for vertical lead transport to groundwater (e.g., low soil pH, shallow water table). Under these circumstances, range soils may benefit from phosphate treatment. Unlike lime spreading, the main purpose of phosphate spreading is not to adjust soil pH but to bind the lead particles. This process also decreases the potential amount of lead that can migrate off-site or into the subsurface. Phosphate spreading can be done either separately or in conjunction with lime spreading. Generally, 15 to 20 pounds of phosphate per 1,000 square feet will effectively control the lead.

Phosphate spreading is especially recommended for sporting clays ranges and those parts of ranges not easily accessible by reclamation equipment. Phosphate spreading should be repeated frequently during the range's lifetime. See pilot testing under "Other Ways to Bind Lead" below for proper frequency for replacing phosphate.

You can purchase phosphate either in its pure form, as phosphate rock, or as lawn fertilizer. The average lawn fertilizer costs approximately $7.00 per 40 pound bag. If you purchase lawn fertilizer, remember to check the bag for the actual percentage of phosphate. Most fertilizers contain 25% phosphate, so that if you purchase a 40 pound bag of fertilizer that contains 25% phosphate (i.e., 10 pounds of phosphate) you will need to spread 80 pounds of fertilizer per 1,000 square feet of the backstop. A typical fertilizer drop spreader can be used for distributing the phosphate. Like lime, phosphate should not be spread when the ground is frozen. In addition, it is not advised to use phosphate near water bodies since it contributes to algal blooms. Rock phosphate is a better choice if water is nearby.

Other Ways to Bind Lead

Although it may be possible to minimize lead's mobility by spreading fertilizers that contain phosphate at impacted areas of the range, a more comprehensive procedure for immobilizing leachable lead in soils, by using pure phosphate in rock form or a ground phosphate rock [Triple Super Phosphate (TSP)], was developed and patented by the U.S. EPA/Ohio State University Research Foundation and RHEOX, Inc. This procedure used a three step approach to minimize lead's mobility. The first step was to identify the boundaries of the area of the range to be treated. This included not only determining the length and width of the range area, but also the depth of lead within the area.

Depth was determined by taking sample cores of the area, which also identified "hot spots" where lead accumulation was greatest. Once the area was identified, the second step was to treat the area with TSP. Pure phosphate rock was used rather then fertilizers, as this phosphate is insoluble in water and will not cause an increase in phosphate runoff.

In this step, pilot testing was conducted. Here, various amounts (in increasing percentages by weight) of TSP were added to the affected soil areas, then the area was tested according to an EPA test method that identified the amount of leachable lead in a given soil sample. This test is called the Toxicity Characteristic Leaching Procedure, or TCLP. Separate TCLP testing of the range's hot spots was conducted.

Upon completion of the pilot testing, which determined the amount of TSP needed at the range, the third step was to begin actual treatment of the range. Where the depth of the lead accumulation was shallow (less than two feet), then standard yard equipment, such as tillers, seed/fertilizer spreaders, and plows were used to mix TSP with the affected soil. Where the affected area's lead accumulation was deeper than two feet, an auger was required to mix the TSP with the affected soil. Random testing of the range ensured the effectiveness of the treatment level.

3.2.2 Controlling Runoff

The BMPs for controlling soil erosion and surface water runoff are important to preventing lead from migrating off-site. There are two factors that influence the amount of lead transported off-site by surface water runoff: the amount of lead fragments left on the range and the velocity of the runoff.

The velocity of the water can successfully be controlled at outdoor ranges by: (1) using vegetative, organic, removable and/or permanent ground covers; and (2) implementing engineered controls which slow down surface water runoff and prevent or minimize the chances of lead migrating off-site. Bear in mind that safety considerations and potential ricochets need to be considered when implementing any engineered controls.

Vegetative Ground Cover

Planting vegetative ground cover (such as grass) is an important and easy erosion control method. Vegetation provides several benefits by minimizing the amount of lead that will run off the land surface during heavy rainfall. It is important to use a mixture of grass seeds to ensure that the cover will last into the future (i.e., annual rye grass lasts one year and dies and perennial rye grass lasts three to four years, then dies off). Fescue grasses form useful mats that are effective in controlling erosion.

Ground cover absorbs rainwater, which reduces the amount of water the lead is in contact with, as well as the time that the lead is in contact with the water. Furthermore, the ground cover will divert and slow down surface water runoff, thus helping to prevent lead from migrating off-site.

Grasses yield the greatest benefit at rifle and pistol ranges where the bullet impact areas are sloped, and water runoff and soil erosion may be more likely. Specific recommendations are to:

- Utilize quick growing turf grass (such as fescue and rye grass) for the grass covering of backstops, which can be removed prior to reclamation and replanted thereafter;
- Avoid vegetation that attracts birds and other wildlife to prevent potential ingestion of lead by wildlife; and
- Use grass to direct surface water drainage away from the target area (e.g., planting them at the top of the backstop or sand trap). This will minimize the water's contact with lead bullet fragments, minimizing the potential for lead migration.

Grass is not impermeable; however, it does slow down the rate of flow and reduce the amount of lead entering the soil via rainwater. Remember, grass requires periodic maintenance (i.e., mowing) to maintain its effectiveness as well as for aesthetic reasons.

Mulches and Compost

Mulches and composts can reduce the amount of water that comes in contact with the lead fragments. In addition, mulches and compost contain hermic acid, which is a natural lead chelating agent that actually sorbs lead out of solution and reduces its mobility. At a minimum, the material should be two inches thick. These materials can be spread over any impacted area and/or low lying areas where runoff and lead may accumulate. Like vegetative covers, organic surface covers are not impermeable. In addition, the organic material needs periodic replacement to maintain effectiveness and aesthetic integrity. Furthermore, these materials should be removed prior to any lead removal event, as they may impede sifting or screening. **Note that these materials tend to be acidic (especially during decomposition), so, if low pH is a concern at your range, this option may not be appropriate. Again, however, lime may be used to control pH (see Section 3.1.1)**

Surface Covers

Removable Surface Covers

Removable surface covers may be effective at outdoor trap and skeet ranges. In this case, impermeable materials (e.g., plastic liners) are

placed over the shotfall zone during non-use periods. This provides the range with two benefits during periods of rainfall: (1) the shotfall zone is protected from erosion; and (2) the spent lead shot is contained in the shotfall zone and does not come in contact with rainwater.

Permanent Surface Covers

For outdoor rifle and pistol ranges, impact backstops and target areas can also be covered with roofed covers or other permanent covers to prevent rainwater from contacting berms. However, this method may be less desirable because of the cost to install the roof, which must be carefully designed to avoid safety issues with ricochets, etc.

For shotgun and other ranges, synthetic liners (e.g., asphalt, Astroturf™, rubber, other synthetic liners) can also be used beneath the shotfall zone to effectively prevent rainwater or runoff from filtering through lead and lead contaminated soil. Synthetic liners will generate increased runoff, which must be managed, however. No single type of liner is suitable for all situations based on site characteristics. Therefore, liners must be chosen on a site-specific basis, bearing in mind the site's unique characteristics, such as soil type, pH level, rainfall intensity, organic content of soil, and surface water drainage patterns.

Engineered Runoff Controls

Runoff control may be of greatest concern when a range is located in an area of heavy annual rainfall because of an increased risk of lead migration due to heavy rainfall events. A "hard" engineered runoff control may be needed in this situation. A heavy rainfall event is defined as rainfall that occurs at such a rate that it cannot be absorbed into the ground and causes an increase in the volume and velocity of surface runoff. The impacts of rainfall are greater in rolling or sloped terrain (increases velocity of runoff) or where surface water bodies are located on, or immediately adjacent to, the range.

Examples of "hard" controls include:

- Filter beds
- Containment Traps and Detention Ponds
- Dams and Dikes
- Ground Contouring.

Designing and implementing these "hard" engineering controls may require the assistance of a licensed professional civil engineer. They are included in this manual to offer the reader a general understanding of these BMP options. However, this manual does not offer specific instructions for construction and operation of these controls. For information about designing and implementing any of these controls, or assistance with other range design questions, contact a licensed professional civil engineer having applicable experience or the NRA Range Department, at (800) 672-3888, ext. 1417. The National Sports Shooting Foundation (NSSF) may be contacted at (203) 426-1320 for specific references regarding the use and design of these controls.

Filter Beds

Filter beds are engineering controls built into an outdoor range to collect and filter surface water runoff from the target range. The collected runoff water is routed to a filtering system, which screens out larger lead particles, raises the pH of the water (thus reducing the potential for further lead dissolution), and drains the water from the range area. This technique may not completely prevent lead from entering the subsurface, since lead bullets, fragments and large particles may still remain on the range.

Filter beds should be established at the base of the backstop (see Figure 3-2). In addition to mitigating off-site migration, the filter beds work to raise the pH of the rainwater, which has fallen on the target range, to reduce lead dissolution, and to strain small lead particles out of the rainwater. The filters typically consist of two layers: a fine-grained sand bed underlain by limestone gravel or other neutralization material. By design, the backstops and berms direct the runoff so that it drains from the range to the filters. The collected water then soaks through the top sand layer into the neutralization material.

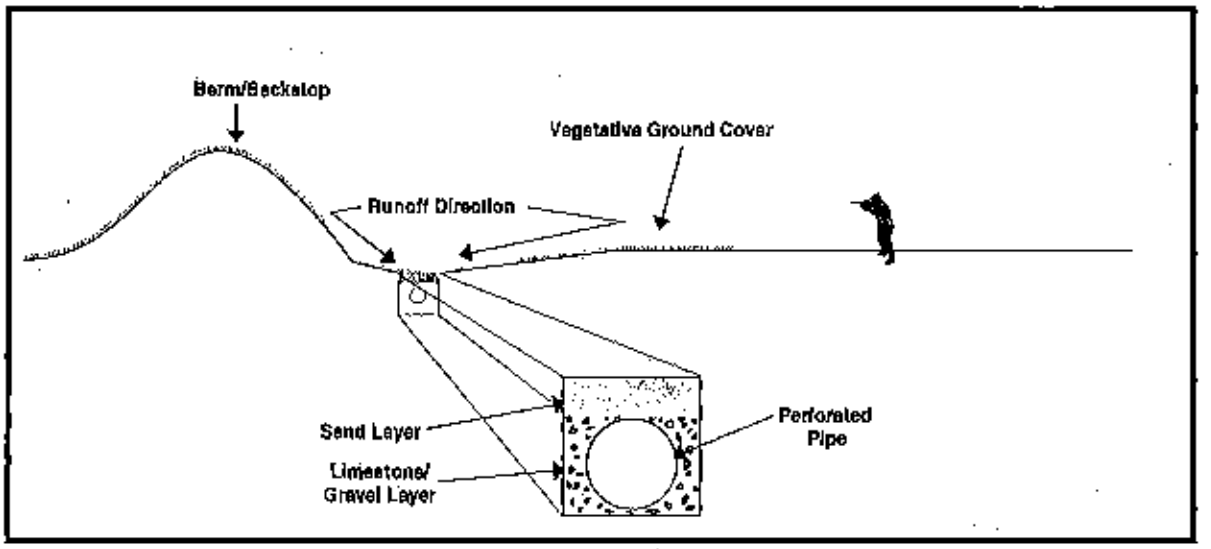

Figure 3-2 – Sample Filter Bed System (Adapted from Proceedings for National Shooting, Range Symposium, October 17-19, 1993, North American Hunting Club and Wildlife Forever)

which raises the pH of the filtrate. The lead particles in the rainwater are collected on the sand, while the pH-adjusted water drains through the filter to a perforated drainage pipe located within the limestone gravel.

Filter beds are designed to capture fine particles of lead transported in surface water runoff. They are not designed to capture bullets. The operation and maintenance requirements of filter beds are minimal. Maintenance activity is limited to periodic removal of debris (such as litter, leaves, etc.) and occasional replenishment of the limestone.

The use of filter beds is most effective on sites with open, rolling terrain where surface water runoff is directed to them. At existing rifle and pistol ranges, a limited system of trenches and filters can be installed at the base of natural soil backstops or at natural drainage depressions.

Containment Traps and Detention Ponds

Containment traps and detention ponds are designed to settle out lead particles during heavy rainfall. Typically, they are depressions or holes in the range's drainage paths. Here, the lead-containing runoff passes through the trap or pond, allowing the lead bullet fragments to settle out. Vegetative cover can be placed in the drainage path to increase the effectiveness of containment traps and ponds by further reducing the velocity of runoff and allowing for more lead fragments to settle from the runoff. It is important to regularly collect the lead and send this lead to a recycler.

Dams and Dikes

At shotgun ranges, dams and dikes can also be used to reduce the velocity of surface water runoff. Dams and dikes must be positioned perpendicular to the direction of runoff to slow the flow of surface water runoff. To accomplish this, determine the direction of the range's surface water runoff. This will be particularly obvious at ranges with sloped terrain. The dams or dikes should be constructed using mounds of dirt that are approximately a foot high. These mounds should transect the entire range perpendicular to the stormwater runoff direction.

These runoff controls are most important at ranges at which off-site runoff is a potential problem, such as ranges where the lead accumulation areas are located upgradient of a surface water body or an adjacent property. Since lead particles are heavier than most other suspended particles, slowing the velocity of surface water runoff can reduce the amount of lead transported in runoff.

Ground Contouring

Another mechanism to slow runoff and prevent lead from being transported off site is ground contouring. By altering drainage patterns, the velocity of the runoff can be reduced. Furthermore, in areas where pH is high (resulting in a lower potential for lead dissolution), the soil can be graded or aerated to increase the infiltration rate of precipitation, so that rainwater is more easily absorbed into the soil. This slows down or prevents surface water runoff and off-site migration. It should be pointed out that this design, in effect, collects lead in the surface soils. Therefore, range operation and maintenance plans should include lead reclamation as well as adjusting the pH, and adding phosphate.

3.3 Lead Removal and Recycling (Step 3)

To successfully minimize lead migration, the most important BMP for lead management is lead reclamation. Implementing a regular reclamation program will allow you to avoid expensive remediation and potential litigation costs. Ranges in regions with high precipitation and/or with acidic soil conditions may require more frequent lead recovery since the potential for lead migration is greater. In regions with little precipitation and/or where the soil is somewhat alkaline, spent bullets may be allowed to accumulate on the soil for a longer time between reclamation events. It should be noted that to ensure that lead is not considered "discarded" or "abandoned" on your range within the meaning of the RCRA statute (i.e., a hazardous waste), periodic lead removal activities should be planned for and conducted. This typically requires one or more of the following:

- Hand Raking and Sifting
- Screening
- Vacuuming
- Soil Washing (Wet Screening, Gravity Separation, Pneumatic Separation)

These methods are discussed in detail below. Figure 3-3 provides examples of common lead reclamation equipment.

Figure 3-3 – Examples of Common Lead Reclamation Equipment

Example of shaker system.
Courtesy of National Range Recovery

Example of final separation device ***(Patented Pneumatic Separation Unit) used with a Shaker System. Courtesy of MARCOR.***

Also, it is important to be aware that state regulations may require that the material being sent for recycling have a minimum lead content in order to qualify as a scrap metal that can be shipped under a bill of lading (i.e., exempt from RCRA).

3.3.1 Hand Raking and Sifting

A simple BMP that can be done by club members, particularly at small ranges, is raking and/or sifting bullet fragments from the soil. Sifting and raking activities should be concentrated at the surface layer. This is a low-technology and low-cost management alternative for lead reclamation. Once collected, the lead must be taken to a recycler or reused. Arrangement with a recycler should be made prior to collecting any spent lead to avoid having to store the lead and avoid potential health, safety and regulatory concerns associated with storing lead.

At trap and skeet ranges, conducting sifting and raking activities in the shot fall zone (approximately 125 - 150 yards from the shooting stations) will yield the most lead. For sporting clay ranges, these activities should be conducted around tree bases, where lead shot tends to collect. Basically, the process consists of raking with a yard rake the topsoil in the shot fall areas into piles, as if you were raking leaves, removing any large debris (e.g., rocks, twigs, leaves, etc.), and then sifting the soil using screens.

Once the soil has been raked and collected, pass it through a standard 3/16 inch screen to remove the large particles. This process will allow the lead shot sized particles to pass through the screen. The sifted material (those not captured by the 3/16 inch screen) should be passed through a 5/100 inch screen to capture the lead and lead fragments. This process will also allow sand and other small sediment to pass through the screen. Screens can be purchased at many local hardware stores. The screens should be mounted on a frame for support. The frame size will vary based on the technique used by each range. For example, if one person is holding the framed screen, it may be better to use a smaller frame (2 feet by 2 feet) whereas, if several people are holding the framed screen, it can be larger.

Raking and sifting can be performed by club members on a volunteer basis. Some clubs provide incentives, such as reduced fees, to members who assist with the lead removal process. Other clubs have hired college students during the summer. A number of small clubs have found that reloaders will volunteer to rake in exchange for collected shot.
Hand sifting and raking are cost effective lead removal techniques for small ranges, or low shooting volume ranges. However, these techniques may not be appropriate for situations in which there is a large volume of lead on the range. In this instance, reclamation machinery may be more appropriate.

Note: Those conducting the hand raking and sifting reclamation at ranges should protect themselves from exposure to lead. Proper protective gear and breathing apparatus should be worn. The Occupational Safety and Health Administration (OSHA) or an appropriate health professional should be contacted to learn about proper protection.

3.3.2 Purchasing/Renting Mechanical Separation Machinery

Reclamation equipment may be rented from local equipment rental services. One type of machine that it may be possible to rent for lead shot reclamation is known as a screening machine (also referred to as a mobile shaker, gravel sizer, or potato sizer). This device uses a series of stacked vibrating screens (usually two screens) of different mesh sizes and allows the user to sift the lead shot-containing soil [gathered by hand raking, sweeping, or vacuuming (discussed above)]. The uppermost screen (approximately 3/16 inch mesh) collects larger than lead shot particles, and allows the smaller particles to pass through to the second screen. The second screen (approximately 5/100 inch mesh) captures lead shot, while allowing smaller particles to pass through to the ground. The lead shot is then conveyed to a

container such as a five gallon bucket. In the Northeastern United States, the typical rental cost for this equipment is between $500 and $4,500 a week, depending on the size shaker desired. It may be possible to get more information on rentals for this type of equipment from heavy equipment rental companies.

Another possible option is to rent a vacuum system that will collect the lead shot-containing soil from the range. Here, vacuuming takes the place of hand raking or sweeping. A vacuum machine is used to collect the lead shot-containing soil. Once collected, the lead shot-containing soil must be sifted through a screening system (either a rental screening machine, or a series of home made framed screen sets). You may be able to obtain more information about renting vacuums or vacuuming services (e.g., it may include a person to operate the machinery) from heavy equipment rental companies.

Some clubs have found that performing their own lead reclamation to be very time consuming. Part of the reason these reclamations took so long is that the soils were wet. Reclamation is much easier under dry soil conditions. For example, one club reclaimed lead from their range using equipment they modified themselves. Twenty-five tons of lead were collected but the reclamation took over two years. Another club took a year to reclaim 10 tons of lead. A more preferable option may be to hire a reclamation company.

3.3.3 Hiring a Professional Reclamation Company

Another option for lead removal is to hire a professional reclaimer. Lead reclamation companies claim to recover 75%-95% of the lead in the soils. Generally, with reclamation companies there is no minimum range size requirement for lead reclamation. Concentration of lead is more important than quantity spread over a field, especially if it is a difficult range for reclamation (e.g., hilly, rocky, a lot of clay in the soil).

Please note that reclamation companies tend to be in high demand — it may take over a year for the company to start at your club. Therefore, it is wise to plan ahead and make the call to the reclamation company as early as possible.

Some reclamation companies require a site visit to view the topography, the soil composition, and amount of lead observed on the ground. During the visit, some companies may even do a site analysis to determine whether or not it is feasible to reclaim. This analysis identifies the location of lead, the expected recovery amount, and the depth lead reaches into the soils.

3.3.4 Reclamation Activities

Using machinery to reclaim lead usually requires that the area be clear of scrub vegetation. Grass, mulch, or compost is generally removed or destroyed during the reclamation process. Some reclamation companies have no problem beginning reclamation on a grassy field. Other reclamation companies will remove grass before or during reclamation (by burning it, if allowed locally, leaving behind the lead shot), and still others require that all vegetation be removed before they arrive at the range. Some companies will re-seed the area once the reclamation is completed.

Since sporting clay ranges generally have many trees, removal of vegetation as discussed above may not directly apply to existing sporting clay ranges. At these ranges, the focus is on removing vegetative debris (i.e., fallen limbs, tree bark, etc.) prior to reclamation. This may include removing some trees to gain better access with the reclamation machinery. Of course, when designing a new sporting clay range, steps to facilitate lead reclamation should be taken into account. For example, less and more widely spaced trees will facilitate lead reclamation.

Reclamation companies use several types of machinery to reclaim lead. Some companies drive their separation machinery over the site. The lead-laden soil is picked up, processed and then returned to the ground after most of the lead

is removed. Other companies scrape off the top several inches of soil from the ground, using a front-end loader to bring the soil/lead to stationary reclamation machines, and then return the soil to the field after reclamation. Many companies till the top two to five inches of soil and grass immediately prior to reclamation to facilitate the process (some companies may require this to be done prior to arrival on the range).

Regardless of how it is collected, the actual reclamation of the lead follows the same general pattern. Most often, it is sifted through a series of shaking screens. The lead and soil pass through shaking screens (usually at least two screens) of decreasing mesh (hole) size, with the topmost screen having the largest mesh. This part of the reclamation machinery is usually adapted from machinery used for potato or gravel sizing.

Any soil/debris automatically screened out as being too big or too small is either returned to the field or re-screened to ensure no lead is caught in the debris. This procedure is why moist, clay soils are more difficult to reclaim. The moist, clay soils can bind together into shot-sized pellets producing more "product" for the second part of the reclamation. The wet soils can also clog the screens.

For some reclamation companies, their process ends after sifting the soil and returning it to the ground. However, some companies take reclamation one step further. After screening, the resulting lead, soil, and other lead-sized particles enter a blowing system. Here the lead shot is easily separated from the soil and other debris by the blowing air. The lead is much more dense than the soil and other lead-sized debris so that it falls out first. Figure 3-3 depict examples of actual lead reclamation machinery.

Some lead reclamation companies will perform the reclamation during club off-hours so that club activities are not interrupted. Additionally, some perform the reclamation on a field-by-field basis, to minimize any disruptions to club activities. However, others companies require the club to shut down during the reclamation. Reclamation time varies depending on weather, site accessibility, range size, and number of personnel assigned to perform the reclamation.

Reclamation activities may generate dust, especially in drier western locations. To prevent or minimize dust from traveling off the range and causing complaints from neighbors, reclamation activities generating dust should only be conducted during periods of no wind. In addition, such activities should be completed as quickly as possible.

Vacuuming

For ranges that are located on hilly, rocky, and/or densely vegetated terrain, several reclamation companies employ a vacuum system that collects the lead shot (and soil and other detritus). The resulting mix is then placed into the reclamation machinery discussed above. This method is especially effective for sporting clay ranges where lead shot tends to pile up around tree bases.

Vacuuming has traditionally been used for removal of lead shot from trap, skeet and sporting clay ranges. Another way to apply this method involves removing the top layer of an earthen backstop or sand trap with shovels. It is then spread thinly over an impermeable material such as plywood. A vacuuming device is then used to collect the materials that are lighter than lead (e.g., sand or soil), while leaving behind the heavier materials (i.e., lead bullets/shots and fragments). The soil can then be returned to the range. This process is most efficient for dry, sandy soils without a lot of organic material. A more recent innovation is the use of a high suction vacuum. This vacuum itself does not have to be moved about, since a very long hose (up to 600 feet) is used to move in and around trees during the collection of lead shot at trap and skeet ranges.

Soil Washing (Physical and Gravity Separation)

Soil washing is a proven technology and another lead reclamation method used by some reclaimers to separate the lead particles from

the soils. Soil washing is the separation of soils into its constituent particles of gravel, sand, silt and clay. Because of the much higher surface area and surface binding properties of clay, most lead contaminants tend to adhere to the clay particles.

Soil washing, therefore, attempts to generate a clean sand and gravel fraction by removing any fines adhering to the larger soil particles and, if necessary, to transfer contaminants bound to the surface of the larger particles to the smaller soil particles. Typically, the soils are first excavated from the range and then mixed into a water-based wash solution. The wet soil is then separated using either wet screening or gravity separation techniques. One benefit of this system of reclamation is that it does not require that soils be dry.

In addition, soil washing may be able to recover all or almost all lead particles through a combination of wet screen sizing and density separation. This technique is an option for remediation of a range being closed and may compare favorably from an economic standpoint with the disposal option.

Soils treated using this method have been shown to be below 5 mg/L TCLP and to have up to 99% of particulate lead removed. Treatment costs are site specific, but can range from less then $40 per ton (1999 levels) for simple physical/gravity separation up to about $100 per ton for processes involving leaching. Credits for recycled lead help offset the treatment cost and the cost of recycling any treatment sludges and concentrated soil fines. Water used in soil washing is from a closed loop system and should only be disposed at completion of cleanup. Experience shows the water to not be a RCRA regulated hazardous waste, therefore probably allowing disposal to a local wastewater treatment plant.

Wet Screening

With this method, particles larger and smaller than the surrounding soils are passed through a series of large-mesh to small-mesh screens. Each time the mixture passes through a screen, the volume of the soil mixture is reduced. Large particles such as lead shot/bullets and fragments are screened out of the soil/wash mixture early in the process and can be taken off-site for recycling - allowing the soil to be placed back on-site.

Gravity Separation

This technique can be used in cases where the lead particles are the same size as surrounding soil particles. The wet soil/wash mixture is passed through equipment, which allows the more dense materials (i.e., lead materials) to settle to the bottom of unit and separate out of the soil/wash mixture.

Pneumatic Separation

Pneumatic separation (see figure 3-3) is an effective means to enhance the traditional screening results. Traditional screening cannot separate shot and bullets from other shot and bullet sized material, i.e., rocks, stones, roots, and various debris. A recycling facility considers non-lead items as "contaminants" which drastically reduces the value of the recycled lead. Pneumatic separation utilizes an air stream, and specific density analysis, to effectively separate the shot/bullets from the other shot/bullet sized material.

3.3.5 BMPs to Assist Lead Reclamation and Recycling

There are several operational activities that should be conducted throughout the year to facilitate reclamation. The following is a discussion of these activities.

Frequency of Lead Removal

It is important to perform lead removal at a frequency appropriate for your site. The frequency is dependent on several factors. These include:

- Number of rounds fired
- Soil pH
- Annual precipitation
- Soil Type
- Depth to groundwater.

Lead quantity, as estimated by the number of rounds fired, is a factor in determining the appropriate frequency of reclamation at ranges. It also assists in determining the cost of reclamation. One reclamation company indicated that reclamation was most cost effective when it contains at least 20 pounds of lead per square foot of backstop. Another source indicated that a minimum of 100,000 rounds per firing lane should be allowed before lead reclamation occurs. This would ensure good range operation and maintenance, while minimizing the cost per quantity of lead recovered.

For shotgun ranges, tracking the number of targets thrown can help indicate when the lead shot should be reclaimed. For example, considering environmental issues, the market for scrap lead and common cleanup methods, one source indicated that when a range has thrown at least 250,000 to 1,000,000 targets, depending on the shooting area, reclamation of the lead shot is encouraged. Another reclaimer indicated that if at least two pounds of lead per square foot have accumulated on the range, reclamation is recommended.

Because the number of rounds fired is important to know, establishing record keeping procedures to monitor the number of rounds fired is recommended. This can be accomplished by maintaining logbooks and asking shooters to list the number of rounds shot and the type/size of shot/bullets they use. This should be done by lane and by stand.

There are many ranges at which lead removal has not occurred for many years. Many of these ranges are used extensively. Such ranges are especially good candidates for lead removal and recycling. Subsequent removal frequency depends on range use and environmental factors. The NRA recommends a frequency of one to five years for lead cleanup, even on ranges with minimal use[4]. One possible approach to reducing the cost of reclamation more cost effective is for a number of ranges in the same geographical area to work together in organizing coordinated removals at their ranges. This will reduce the reclaimer travel and mobilization cost for each range.

Minimization of Vegetation

As discussed previously, vegetation is useful both for controlling the amount of runoff and erosion from the range and inhibiting lead mobility. **However, excessive or unmaintained vegetative cover can interfere with reclamation activities.** For example, large amounts of vegetation impedes the screening and sifting processes used by many reclamation companies. Therefore, prior to reclamation activities, it is best to remove, reduce, or mow excessive vegetation from the area. Once the reclamation has been conducted, quick-growing vegetation such as a rye/fescue grass mix should be replanted. This process should be repeated for each reclamation event.
In addition, heavily wooded areas may inhibit lead reclamation because they are less accessible by heavy reclamation machinery. For ranges that are heavily wooded, it is recommended that you minimize the vegetation or modify the range design to allow lead reclamation equipment access to the range. Access to the impact area should be developed to facilitate reclamation. **Make sure that the pathways do not present a safety risk.**

Innovative Landscaping

Some new ranges are landscaping their ranges to include a sand track (an area the size of the shotfall zone that is only sand) located behind some aesthetically pleasing shrubs. This allows the spent shot to concentrate on the sand, making it very easy to perform reclamation because there is no interference by vegetation.

Selecting a Lead Reclaimer

In ensuring that the reclamation is conducted appropriately, selecting a reclaimer that is right for your range is extremely important. Some lead reclamation companies will travel to your range and assess the range prior to conducting

4. National Rifle Association, "Metallic "Bullets" lead Deposits on Outdoor and Indoor Firing Ranges" 1991

lead collection activities. This assessment trip allows the reclamation company to confirm information gained during initial discussions, as well as to assist in appropriately estimating costs, time required, and the estimated volume of lead at the range. Conducting this pre-assessment also allows you to determine which reclaimer is right for your situation.

Questions Commonly asked by the Reclaimer

When you contact a reclamation company, it is likely that the reclaimer will ask several general questions. Typical questions include:

- When was the last reclamation conducted?
- How many rounds have been shot since that last reclamation?
- What is the use frequency of the range?
- What are the site characteristics and soil types?
- What type of bullet containment device is used at the range?

Answering these questions will be a lot easier if you have maintained good records, as is suggested above.

Questions to ask the reclaimer

When choosing a reclaimer be sure to ask the general questions about prior cleanups (past projects), insurance to cover company and cleanup (general liability insurance, pollution insurance, bonding, etc.), and site plans to ensure health and safety of workers and range personnel. Other questions you may want to ask the reclaimer include:

- Can the reclamation take place outside normal hours of range operation?
- What costs are involved?
- How long will the reclamation take?
- Does vegetation at the range need to be removed?

Economic Considerations

Lead removal costs may vary dramatically depending upon the type and volume of soil or sediments, topography, amount of lead, location, and reclamation company and technique used. Because the economics vary due to many factors, this manual does not provide specific estimates. However, it is important to understand that lead reclamation will generally require an expenditure by the range, even when considering any monetary returns from selling reclaimed lead. By tracking the range use and using the criteria discussed earlier (see Frequency of Lead Removal), the reclamation costs per quantity of lead can be optimized. For long term range management, routine lead removal will help future cost avoidance by minimizing the need for costly site remediation

Some reclaimers bid the lowest flat fee with all the lead provided to the range for selling. The range owners/operators must then consider the transportation costs and recycling fee associated with sending the reclaimed shot and bullets to a recycling company. Alternatively, the reclaimer will use the economic return of lead sold for recycling, based on the volume reclaimed and the current value of lead, to reduce the total cost of reclamation and recycling. Although the value of lead varies, the scrap value of reclaimed lead typically falls between $.06 and $.25 per pound, **excluding transportation cost**. See the appendix for contact information regarding lead reclamation companies that specialize in lead removal at outdoor ranges.

3.4 Documenting Activities and Record Keeping (Step 4)

Documenting activities and keeping good records is of paramount importance for an effective lead management program at a range. Owners/operators should document all activities done at the range with respect to BMPs and recycling of lead. Records should be kept on when services were provided and who provided them.

Owners/operators may want to document what type of BMP(s) were implemented to control lead migration, the date of service, and who did the services. The records should be kept for the life of the range. Records may be used to show that owners/operators are doing their part to

help prevent lead migration off-site and show that they are doing their part to be stewards of the environment.

3.5 Additional Economic Considerations

Not all BMPs need to be implemented at once. Many can be phased in over time. However, it is important to begin implementing BMPs, especially lead reclamation and recycling, as soon as possible. Implementing the most appropriate BMPs for your range requires consideration of your range characteristics and costs associated with implementing the BMPs. This manual provides a large selection of BMPs that vary in both cost and sophistication. In selecting BMPs for your range, it is important to look at all costs and all the benefits (or potential problems) associated with each BMP.

3.6 Summary of Key BMPs for Shooting Ranges

There are several BMPs that are highly recommended to be implemented, if applicable to your range. Table 3-1 identifies the advantages and disadvantages of all BMPs discussed in this chapter. This table serves as a quick reference guide for potential BMPs. Readers should refer back to the detailed discussions above for further information regarding these BMPs.

3.7 Certificate of Recognition

EPA has established a voluntary process whereby a shooting range may apply for a "Certificate of Recognition." The Certificate is intended to be awarded to ranges that have certified that they have prepared and intend to implement, or have implemented, a written Environmental Stewardship Plan that is consistent with the EPA *Best Management Practices for Lead at Outdoor Shooting Ranges* manual. To assist in this process, Appendix E contains a template for an Environmental Stewardship Plan, an electronic copy of which is available on EPA's shooting range website (http://www.epa.gov/region2/leadshot) in several formats. This template, combined with information provided throughout this manual, other resources and guidance, and site-specific factors, will help in guiding the process of evaluating relevant information about your facility and determining which BMP(s) might be appropriate for your ranges. EPA's template was adapted from Appendix C of the National Shooting Sports Foundation's manual, *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges* (the NSSF manual.) Accordingly, use of that template would also be acceptable for use in EPA's Certificate of Recognition program.

In order to request this certificate, a range must submit a notice to the Lead Shot Coordinator in EPA Region 2 stating that they have completed an Environmental Stewardship Plan as indicated above and are intending to implement it within six months. The certificate is intended to convey, to all that may see it, that the range has declared its intention to properly manage lead shot and bullets. However, it must be noted that a certificate is not a permit to operate and provides no additional operational approval, implied or otherwise.

Table 3-1 – Summary of Key BMPs

BMPs for Preventing Lead Migration		
Monitoring and Adjusting pH		
BMP Option	**Advantages**	**Disadvantages**
Lime Spreading	1. Easy 2. Inexpensive 3. Effective	1. Does not offer a permanent solution 2. Will not work in extremely acidic conditions
Immobilizing Lead		
BMP Option	**Advantages**	**Disadvantages**
Phosphate Spreading	1. Easy 2. Inexpensive 3. Effective	1. Does not offer a permanent solution
Controlling Runoff		
BMP Option	**Advantages**	**Disadvantages**
Vegetative Ground Cover (e.g., grass, etc.)	1. Easy 2. Aesthetically pleasing 3. Relatively inexpensive 4. Effectively slows and can redirect runoff 5. Some may "bioabsorb" lead	1. Requires periodic maintenance 2. Must be removed or reduced prior to reclamation 3. Excessive vegetation will interfere with reclamation
Organic Surface Cover (e.g., mulch and compost)	1. Easy 2. Aesthetically pleasing 3. Relatively inexpensive 4. Effectively slows and can redirect runoff	1. Requires periodic maintenance 2. Must be removed prior to reclamation 3. May not be suitable at ranges with acidic soil conditions
Filter Beds	1. Diverts and treats lead contaminated runoff 2. Low maintenance 3. Assists with range drainage	1. May require hiring a licensed engineer 2. Higher initial setup cost

Table 3-1 – Continued

Controlling Runoff (cont.)		
BMP Option	**Advantages**	**Disadvantages**
Water/Sediment Traps	1. Low maintenance 2. Assists with range drainage	1. May require hiring a licensed engineer 2. Higher initial setup cost
Dams and Dikes	1. Low maintenance 2. Assists with range drainage	2. Higher initial setup cost
Ground Contouring	1. Lower initial setup cost 2. Assists with range drainage	1. May require hiring a licensed engineer
Controlling and Containing Bullets		
Bullet Containment Devices		
BMP Option	**Advantages**	**Disadvantages**
Earthen Backstop	1. Minimal (if any) initial setup cost 2. Accepts firing from various guns and directions	1. Build up of bullets increases chances of ricochet and fragmentation problems 2. Lead removal requires mining 3. Potential decreased value of lead because it is less clean than lead reclaimed from other trap systems 4. Does not eliminate lead's introduction into the environment
Sand Trap	1. Low initial setup cost 2. Ease of maintenance 3. Accepts firing from various guns and directions	1. Build up of bullets increases chances of ricochet and fragmentation problems 2. Lead removal requires mining
Pit and Plate Trap (Sand)	1. Low initial setup cost 2. Simple installation 3. Lead removal and recycling requires less extensive mining	1. Lead builds up on top layer of sand causing ricochet problems 2. Increased bullet fragmentation 3. Higher level of maintenance than sand traps

[1] Much of this information was obtained from Action Target's Bullet Containment Trap Technologies video. Reference to various pros and cons of individual bullet containment devices is included in this manual for informational purposes only. The USEPA does not endorse any particular bullet containment device, design, or product.

Table 3-1 – Continued

Controlling and Containing Bullets (Cont.)		
Bullet Containment Devices (cont.)		
BMP Option	**Advantages**	**Disadvantages**
Escalator Trap (Steel)	1. Can be used indoors and outdoors	1. Deflection plates require regular oiling. The oil used is hazardous and can easily migrate at outdoor ranges 2. Relatively high maintenance 3. Poor lead collection because the bullets may become clogged at the spiral collection area at the top of the deflection plate 4. Increased bullet fragmentation 5. May require rubber curtains to be placed in front of the trap to slow bullets 6. More noise 7. Possible creation of lead dust
Vertical Swirl (Steel)	1. Can be used indoors or outdoors 2. Bullets are captured in pure form in containers, thus removal and recycling is easy	1. Does not accept shooting from all directions 2. Corners where each unit meet can cause ricochet and fragmentation problems 3. More noise 4. May create lead dust
Wet Passive Bullet Trap (Steel)	1. Can be used indoors and outdoors 2. Excellent results (i.e., low ricochet, low fragmentation, ease of removal) 3. Bullets are captured in containers, thus removal and recycling is easy	1. Expensive 2. Oil and water mixture is hazardous 3. More noise
Lamella Trap	1. Can be used indoors or outdoors 2. Reduction of lead dust	1. Rubber strips quickly become destroyed and must be replaced 2. Potential fire hazard 3. High maintenance 4. Scattered lead fragments mixed with rubber can migrate; lead contaminated granules are hazardous and require special handling

Table 3-1 – Continued

Controlling and Containing Bullets (Cont)		
Bullet Containment Devices (cont.)		
BMP Option	**Advantages**	**Disadvantages**
Rubber Granule	1. Can be used indoors or outdoors 2. Reduction of lead dust 3. Minimizes fragementation, compared with some backstops	1. Rubber strips can quickly become destroyed and must be replaced 2. Some pose potential fire hazard, although fire-retardant/resistant materials are available in some designs 3. High maintenance 4. Scattered lead fragments mixed with rubber can migrate; lead contaminated granules are hazardous and require special handling
Shock Absorbing Concrete	1. Adaptable/can be formed in any shape 2. Can be used to reduce erosion in soil berms/target emplacements 3. Crushed concrete can potentially be recast after fragments removed	1. Mechanical lifting and handling equipment must be used during installation and maintenance 2. High maintenance (replacement) costs
Removal and Recycling of Lead		
Hand Raking and Sifting	1. Easily done by club members 2. Inexpensive 3. Can be done outside operating hours 4. Relatively effective	1. May be more time consuming at large ranges 2. Weather sensitive (i.e., works best under dry conditions) 3. Exposure to lead and lead dust possible
Screening	1. Effective 2. Potential economic returns	1. Vegetation must be removed 2. Weather sensitive (i.e., works best under dry conditions)
Vacuuming	1. Effective 2. Can be used at least accessible ranges 3. Less vegetation needs to be removed	1. Weather sensitive (i.e., works best under dry conditions)
Soil Washing	1. Effective at cleaning the soil to remove the lead particles so one is left with non-lead soil	1. Vegetation must be removed

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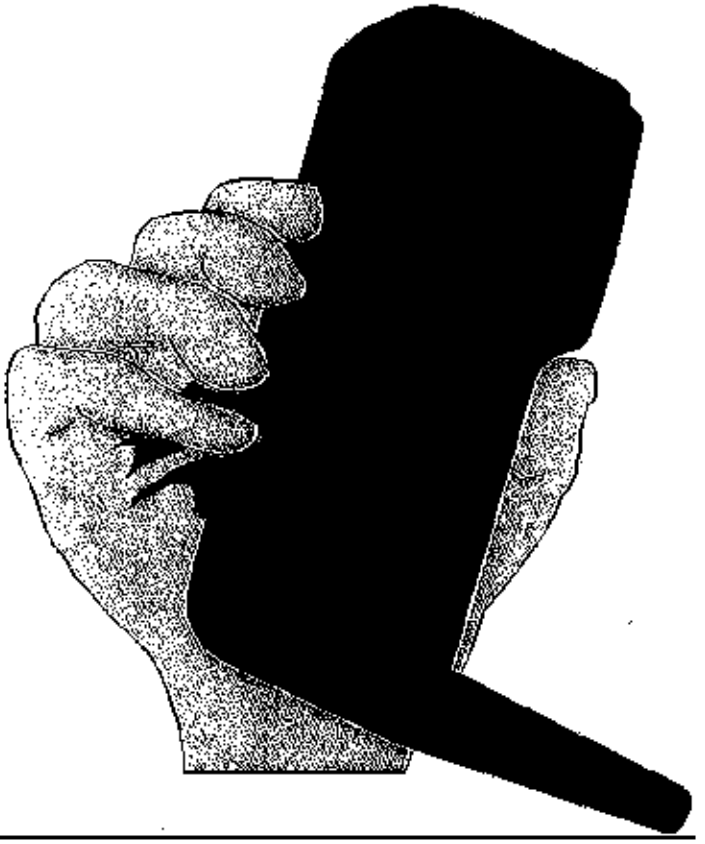
Appendix A: Resources

This manual provides contacts for lead reclamation companies, lead recycling companies, bullet trap manufacturers, and organizations that provide prevention and/or remediation techniques to assist clubs and firing ranges in implementing Best Management Practices for shooting ranges. The list was updated for the June 2005 printing. Vendors who are interested in being added to the list of lead reclaimers or remediation contractors should contact:

Lead Shot Coordinator
RCRA Compliance Branch
US EPA Region 2
290 Broadway
New York, NY 10007-1866
Telephone: (212)637-4145
E-mail: Leadshot.Region2@epa.gov



Lead Recycling Companies

Below is a list of recycling companies for lead in soils and spent lead shot/bullets that were contacted during the writing of this manual. Lead recycling companies smelt lead. It is not inclusive and is included for informational purposes only. Local scrap metal recyclers may also accept spent lead shot or spent bullets. Mention of these companies does not serve as an endorsement by the EPA.

The Doe Run Company Resource Recycling Divsion HC1 Box 1395 Boss, MO 65440 800-633-8566 573-626-3476 Lou Magdits l.magdits@doerun.com	**East Penn Manufacturing Company, Inc.** P.O. Box 147 Lyon Station, PA 19536 610-682-6361 Rick Leiby Web Site: http://www.eastpenn-deka.com
Exide Spring Valley & Nolan Streets Reading, PA 19612 800-437-8495 Robert Jordan, Maritza Rojas-Suarez Web site: http://www.exide.com	**Gopher Smelting and Refining** 3385 Highway 149 South Eagan, MN 55121 651-454-3310 800-354-7451 Mark Kutoff Web Site: http://www.gopherresource.com/
Gulf Coast Recycling 1901 N. 66th St Tampa, FL 33619 813-626-6151 William Weston	**Kinsbursky Brothers, Inc.** 1314 N. Anaheim Blvd Anaheim, CA 92801 714-738-8516 Paul Schneider Web Site: http://www.kinsbursky.com
Reserve Trading Corp. P.O. Box 302 Medina, OH 44258 330-723-3228	

Lead Reclamation Companies

Below is a list of reclamation companies for lead in soils and spent lead shot/bullets that were contacted during the writing of this manual. Lead reclamation companies reclaim lead from ranges. It is not inclusive and is included for informational purposes only. Mention of these companies does not serve as an endorsement by the EPA.

Brice Environmental 3200 Shell St, P.O. Box 73520, Fairbanks, AK 99707 Craig Jones 907-456-1955 www.briceinc.com Reclaims primarily from earthen backstops and sand traps.	**En-Range, Inc.** 3326 NW 29th St. Miami, FL 33142-6310 Thomas M. Taylor 305-999-9965 Fax 305-635-8645 Email: enrange1@yahoo.com www.en-range.com Provides lead reclamation and other environmental and maintenance services.	**Entact** 1010 Executive Court Suite 280 Westmont, IL 60559 630-986-2900 www.entact.com Performs physical removal of the lead from backstops, chemical treatment of soils and returns soil to the backstop.
Karl & Associates, Inc. 20 Lauck Road Mohnton, PA 19540 Edmund Karl III 610-856-7700 Works primarily in the the mid-Atlantic area. Lead-containing soil is physically removed and sent to licensed disposal sites or licensed recycling facilities.	**MARCOR** 246 Cockeysville Road Hunt Valley, MD 21030 Dave Jungers 410-785-0001 www.marcor.com Uses a pneumatic separation unit to remove lead from contaminated soil and treats soil to pass TCLP.	**Metals Treatment Technologies, LLC (MT^2)** 12441 West 49th Avenue Suite 3 Wheat Ridge, CO 80033 Jim Barthel 303-456-6977 www.metalstt.com Removes lead from soil and treats soils at all types of ranges.
Sears Trucking Company P.O. Box 38 El Reno, OK 73036 Garland Sears 800-522-3314 Fax 405-262-2811 Physically removes lead from soils at trap and skeet ranges.	**Solucorp Industries, Ltd.** 250 West Nyack Road West Nyack, NY 10994 Mike DeLuca 845-623-2333 Fax 845-623-4987 Email: solucorpmbs@aol.com www.solucorpltd.com Removes and treats soil using their Molecular Bonding System (MBS) soil stabilization technology.	**Southern Lead Removal** P.O. Box 2645 Daytona Beach, FL 32115 Kevin Gilchrist 386-763-0115 Fax 386-761-6991 Removes lead from indoor and outdoor pistol ranges only.
Sport Shooting Services P.O. Box 667 Crawfordville, FL 32326 Ed Tyer 850-926-7375 Cellphone 850-294-0132 Email: envirorange@aol.com Removes lead from earthen berms, uses a shaker and screen system to separate lead from soils, rents screening equipment, and consults on range design, primarily in Florida.	**Terra Resources, Ltd.** HC4 Box 9311 Palmer, AK 99645 Larry Wood 907-746-4981 Cellphone: (907) 232-5059 Fax: 907-746-4980 www.terrawash.com Uses gravimetric process to separate lead and TerraWash™ soil washing technology.	**Waste Recycling Solutions, Inc.** 1850 Route 112 Medford, NY 11763 Tommy Arabia, President 631-654-3811 Uses a vacuum system to remove lead from trap and skeet ranges.

Other Resources

Below is a list of additional phone numbers that may be of use if you have general questions including questions on range construction, design, and implementing BMPs.

U.S. Fish and Wildlife Service 4401 North Fairfax Arlington, VA 22203 703/358-2156 Web site: http://www.fws.gov/	**Institute of Scrap Recycling Industries, Inc.** 1325 G Street, NW, Suite 1000 Washington, DC 20005-3104 202/737-1770 Web site: http://www.isri.org/
Lead Industries Association, Inc. 13 Main Street Sparta, NJ 07871 973/726-LEAD (973/726-5323) fax: 973/726-4484 Web site: http://www.leadinfo.com	**National Rifle Association of America** 11250 Waples Mills Road Fairfax, VA 22030 800/NRA-3888 Web site: http://www.nra.org
National Shooting Sports Foundation and National Association of Shooting Ranges 11 Mile Hill Road Newtown, CT 06470 203/426-1320 NSSF web site: http://www.nssf.org NASR web site: http://www.rangeinfo.org	**Sporting Arms and Ammunition Manufacturers' Institute, Inc.** Flintlock Ridge Office Center 11 Mile Hill Road Newtown, CT 06470-2359 203/426-4358 Web site: http://www.saami.org
Wildlife Management Institute 1101 14th Street, N.W. Suite 801 Washington, DC 20005 202/371-1808 Web site: http://www.wildlifemanagementinstitute.org	

Web Resources

Useful Web Sites	
Description	**Web Address**
Federal Government Sites	
U.S. EPA's Outdoor Shooting Range Home Page	http://www.epa.gov/region2/waste/leadshot/
U.S. EPA – Military Munitions Rule	http://www.epa.gov/epaoswer/hazwaste/military/ http://www.epa.gov/tribalmsw/thirds/remunition.htm
U.S. Occupational Safety and Health Administration (OSHA)	http://www.osha.gov/
National Institute for Occupational Safety and Health (NIOSH)	http://www.cdc.gov/niosh/
State Government Sites	
Florida: BMPs for Shooting Ranges	http://www.dep.state.fl.us/waste/categories/shooting_range/
Massachusetts : Lead Shot in the Environment	http://www.state.ma.us/dep/files/pbshot/pb_shot.htm
Minnesota: Poster for "Firing Range Hazards"	http://www.cdc.gov/niosh/mnables.html
Ohio: Lead Shot Reclaimers list	http://www.epa.ohio.gov/dhwm/leadrecy.htm
Wyoming: Lead Recyclers List	http://deq.state.wy.us/outreach/lead.htm
Court Decisions	
Connecticut Coastal Fishermen's Association v. Remington Arms	http://www.duedall.fit.edu/summer/rcra.htm
Long Island Soundkeeper Fund and NY Coastal Fishermen's Assoc. v. New York Athletic Club	http://www.epa.gov/region02/waste/leadshot/lisfnyac.htm
Articles and Research	
USAF - Lead Contamination in Soils at Military Small Arms Firing Ranges	http://www.afcee.brooks.af.mil/pro-act/fact/june98a.asp
U.S. Army Env. Center (AEC) – Small Arms Range Technology	http://aec.army.mil/usaec/range/operations03.html http://aec.army.mil/usaec/technology/rangexxi03.html http://aec.army.mil/usaec/publicaffairs/update/win97/range.htm
AEC – Green Bullets	http://aec.army.mil/usaec/publicaffairs/publicity02.html http://aec.army.mil/usaec/technology/rangexxi00a.html http://aec.army.mil/usaec/publicaffairs/update/spr97/bullets.htm
AEC - Recycling of Firing Range Scrap	http://aec.army.mil/usaec/publicaffairs/update/spr99/spr9911.htm
Florida Center for Solid and Hazardous Waste Management	http://www.floridacenter.org/
National Association of Shooting Ranges' Reference Library	http://www.rangeinfo.org/resource_library/facility_mngmnt/

Bullet Trap Manufacturers[1]

Bullet Trap Manufacturer	Designs Available	Estimated Cost of Trap	Price Includes	Not Included in Price	Usage of Trap	Description	General Comments
Action Target (801) 377-8033 Contact: John Curtis, CEO actiontarget.com	Total Containment Trap (TCT)	$1,600 to $1,800 /linear foot (dependent on features selected)	Purchase of Equipment Installation Delivery (Freight included)		Rifle Pistol Armor - piercing* *depends on type of armor-piercing	The TCT is a funnel-style trap that uses steel plates mounted at low angles to direct bullets into a deceleration chamber. The low angles prevent break up of the bullets until they reach the chamber, where the bullets lose energy and drop into removeable storage containers. An optional dust collection unit uses a powerful vacuum to remove lead dust and other fine particles from the collection chamber.	The TCT is designed for both indoor and outdoor applications. It may be used safely with handguns, shotguns, and high-powered rifles, and has been successfully tested and used with 50-caliber fire.
Action Target (Cont.) see details above	Rubber Berm Trap (RBT)	$1100/liner foot	Installation and Delivery		Rifle or Pistol. Armor-piercing. Cannot use incendiary rounds.	The RBT is very similar in form and function to a traditional sand or earthen berm trap, with the obvious difference being the use of chopped rubber instead of sand as a collection medium. Bullets fired into the trap are absorbed by the rubber and remain there until reclamation through mining of lead from the trap.	Because rubber is a softer collection medium, bullets can be captured with less break-up and fragmentation. The resulting reduction in lead dust levels is especially beneficial in indoor ranges. This benefit is decreased as more rounds accumulate in the trap, causing newly fired bullets to impact bullets already in the trap.

[1] EPA does not endorse any particular bullet containment device or product. Information on this table is offered to readers for a general understanding of some common bullet trap options and is based on vendor marketing literature.

Bullet Trap Manufacturers Con't.[1]

Bullet Trap Manufacturer	Designs Available	Estimated Cost of Trap	Price Includes	Not Included in Price	Usage of Trap	Description	General Comments
Copius Consultants (516) 783-7489 Contact: Craig Copius	Containment/ Recovery System	Ranges from $600/linear foot to $1,000/linear foot (Price varies with specific design selected)	Purchase of Equipment	Shipping	Rifle Pistol Machine gun Shotgun	This is a modification of the sand backstop. Sizes vary depending on the needs and characteristics of the range; however, average height is 10' - 12' and average width is 12' - 14'. The trap utilizes ballistic grade sand to trap bullets and bullet fragments in a sealed system. The system contains collection and filtration systems to ease reclamation and eliminate off-site migration of lead.	Specific recommended bullet trap is based on the following: 1) Type of usage, quantity of usage, etc. 2) Location in country 3) Environmental issues (e.g., location near a waterbody) Price will depend on the design adopted. One unique feature is that shooting can occur at any angle.
Meggitt Defense Systems Caswell (612) 706-6201 Contact: Brian Danielson	Granular Rubber Bullet Traps	$940 to $1,300/linear foot (dependent on type of trap and other features selected)	Purchase of Equipment Installation Delivery (Freight included)		Pistol Rifle Armor- Piercing Shotgun Machine gun Tracers (Speak to Sales Rep.)	The trap absorbs bullets fired from any angle or distance. No exposed steel surfaces; bullets are not fragmented. The granulated material used in the trap can be turned over quickly to recover the spent rounds.	Suitable for indoor and outdoor ranges. Eight types of traps available. Custom builds traps. Provides site-specific design, if requested. Reclamation is recommended after approximately 90,000 rounds have been fired (depending on trap type.)

[1] EPA does not endorse any particular bullet containment device or product. Information on this table is offered to readers for a general understanding of some common bullet trap options and is based on vendor marketing literature.

Bullet Trap Manufacturers Con't.[1]

Bullet Trap Manufacturer	Designs Available	Estimated Cost of Trap	Price Includes	Not Included in Price	Usage of Trap	Description	General Comments
Range Systems (888) 999-1217 (763) 533-9200 Contact: Steve Thomas range-systems.com	Encasulator Bloc Trap™ Encasulator Granular Trap™	$800-$1,250/linear ft (Price varies with design criteria and product selection)	Purchase of Equipment Installation	Freight	Pistol Rifle Shotgun (shot and slugs)	The bullet traps are constructed for maximum bullet retention with minumum space and cost. The bullet traps virtually eliminate ricochet and airborne lead.	Full service shooting range provider from design and engineering to construction and maintenance. Custom-built traps with exclusive patented rubber technology.
Savage Range Systems (413) 568-7001 Contact: Joan Drucker snailtraps.com	The SNAIL™ Trap	Two types of traps: Pistol Wet: $2,250/linear ft Pistol Dry: $2,150/linear ft Rifle Wet: $2,400/linear ft Rifle Dry: $2,300/linear ft	Purchase of Equipment	Shipping Installation	Rifle (up to .50 cal BMG) Pistol	The SNAIL trap is designed with low angle entrance ramps to guide the bullet into the circular deceleration chamber without scarring the plate. The bullet loses all of its energy in the chamber and drops into a collection system. The use of water and synthetic oil contains the lead particulates and dust, and minimizes friction on the plates.	Usage for indoor and outdoor ranges. Can also be provided with a conveyance system that drops the bullet to a single collection point (e.g., 55-gallon drum) for recycling. Low-maintenance system

[1] EPA does not endorse any particular bullet containment device or product. Information on this table is offered to readers for a general understanding of some common bullet trap options and is based on vendor marketing literature.

Bullet Trap Manufacturers Con't.[1]

Bullet Trap Manufacturer	Designs Available	Estimated Cost of Trap	Price Includes	Not Included in Price	Usage of Trap	Description	General Comments
Stapp EBC, Incorporated (703) 239-9223 Contact: Matt Ciskowski, P.E. 8101 Ox Road Fairfax Station, VA 22039 Fax: (703) 239-9224 bulletcatcher.com	STAPP Bullet Catcher	Varies by specific design (measured by square foot)	Purchase of Equipment Installation Delivery (Freight)		Pistol & Rifle (best for calibers up to 12mm) Can handle jacketed rounds and tracers	The STAPP bullet catcher (consisting of a bottom rubber liner, drainpipe reservoir, rubber granule fill, and cover layer of rubber) collects lead and any infiltrating water without runoff. The system is constructed over an earthen berm and can be modified to any range configuration. Projectiles are completely collected by the bullet catcher with minimal fragmentation. The surrounding structure is ricochet-proof even under the most extreme temperatures.	Designs are site adapted. Reclamation can be performed by Stapp EBC or by range personnel. Email: mciskowski-trc@verizon.net

[1] EPA does not endorse any particular bullet containment device or product. Information on this table is offered to readers for a general understanding of some common bullet trap options and is based on vendor marketing literature.

Bullet Trap Manufacturer	Designs Available	Estimated Cost of Trap	Price Includes	Not Included in Price	Usage of Trap	Description	General Comments
Super Trap Inc. (951) 736-9440 Contact: Art Fransen, Retired, L.A.S.D. 1601 Commerce St Corona, CA 92880 Fax (951)736-9450 Email: info@supertrap.com supertrap.com	Gel-Cor™ Class A, Fire-Rated Rubber Bullet Traps ELIxIR™ Tactical Shooting Ranges Super Trap® Range Backstops SACON® Perimeter Facilities, Walls, Blocks & Tiles	Approx $520 to $1,600 per linear foot Varies by design, including: - indoor - outdoor - foundation - width of trap	Purchase of Equipment Installation Training	Shipping (Price will depend on destination)	Rifle & Pistol (up to and including .50 cal) Machine Gun Armor Piercing Tracer & Incendiary Ammunition *Also:* Frangible & Tungsten Traditional & Tactical Shooting	STI specializes in tactical shooting ranges. The firing range system captures and contains bullets whole, using a treated, granular ballistic media of recycled pure SBR (styrene-butadiene rubber), free of all steel and fiber contaminants that could normally allow fires to ignite. The infrastructure is 10 gauge galvanized steel and the hopper/deflection baffle is 3/8" AR 500 steel rifle rated (indoor and outdoor.) Outdoor Ranges: The backstop base typically lies on a graded berm at the appropriate angle determined by the user and STI staff. SACON® can absorb bullets and prevent lead contamination, replacing railroad ties, logs, brick walls and concrete enclosures on firing ranges.	STI's bullet trap systems eliminates hazardous materials contamination (TCLP tests below 1ppm), in addition to preventing ricochets and lead splash-back. Reclamation is recommended after approximately 100,000 to 130,000 rounds per 4 ft lane, based on type of shooter position and layout of targetry (static vs. dynamic.) Lead reclamation is performed using a vacuum air density separator system and rubber media is continuously reused. Use of recycled rubber media in the trap may qualify the range improvement for grant funding. Contact regional recycling associations for more information. STI offers more than six versions of Tactical Shooting Ranges, as well as custom built traps.

[1] EPA does not endorse any particular bullet containment device or product. Information on this table is offered to readers for a general understanding of some common bullet trap options and is based on vendor marketing literature.

Appendix B: Lead Shot Alternatives

Another method of preventing lead contamination at pistol, rifle, trap, skeet, or sporting clays ranges is to use less toxic or non-lead ammunition.

Much progress has been made in the development of alternatives to lead shot for hunting uses. Information gathered since 1976 on lead poisoning of endangered and non-endangered migratory birds due to lead shot ingestion led the United States Fish and Wildlife Service (USFWS) to consider several alternatives to eliminate lead poisoning among migratory waterfowl birds. A ban on lead shot for water fowl hunting was phased in beginning in 1986 and finalized in 1991. Lead shot is also now banned for shotgun hunting occurring near wetlands in national wildlife refuges. Starting in the fall of 1998, the USFWS banned the use of lead shot in waterfowl production areas. Additionally, many state-managed hunting areas require non-toxic shot for upland/small game hunting.

There are several alternatives to lead shot on the market today and still more alternatives are being developed. Before being used for waterfowl hunting, these alternatives must be approved by the USFWS. Bismuth, steel, tungsten/iron, and tungsten/polymer shots have been approved by the USFWS and additional alternative shot materials are in the USFWS approval process. Most of the ammunition manufacturers in the United States, as well as the military, have developed non-toxic alternatives to lead. Research in Europe may also result in additional non-toxic shot alternatives from which U.S. shooters may choose in the future. The following pages compare lead shot to non-toxic, alternative shot.

Summary of Lead Shot Alternatives†

Shot Material	Approximate Cost per 25 Round Box[1]	Ballistic Performance	Availability	Comments
Lead	$5.00/box $3.00 - $4.00/box of reloaded shells	Standard to which all alternatives are compared	Readily available	Lead is heavy and malleable
Bismuth* 97% Bismuth/ 3% tin	Bismuth shells are packed in 10 round boxes @ $15.00 - $25.00/ 10 round box	Similar to lead	Limited world supply of bismuth	Bismuth is a byproduct of lead and gold mining. There are currently many uses, including: medicine (Pepto-Bismol), cosmetics, pigments, and shotgun shot. The addition of tin makes bismuth more malleable and reduces frangibility. Bismuth shot is safe to use in older firearms.

† Product reference within this table is not an endorsement by EPA.

* Approved by USFWS for migratory waterfowl hunting.

[1] Costs will vary from store to store and were valid at the time of manual development.

Summary of Lead Shot Alternatives – Continued†

Shot Material	Approximate Cost per 25 Round Box[1]	Ballistic Performance	Availability	Comments
Steel*	$8.00 - $12.95/box $6.00/box of reloaded shells $15.00/box (copper-plated)	In test performance by the Cooperative North American Shotgun Education Program (CONSEP) in hunting situations, no significant differences were found between lead and steel shot at reasonable distances. Lead is more effective at longer ranges.	Readily available from both domestic and imported sources.	Steel shot is about 33% lighter then lead. Therefore, the initial velocity must be increased so that downrange pellet energy remains similar. In hunting situations, larger, and therefore heavier, steel shot is used. Few shooting competitions allow steel shot at this point, but the number is increasing. While steel target loads are available, shooter perception that steel will adversely affect guns and scoring seems to be the limiting factor in acceptance of steel shot for target shooting. Steel shot will not damage newer guns, but may cause ring bulge in older guns if a very tight choke is used. This problem has been resolved in the newer guns with the use of screw-in chokes.

† Product reference within this table is not an endorsement by EPA.

* Approved by USFWS for migratory waterfowl hunting.

[1] Costs will vary from store to store and were valid at the time of manual development.

Summary of Lead Shot Alternatives – Contiued†

Shot Material	Approximate Cost per 25 Round Box[1]	Ballistic Performance	Availability	Comments
Steel* (cont.)				Another concern with steel shot is safety. Because steel is much less malleable then lead, steel shot is likely to ricochet if it strikes something hard. Lead shot, on the other hand, will deform and flatten. In Europe, steel shot is banned for hunting because it can become embedded in trees. The steel shot in trees cut for lumber can cause damage to sawmill equipment and raise concerns about worker safety. Although steel shot can be reloaded, components are not readily available.
Tungsten/Iron* 40% tungsten/ 60% iron	$62.50/box (tungsten/iron shots are packed in 10 round boxes @ $25.00/10 round box)	Preliminary reports indicate that tungsten/iron shot is as effective as lead shot. However, the amount of shot in each cartridge is significantly less then in typical lead cartridges or even steel cartridges. The density of tungsten/iron is 94% that of lead.	Readily available	The tungsten/iron shot currently available is harder than steel. It would, therefore, cause similar damage to older guns.

† Product reference within this table is not an endorsement by EPA.

* Approved by USFWS for migratory waterfowl hunting.

[1] Costs will vary from store to store and were valid at the time of manual development.

Summary of Lead Shot Alternatives – Continued[†]

Shot Material	Approximate Cost per 25 Round Box[1]	Ballistic Performance	Availability	Comments
Tungsten/polymer Various manufacturers have received final approval from the USFWS to market this type of shot.	Not available yet	Comparable to tungsten/iron	Currently not available	Two ammunition manufacturers are currently producing tungsten/polymer shot. This shot is more malleable than the tungsten/iron alloy and would, therefore, be less damaging to shotguns. A research and development company has developed a tungsten/polymer material as a substitute for lead in all its uses. According to this company, its tungsten/polymer can be formulated to be flexible or stiff, depending on the application. This material has been tested by the US Army in projectiles, but has not been used to manufacture shot. However, the company has initiated the process of applying to the USFWS for approval of this material as non-toxic shot.

† Product reference within this table is not an endorsement by EPA.

1 Costs will vary from store to store and were valid at the time of manual development.

Summary of Lead Shot Alternatives – Continued†

Shot Material	Approximate Cost per 25 Round Box†	Ballistic Performance	Availability	Comments
Tungsten/steel Same as tungsten/iron				
Tin USFWS granted temporary approval for 1999-2000 hunting season	Not available yet	Since tin is just being developed as an alternative to lead, performance information is not yet available. However, since the density of tin is less than steel, performance may be less effective than steel.	Currently not available	This material is just being developed as a lead shot alternative. However, it has similar problems as steel in that it is lighter then lead. The International Tin Research Institute in england is developing this product.

Other materials that are currently being experimented with as alternatives to lead are molybdenum and zinc. Not enough information is available to have included these alternatives in the above table.

† Product reference within this table is not an endorsement by EPA.

Summary of Lead Shot Alternatives - Conclusions

The table clearly illustrates that a number of non-toxic alternatives to lead shot exist such as steel and tungsten as well as alloys and synthetic polymers. As demand for shot from these metals increases from migratory waterfowl hunters, it is anticipated that the costs will come down. However, alternatives currently cost approximately two to twenty times more than lead shot.

The ban on lead shot in hunting situations impacts target shooting. The alternatives to lead shot that are now being developed for or are already approved by the USFWS for migratory bird hunting could be considered for use by target shooters.

Although alternatives to lead shot are now being used by hunters, it is rare that the alternatives are used by target shooters. The limiting factors appear to be the expense and performance. All the alternatives to lead are much more expensive, some prohibitively. Unfortunately, the least expensive alternative, steel, is also perceived to be less effective.

To encourage use of lead shot alternatives, some ranges sponsor shooting competitions using lead-free ammunition, but these are rare. The use of steel or other alternative shot is a recommended BMP in established sporting clays areas at which reclamation of lead shot is difficult to impossible.

Note: Switching to non-toxic shot may create additional issues. For instance, steel has an increased risk of ricochet. Switching to steel may require additional safety features and/or operating procedures.

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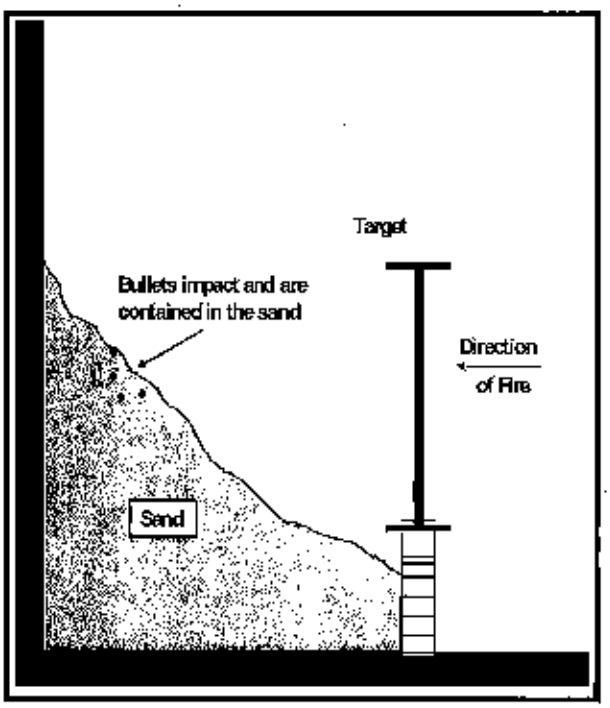
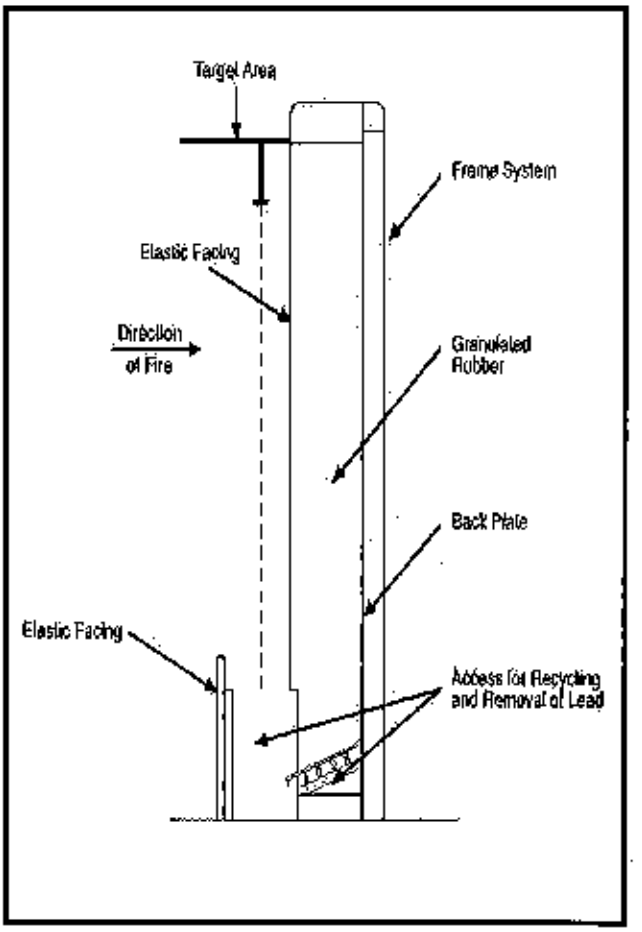
Appendix C: Sample Bullet Containment Devices

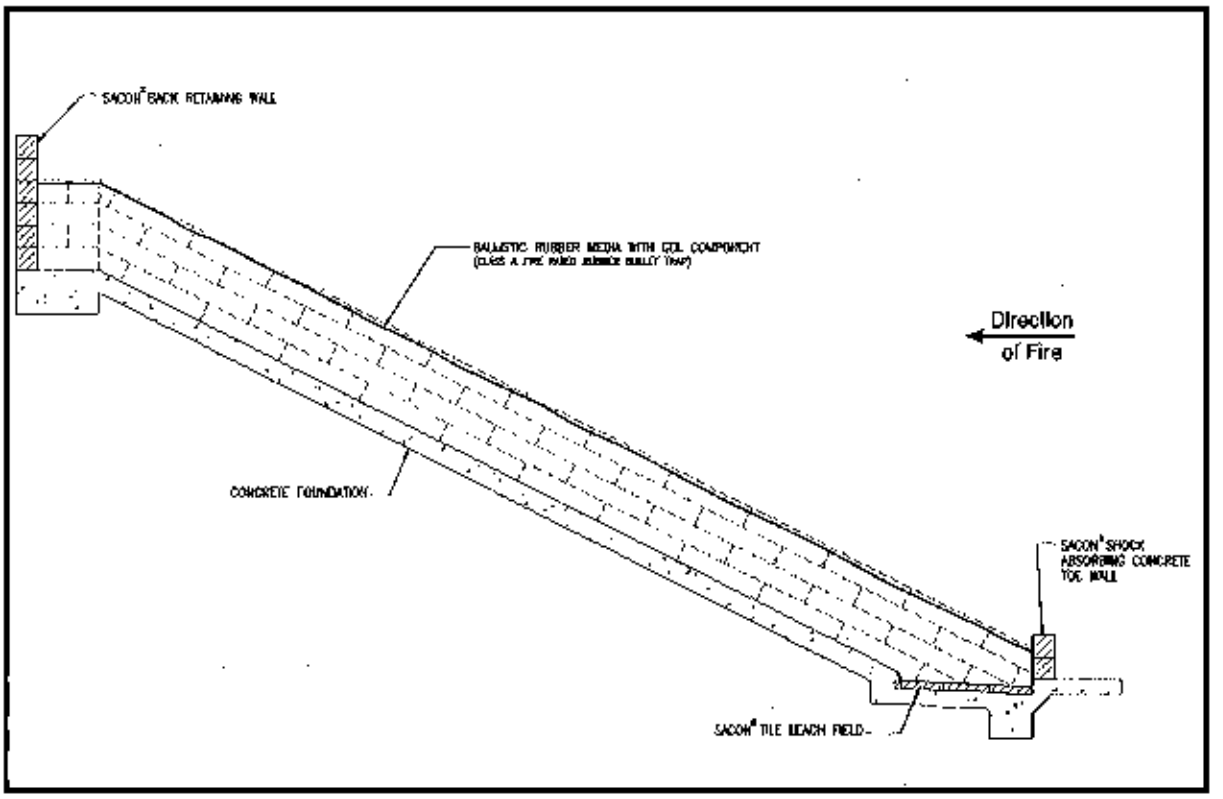
The bullet containment designs in this appendix are sample designs for the containment systems mentioned in this manual. Design systems may vary from different manufacturers. Reference to various individual bullet containment devices is included in this manual for informational purposes only. EPA does not endorse any particular bullet containment device, design, or product.



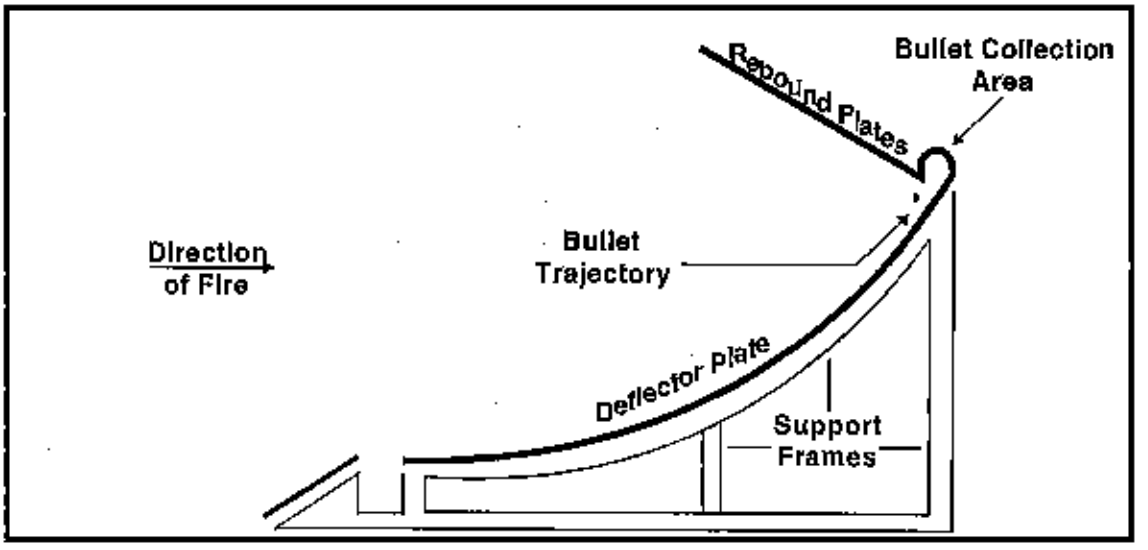
Sand Trap



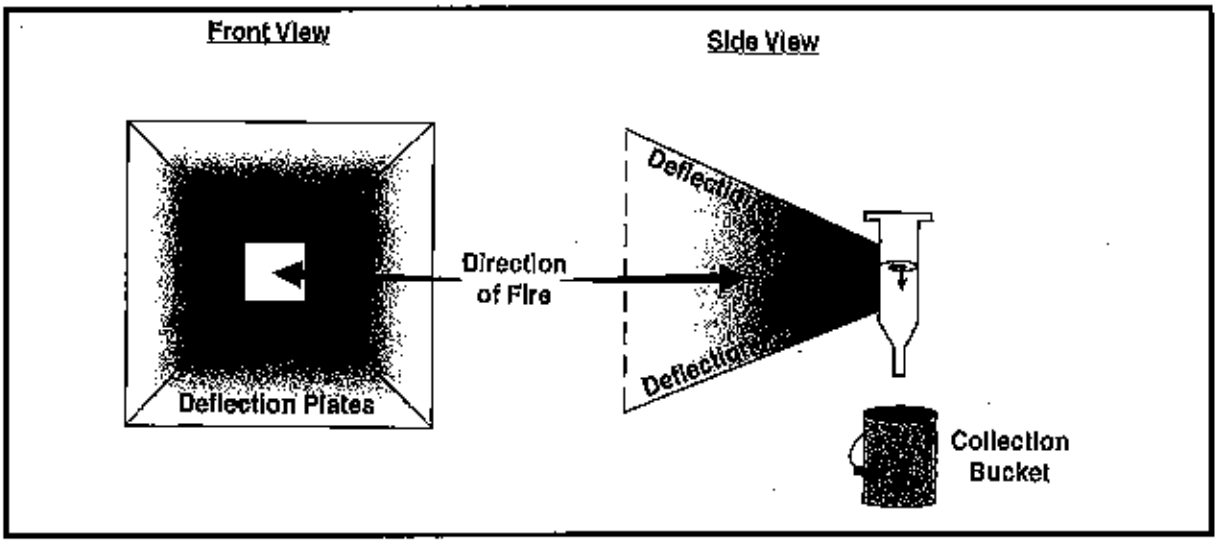
Rubber Granule Trap (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)



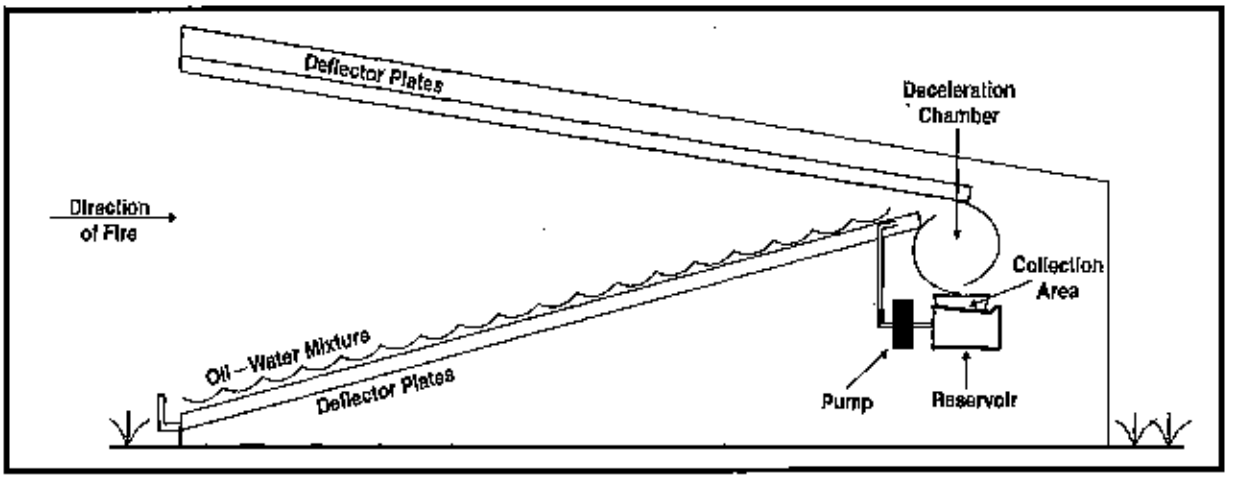
Gel-Cor Bullet Trap™ (Provided by Super Trap, Inc.)



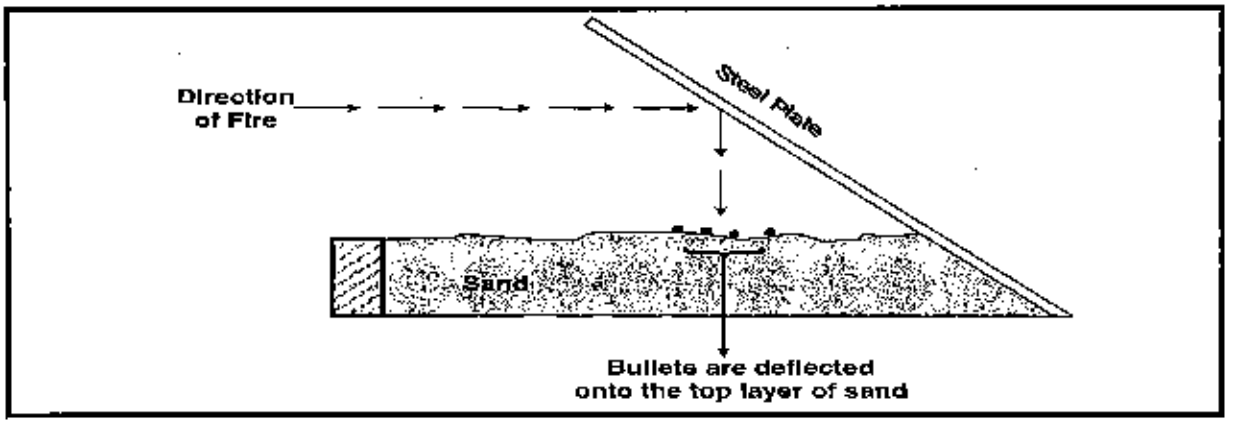
Escalator Trap (Adapted from: *Bullet Trap Technologies*, Action Target Educational Video Series)



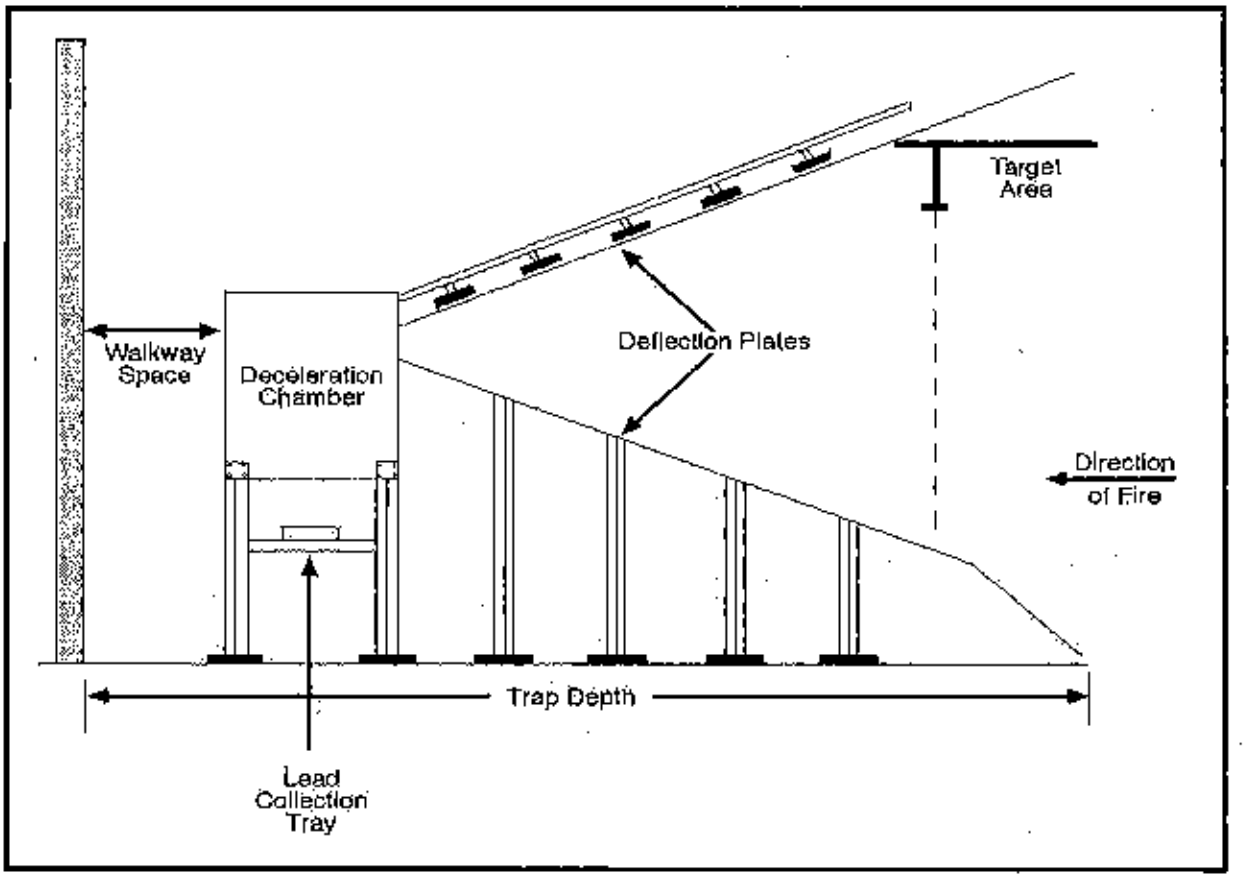
Vertical Swirl Trap (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)



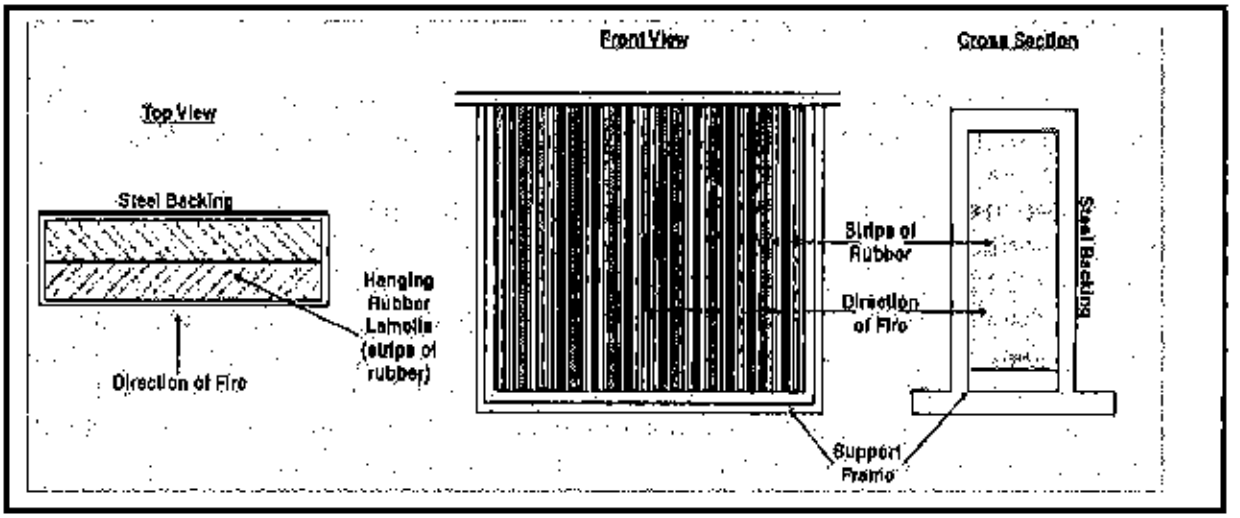
Wet Passive Trap (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)



Pitt and Plate (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)



Steel Bullet Trap (Adapted from: *Bullet Trap Technologies*, Action Target Educational Video Series)



Lamella Trap (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)

Appendix D: RCRA Regulatory Requirements and Interpretations

Timely separation of lead shot and bullets from soil at active ranges, recycling of the lead, and subsequent redeposition of the soil on the active range is exempt from RCRA regulation.

1. Reclaiming and Recycling Lead Shot

EPA's Office of Solid Waste issued guidance in 1997 indicating that lead shot, when recycled, is considered a scrap metal and is therefore exempt from RCRA regulation. A copy of the March 17, 1997 letter with this guidance is attached. Under the RCRA Subtitle C hazardous waste management regulations, lead shot would be considered scrap metal, which is exempt from hazardous waste regulations if it is recycled (see 40 CFR 261.6(a)(3)(ii)). Although storage of scrap metal being recycled is not affected by specific time limits such as the speculative accumulation provision (40 CFR 261.1(b)(8)), the scrap metal must legitimately be recycled to remain exempt under this provision. It should also be noted that lead shot may be subject to the authority of RCRA 7003, which addresses imminent hazards. However, use of best management practices is likely to prevent situations which would present an imminent hazard. Using such practices, together with following a clear, written policy governing the facility's recycling efforts, should also assist in assuring that the facility's practices can be demonstrated to be legitimate recycling.

2. Storage of Lead on Shooting Ranges Prior to Recycling

Some ranges have indicated that it may be desirable to store recovered lead shot and bullets on the range property for some periods of time prior to sale for recycling.

Provided that best management practices are followed in terms of storing and recycling the sorted lead, a range that follows such practices, and engages in legitimate recycling, should be able to store such material prior to recycling without RCRA regulatory controls (see discussion below). Best practices would suggest that the sorted lead, at a minimum, should not be exposed to the elements and should be managed so as to prevent releases to the environment. Best practices also indicate that the sorted lead should be stored in containers in good condition, regular inspections of the container condition should be conducted, and the records of inspections should be maintained and be readily available. Further, best practices also suggest that the sorted lead should be recycled in a timely manner and storage times should not exceed the time-frames or goals articulated in a clear, written policy.

3. Placement of Soil After Removal of Lead

For soil placed back on an active range after a BMP has been applied to remove the lead, the following regulatory approach has been followed. On February 12, 1997, EPA published the RCRA Subtitle C Military Munitions Rule in the Federal Register (62 Fed. Reg. 6621). The Military Munitions Rule considers range management to be a necessary part of the safe use of munitions for their intended purpose. Thus, the range clearance activity (recovery of lead shot and bullets) is an intrinsic part of the range operation. Therefore, the rule excludes range clearance activities (including the placement of soil back on the range) from RCRA Subtitle C regulation. Although the Military Munitions Rule did not apply to non-military ranges, EPA, in its response to comments on the proposed rule, clearly stated that "it felt that the 'range clearance' interpretation in the final Military Munitions Rule is consistent with the EPA's interpretations for non-military ranges." In addition, the EPA's Director of the Office of Solid Waste sent the New York State Department of Environmental Conservation a letter dated April 29,1997, confirming that the Military Munitions Rule range clearance principles apply equally to non-military ranges. A copy of the letter is attached.

4. Relocation of Backstop and Shotfall Zone Soil

Some ranges have indicated to the EPA that it may be desirable to transport and/or relocate a backstop in order to reorient or modify their range. This may occur when there is a need to reorient the range due to environmental concerns (e.g., shooting over water (wetland, stream, pond) or excessive runoff), alter the layout to improve shooter safety, or redesign to modify shooting conditions (e.g., adjusting number of shooting positions, increasing or decreasing target distance.) In some cases backstop material would not be moved off the range property, but to another area on the range property.

EPA's position is that range backstop materials are part of the range and are not wastes when they are moved or relocated, as long as the range continues to be used as a range and the backstop materials continue to be used as backstop materials. Hence, backstop materials that are still in use are not subject to the RCRA hazardous waste management regulations and need not be tested for hazardous waste characteristics. However, removal of lead from backstop materials that are to be relocated or moved is a normal practice of good range management in that it extends the usable life of the materials and reduces the possibility of releases of lead into the environment. If lead removal does not occur before moving the backstop material, the lead will become more dispersed throughout the material during movement and will thus be more difficult to recover in future reclamation events.

As a range management practice, it is environmentally preferable to use soil that may already contain lead and is on an active portion of the range, which will therefore undergo regular lead reclamation in the future, than to leave such soil in place and construct a new backstop with lead-free soil. Records of all movements of berm and shotfall zone soils, along with corresponding site plans, should be maintained indefinitely, as they will be necessary in evaluating cleanup needs during subsequent construction or range closure.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
March 17, 1997

Mr. Duncan Campbell
Environmental Protection Agency, Region V
RCRA Enforcement
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Dear Mr. Campbell:

Enclosed please find a memorandum on the regulatory status of lead shot, which includes a general discussion on the regulatory status of lead shot as scrap metal. I hope that this information is sufficient to address your specific concerns as they relate to the pile of lead shot at the Saxon Metals facility.

If you have any questions or would like to discuss this matter further, please contact me at (703) 308-8826.

Sincerely,
Jeffery S. Hannapel
Office of Solid Waste

Enclosure

To: Duncan Campbell, EPA Region V
From: Jeff Hannapel, EPA Office of Solid Waste
Date: March 13, 1997
Re: Regulatory Status of Lead Shot

Based on our conversations, it is my understanding that Saxon Metals received for recycling a shipment of approximately 30,000 pounds of lead shot from a commercial indoor shooting range. Smokeless gun powder is, presumably, commingled with the lead shot. The mixture appears to exhibit the ignitability characteristic of hazardous waste (as evidenced by the incident in which the material ignited when Saxon Metals was attempting to load it into the furnace with a front-end loader). You have asked our office to provide you with guidance on the regulatory status of the lead shot portion of the mixture, specifically whether it is considered a spent material or scrap metal.

The Agency has taken the position that the discharge of ammunition or lead shot does not constitute hazardous waste disposal because the Agency does not consider the rounds from the weapons to be "discarded." As you know, discard is a necessary criterion to be met

before a material can be considered a solid waste and subsequently a hazardous waste. (40 CFR §261.2(a).) The Agency's interpretation regarding discard is based on the fact that shooting is in the normal and expected use pattern of the manufactured product, i.e., the lead shot. Enclosed for your information is a September 6, 1988 letter from EPA to IDEM on this particular point.

In the federal regulations, the term, "scrap metal," is defined as "bits and pieces of metal parts (e.g., bars, turnings, rods, sheets, wire) or metal pieces that may be combined together with bolts or soldering (e.g., radiators, scrap automobiles, railroad box cars), which when worn or superfluous can be recycled." (40 C.F.R. §261.1.) In the Federal Register preamble for the final regulations on the definition of solid waste, EPA indicated that "scrap metal is defined as products made of metal that become worn out (or are off-specification) and are recycled to recover their metal content, or metal pieces that are generated from machine operations (i.e., turnings, stampings, etc.) which are recycled to recover metal." (50 Fed. Reg. 614, 624 (1985).) The lead shot portion of the Saxon Metals pile would be considered scrap metal pursuant to the regulatory definition of scrap metal.

EPA provided further clarification on the regulatory status of scrap metal in the Federal Register preamble to the definition of solid waste final regulations:

> [a]t proposal, scrap metal that was generated as a result of use by consumers (copper wire scrap, for example) was defined as a spent material. (This type of scrap is usually referred to as "obsolete scrap.") Scrap from metal processing, on the other hand (such as turnings from machining operations) was defined as a by-product. (It is usually called "prompt scrap.") Yet the scrap metal in both cases is physically identical (i.e., the composition and hazard of both by-product and spent scrap is essentially the same) and, when recycled is recycled in the same way - by being utilized for metal recovery (generally in a secondary smelting operation). In light of the physical similarity and identical means of recycling of prompt scrap and obsolete scrap, the Agency has determined that all scrap metal should be classified the same way for regulatory purposes. Rather than squeeze scrap metal into either the spent material or by-product category, we have placed it in its own category.

(50 Fed. Reg. at p. 624) Based on these regulatory passages, the lead shot portion of the pile would be considered scrap metal, and not a spent material. The lead shot is a product that is made of metal that can be recycled to recover metal content. Furthermore, the lead shot has not been "discarded" by virtue of its discharge at the shooting range, because the discharge is within the normal and expected use pattern of the manufactured product. Accordingly, lead shot would be considered scrap metal for regulatory purposes. Scrap metal is a solid waste, but it is exempt from the regulatory requirements of Subtitle C when it is recycled. (40 C.F.R. §261.6(a)(3)(ii).) As part of the Phase IV land disposal restrictions supplemental rulemaking (which was proposed January 25, 1996 and is expected to be finalized in April 1997), processed scrap metal and two categories of unprocessed scrap metal that is being recycled would be excluded from RCRA jurisdiction.

Please note that this discussion of the regulatory status is limited to the lead shot portion of the pile as you requested. To the extent that the entire pile exhibits the ignitability or reactive characteristic of hazardous waste, the mixture of materials would be considered hazardous waste and not scrap metal. The scrap metal designation for the lead shot would be applicable only to the extent that the lead shot could be segregated from the other materials in the pile.

I hope that this guidance on the regulatory status of lead shot recovered from shooting ranges provides you with the clarification that you needed. If you have any questions or would like to discuss this matter further, please contact me.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
APR 29 1997

Mr. John P.Cahill
Acting Commissioner
State of New York
Department of Environmental Conservation
Albany, New York 12233-1010

Dear Mr. Cahill:

Thank you for your letter of April 3, 1997 to Administrator Browner requesting a clarification of the Environmental Protection Agency (EPA) Final Military Munitions Rule regarding the extension of its range clearance principles to non-military ranges. Although the final rule addresses only military ranges, we agree with your view that the range clearance principles apply equally to non-military ranges [see comment no. 5 on page 36 of the enclosed excerpt from the Military Munitions Final Rule Response to Comments Background Document].

We are aware of the State of New York's active leadership role in the clean-up of private firing ranges. We appreciate your writing in support of the range clearance aspects of the final Military Munitions Rule and we will consider your suggestions that we issue broader guidance on the applicability of its principles to non-military ranges.

Sincerely yours,

Elizabeth Cotsworth, Acting Director
Office of Solid Waste

Enclosure

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Appendix E: Template for an Environmental Stewardship Plan for Management of Lead Shot/Bullets

Instructions

EPA encourages outdoor shooting ranges to adopt and implement the Best Management Practices (BMPs) found in this manual. To this end, it is recommended that ranges first prepare an Environmental Stewardship Plan (ESP or Plan), which gathers information about, and guides evaluation of, site specific conditions of each range. As such, the ESP assists in selection of appropriate BMPs.

This document serves as a template that may be used by sportsmen's clubs and shooting ranges in their preparation of an ESP. This template was adapted from Appendix C of the National Shooting Sports Foundation's manual, *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges* (the NSSF manual.) This template is only a tool to assist in making ESP preparation easier and can, and in some cases should, be modified to incorporate specific information relative to your club and its ranges. It is intended to be used in conjunction with a full understanding of the NSSF, U.S. Environmental Protection Agency (EPA) and, for ranges in Florida, Florida Department of Environmental Protection (DEP) manuals for the safe management of lead at outdoor shooting ranges. This template is intended to encourage ranges to prepare ESPs and submit them to EPA or NSSF to obtain a Certificate of Recognition from EPA. In this regard, either the following template or the NSSF template is recommended for use in conjunction with EPA's Certificate of Recognition program.

An electronic copy of this template is available on EPA's shooting range website (http://www.epa.gov/region2/leadshot) in several formats.

Disclaimer: This template does not serve as a substitute for understanding the concepts and techniques discussed in the EPA manual or other manuals. This template is not to be used as a substitute for consultation with scientists, engineers, attorneys, other professionals, or U.S. EPA.

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Environmental Stewardship Plan for Management of Lead/Bullets at Outdoor Shooting Ranges

Club Name

Address
City/Town, State & Zip Code
Phone #:

Date

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- ❑ **Introduction**
  - Mission Statement
  - Purpose
  - Goal
  - Delete
- ❑ **Site Assessment**
  - Description of Ranges and Support Facilities
  - Existing Environmental Conditions
    - Trap and Skeet Fields
    - Sporting Clays Course
    - Rifle and Black Powder Range(s)
    - Outdoor Handgun Range(s)
- ❑ **Trap and Skeet Fields**
  - Action Plan
    - Potential Management Options
    - Selection of Management Options to be Implemented
    - Options Selected
      a) Management Actions
      b) Operational Actions
      c) Construction Actions
  - Plan Implementation
    - Schedule for Implementation
    - Responsibilities
- ❑ **Rifle, Black Powder, and Outdoor Handgun Ranges**
  - Action Plan
    - Potential Management Options.....
    - Selection of Management Options to be Implemented.....
    - Options Selected.....
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  - Plan Implementation.....
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- ☐ **Sporting Clays Course**.....
  - Action Plan.....
    - Potential Management Options.....
    - Selection of Management Options to be Implemented.....
    - Options Selected.....
      - a) Management Actions.....
      - b) Operational Actions.....
      - c) Construction Actions.....
  - Plan Implementation.....
    - Schedule for Implementation.....
    - Responsibilities.....

- ☐ **Measuring Success**.....
  - Vegetation.....
  - Soil and Runoff pH.....
  - Erosion.....

- ☐ **Plan Review and Revisions**.....

Figures

Figure 1: Site Location Map
Figure 2: Facilities Diagram
(Additional figures, as appropriate)

Tables

Table 1:
Table 2:

Appendices

Appendix A:
Appendix B:
(Additional Appendices, as appropriate)

Introduction

The XYZ Club, Inc. is located at 123 X Road in Anytown, USA...

Mission Statement

The XYZ Club, Inc. is committed to...

- *Purpose*:

The Purpose of this Environmental Stewardship Plan (i.e., the Plan) is to:

- Identify potential environmental concerns that may exist;
- Identify, evaluate, and prioritize appropriate actions to manage lead shot and bullets safely, as well as identifying and addressing environmental concerns;
- List short- and long-term steps needed for implementation;
- Develop an implementation schedule;
- Identify ways to measure the Plan's success;
- Evaluate annual progress made towards achieving environmental stewardship goals;
- etc.

- *Goal* – To minimize the release of lead into the environment.

Activities to Reach Goal:
Examples include:

- ▷ Avoid shooting over and into water and wetlands.
- ▷ Prevent off-site migration of lead through groundwater and surface water runoff.
- ▷ Conduct lead recovery.
- ▷ Discourage ingestion of lead by wildlife.
- ▷ Maintain soil pH between 6.5 and 8.5 in the shotfall zone.

Site Assessment

Description of Ranges and Support Facilities

The XYZ Club has an x position Trap Range, a y position Skeet Range, a z position Sporting Clays Course, and a q position Small Arms Range. These ranges are located in a rural setting and are oriented away from residential areas and surface water bodies.

[Briefly describe each range, its dimensions, orientation, vegetative cover, numbers of shooters and targets used per year, wildlife usage, etc.]

Existing Environmental Conditions

[Describe any known environmental conditions associated with the ranges. This might include type of soil, depth to groundwater, soil pH, drainage to surface water, unique animal or bird populations, etc. Refer to figures, tables, the results of surveys, inspections, professional opinions, etc.]

- *Trap and Skeet Fields*

- *Sporting Clays Course*

- *Rifle and Black Powder Range(s)*

- *Outdoor Handgun Range(s)*

Trap and Skeet Fields

Action Plan

[Briefly describe the management options selected.]

- *Potentially Applicable Management Options*

[See EPA or NSSF guidance manual for full listing of options]

Examples include:
- Vegetate sparse grass area of trap/skeet field.
- Reorient trap field to avoid lead shot entering wetlands.
- Reorient sporting clays stations to maximize the overlap of falling shot into the open field where it can be more easily recovered for recycling.
- Limit use of the trap/skeet range to only those stations that do not have wetland area within the shotfall zone.
- Apply lime to shotfall zones if soil test results indicate this would be beneficial.
- Prepare fields for lead reclamation.
- Get bids for lead reclamation project.
- Conduct lead reclamation within the trap/skeet shotfall zones.
- Change mowing frequency to closely mow grass in shotfall zones.
- Construct lean-tos at backstop berms.
- Construct a lime lined drainage swale for stormwater management.
- List additional Best Management Practices that may be appropriate to your club.

In addition to appropriate site-specific management options, the list should always include conducting lead reclamation within the berm for rifle and pistol ranges and conducting lead reclamation within the trap, skeet, and sporting clays shotfall zones.

- *Selection of Management Options to be Implemented*

Option x:
Option y:
Option z:

[Describe why the above options were selected and the general roles of club officers, the membership, and outside consultants, as applicable, in implementation.]

In order to implement the options selected, the following actions are necessary.

a) Management Actions: [Examples include: assign personnel responsible for initiating, conducting, and completing the alternatives selected above.]
b) Operational Actions: [Examples include: collect soil samples for pH analysis, consult with USDA's Natural Resources Conservation Service and/or the county Cooperative Extension Service regarding best suited vegetative management recommendations.]
c) Construction Actions: [Examples include: do site preparation work, get bids, institute mowing and vegetative management recommendations, reorient shooting position as appropriate.]

Plan Implementation

- *Schedule for Implementation*

Winter/Spring: [Examples include: pH survey, contact local officials for vegetation management recommendations, reorient shooting positions as appropriate, realign shooting positions as appropriate.]

Summer/Fall: [Examples include: prepare site for reclamation project, apply lime/fertilizer/seed, get bids for berm lean-tos/reclamation. As a rule of thumb, 50 pounds of lime per 1,000 square feet should raise soil pH by 1 once the residual acidity is overcome.]

- *Responsibilities*

[Specific duties (i.e., the trap/skeet chairman/chairmen will..., The club treasurer will..., The membership will provide the labor to...)]

Rifle, Black Powder, and Outdoor Handgun Range(s)

Action Plan

[Briefly describe the management options selected.]

Potentially Applicable Management Options

[See EPA or NSSF guidance manual for full listing of options]

Examples include:
- Culvert the stream through the shooting ranges.
- Vegetate the backstop berm(s) to minimize erosion.
- Construct a lime lined drainage swale for stormwater management.
- Apply lime to the berm and foreground if pH test determines it is necessary.
- Begin planning a lead reclamation project.
- Construct lean-tos at berms.
- List additional Best Management Practices that may be appropriate to your club.

Selection of Management Options to be Implemented

Option x:
Option y:
Option z:

[Describe why the above options were selected and the general roles of club officers, the membership, and outside consultants, as applicable, in implementation.]

In order to implement the options selected, the following actions are necessary.

a) Management Actions: [examples include: assign personnel responsible for initiating, conducting, and completing the alternatives selected above.]
b) Operational Actions: [examples include: collect soil samples for pH analysis, consult with USDA's Natural Resources Conservation Service and/or the county Service Forester regarding best suited vegetative management recommendations.]
c) Construction Actions: [examples include: do site preparation work, get bids, institute mowing and vegetative management recommendations, reorient shooting position as appropriate.]

Plan Implementation

- *Schedule for Implementation*

Winter/Spring: [examples include: pH survey, contact local officials for vegetation management recommendations, reorient shooting positions as appropriate, realign shooting positions as appropriate.]

Summer/Fall: [examples include: prepare site for reclamation project, apply lime/fertilizer/seed, get bids for berm lean-tos/reclamation.]

- *Responsibilities*

[Specific duties (i.e.: the small arms range chairman/chairmen will...,The club treasurer will..., The membership will provide the labor to...)]

Sporting Clays Course

Action Plan

- *Potentially Applicable Management Options*

[See EPA or NSSF guidance manual for full listing of options]

- *Selection of Management Options to be Implemented*

- *Options Selected*

Plan Implementation

- *Schedule for Implementation*

- *Responsibilities*

Measuring Success

By monitoring the success of the Plan, the club is best prepared to make whatever changes may be necessary to reinforce success and make the most of environmental stewardship efforts. Below are some examples of areas to monitor:

Lead Recovery

[Document the quantity (pounds) of lead recovered and recycled, along with the cost of conducting the activities.]

Vegetation

[The density of vegetation growth should be measured throughout the growing season, especially in areas of sparse growth where steps have been taken to increase the vegetative cover. This is can be done by taking periodic photographs (e.g., once a month) from the same places to document the impact of the Plan.]

Wildlife

[Keep a log of visual observations made regarding the frequency of range usage by the variety of species in your area.]

Soil and Runoff pH

[Track soil and runoff pH through semiannual monitoring and adjust the amount of lime applied to different areas of the range to maintain a pH level that will prevent lead from dissolving (i.e., a pH of 6.5-8.5).]

Erosion

[Again, keeping a photographic record of problem areas best prepares your club to document achievements and adjust the Plan as appropriate.]

Plan Review and Revisions

Review the Plan on an annual basis. Update the Plan as needed and schedule activities for subsequent years. Make recommendations for future club officers to consider when updating the Plan and designating future activities to be conducted (tell them what worked, what didn't work, and what still needs to be done.)

FIGURES

Figure 1
Facility diagrams

Figure 2
Resource maps (USGS topographic map, wetlands maps, soil survey maps, FEMA floodplain map, etc.)

Figure 3 (Optional)
Site photographs

Figure 4 (Optional)
Aerial photo of range and surrounding area

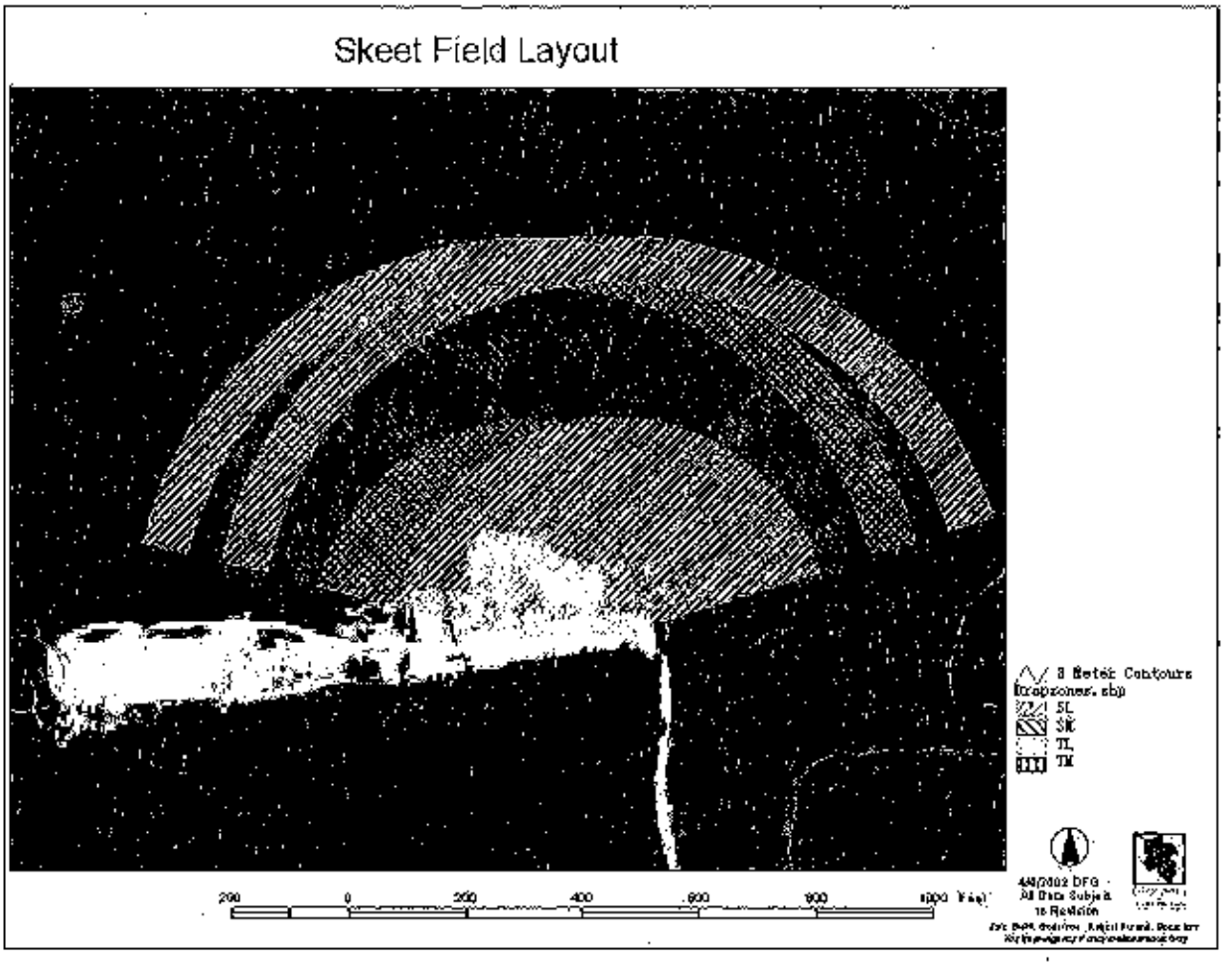
Appendix A
(Optional)

Appendix B
(Optional)

[Insert other figures as necessary to support the text]

Other figures may include an aerial photograph, and sketches of the Club property in general and/or specific ranges in particular.

Example:



[Insert Site Location Map Here]

Typically, a Site Location Map is cut from a USGS Topographic Map of you Club's area. The Club should be centered on the map. Indicate the property boundaries and layout of the range.

Appendix A

Information from USDA, Natural Resources Conservation Service [and/or county Cooperative Extension Service]

[concerning soil and vegetation management recommendations]

Appendix B (etc.)
[For other supporting documentation as needed.]

RANGE DESIGN CRITERIA

U.S. DEPARTMENT OF ENERGY
Office of Health, Safety and Security

AVAILABLE ONLINE AT:
http://www.hss.energy.gov

INITIATED BY:
Office of Health, Safety and Security

CERTIFICATION

This document contains the currently-approved firearms "Range Design Criteria" referred to in DOE M 470.4-3A, *Contractor Protective Force*, and DOE M 470.4-8, *Federal Protective Force*.

Barbara R. Stone
Director
Office of Security Policy

11/18/08
Date

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RANGE DESIGN CRITERIA

1. PURPOSE. This document contains design criteria for U.S. Department of Energy (DOE) live-fire ranges for use in planning new facilities and major rehabilitation of existing facilities. This document supersedes DOE M 470.4-3 Section B, Chapter II and will be approved and maintained by the Office of Security Policy, Office of Health, Safety and Security (HSS) as a stand-alone document on the HSS website.

2. PLANNING FACTORS. All applicable local, State, Federal, U.S. Environmental Protection Agency, Occupational Health and Safety Administration (OSHA), and National Environmental Policy Act requirements should be addressed and be reviewed annually (at least every 12 months) to incorporate any requirements changes that occur.

3. PLANNING OVERVIEW.

   a. General Considerations.

      (1) Live-fire range design should: (a) promote safe, efficient operation; (b) include provisions for ease of maintenance; and (c) be affordable to construct and maintain.

      (2) Live-fire ranges should be designed to prevent injury to personnel and to prevent property damage outside the range from misdirected or accidental firing and ricochets. They should also be designed to direct ricochets away from the firing line inside the range.

      (3) An open range may be established provided that enough distance and land area available to allow for surface danger zones (SDZs) appropriate for the weapons to be used. Lack of SDZs may require baffled ranges. Extreme weather conditions may necessitate indoor ranges.

   b. Type of Range.

      (1) Range requirements should be considered when determining the type and size of the range and the material to be used.

      (2) The range should be suitable for training and qualifications for all courses of fire used on the site as set forth in the HSS-approved Firearms Qualification Courses.

      (3) The range should be designed for shooting day and reduced-lighting DOE firearms courses, moving targets, multiple targets, and advanced shooting courses that may be required by the site.

      (4) When determining whether the facility will be an indoor, open outdoor, partially baffled, or fully baffled range, the decision-making process should include site weather conditions, available land, available funding,

and environmental, safety, and health considerations. The following additional factors should be considered.

(a) How many shooters must be accommodated?

(b) Will emphasis be on training or competitive activities?

(c) What types of firearms and range of ammunition will be used? (See Table 1.)

(d) Will the facility be used exclusively by DOE or will it be open to other organizations?

(e) What special uses will be made of the facility, e.g., advanced training, special weapons, or explosives?

(f) What lighting will be required, and what lighting is desired?

(g) What administrative space will be needed?

(h) What types of target mechanisms will be used?

(i) Will spectator safety areas be needed?

(j) What types of acoustics will be needed?

(k) How will lead contamination be controlled?

(l) Where will bullet traps be needed?

(m) Where will firearms cleaning and maintenance be performed?

c. Site Selection Preparation. The site selected should accommodate the required facility. It should meet acceptable standards for safety and have sufficient space, access, and acceptable zoning and construction costs. Land acquisition costs, future land values, and possible restrictions should also be examined. To ensure the project is feasible the following data should be considered.

(1) Documents. Copies of specific site, environmental, and construction criteria; applicable mandated regulations from the State, county, and local authorities; copies of ordinances, zoning regulations, soil conservation standards, health department requirements, and any other regulations that may pertain to the project should be obtained.

(2) Alternate Sites. Identify alternate sites, because one or more of the potential sites may be unsuitable or construction costs may be prohibitive.

(3) Technical Data. Gather technical data relevant to each site including zoning maps, aerial photographs, topographic maps, and onsite ground and aerial information.

d. Considerations. The criteria to be considered in this process are:

(1) environmental restrictions, e.g., Endangered Species Act, Wilderness Act, and air and water pollution criteria;

(2) access, e.g., is it adequate or should a roadway be constructed to the site;

(3) construction cost, e.g., berms, baffles, barriers, earth moving;

(4) other restrictive Federal or State statutes and local ordinances; and

(5) community growth, especially in areas where urban growth is rapid. Escalating property values may make it unwise to construct in a particular area.

e. Preliminary Design Stage. The following preliminary design process is to be followed.

(1) Prepare:

(a) a preliminary layout sketch of each site;

(b) a draft document, which should include specifications for applicable zoning, building codes, environmental, safety, and health considerations, and other pertinent restrictions;

(c) alternative preliminary site plans showing different range layouts;

(d) a planning cost estimate; and

(e) a risk analysis report.

(2) Submit all zoning and building permit applications for approval. Be prepared, via the draft document, to present and, if necessary, defend the proposal at public hearings before zoning boards, health officials, and other governmental bodies involved in issuing permits.

f. Final Design Stage.

(1) The preliminary site plans include a layout of the proposed range with its accompanying safety fan in a cross section and top view.

(2) The range master/manager, training manager, safety manager, industrial hygienist, appropriate operating personnel and public works engineer

should review the design requirements during the planning phase, before the construction drawings are started, and during the construction phase.

4. OUTDOOR RANGE DESIGN.

a. Site Selection.

(1) Outdoor range sites should be remote from other activities but accessible by road. SDZs should not extend across traveled roads, navigable waterways, railroads, or other areas.

(2) To protect against unauthorized access, SDZs should be controlled while firearms are being discharged. To prevent future encroachment, SDZs should be recorded on site maps.

(3) If other methods to control access to SDZs are not effective, then the zones should be fenced in. Natural barriers around the site, e.g., rivers, hills or a large drainage channel may be used to prevent encroachment and will ensure privacy. The best site is one with a natural backstop for projectiles to reduce the cost of constructing earth impact berms and to provide natural sound abatement.

(4) Outdoor ranges should be oriented to eliminate firing into the sun. The range should be oriented to the north or slightly to the northeast. The ideal direction is between due north and 25° northeast.

b. Range Planning.

(1) Firing into upward sloping land and land with natural backstops of hills or mountains is recommended.

(2) Firing platforms, access roads, and targets should be elevated above the flood level.

(3) The line of fire in rough terrain should be perpendicular to high ground. The line of fire on flat terrain should be free of knolls, ridges, and trees that reduce visibility.

(4) Known distance ranges should be as flat or evenly graded as possible. If the grade between the firing points and target does not exceed 2 percent, then the firing points may be below the target.

(5) Roads used for setting and servicing targets in impact areas and for maintenance of earth berm may be graded pathways. Roads in areas not subject to disturbance, e.g., vehicle parking areas, and roadways behind firing lines or out of range of weapons, should be designed for anticipated vehicle weight and usage.

(6) The ground between the targets and firing line should be free of any hardened surface (smooth-surfaced walkways excepted) such as rocks or other ricochet-producing material.

(7) The surface may be sodded or planted with low-growing ground cover.

(8) The surface should be smooth, firm, and graded to drain away from the targets. A slight side-to-side grade of 1 percent to 2 percent should be provided for storm water runoff. For baffled ranges, the lateral slope should not exceed 2 percent because of the geometry of the baffle system.

(9) The overall size will be governed by the range distance and number of firing positions.

(10) Range distances from the firing line to the target are determined by the approved DOE qualification courses of fire for all weapons available for use by Protective Force (PF) personnel and by site-specific training courses of fire. The distances from the firing line to the target should be accurate to +.01 percent. It is important that any inaccuracy in the firing line-to-target distance is a greater, rather than lesser, distance (e.g., 101 yards for a 100-yard range instead of 99 yards).

(11) Shooters should have secure footing.

c. Surface Danger Zones. SDZs should be established to contain all projectiles and debris caused by firing ammunition and explosives (see Table 1). SDZ dimensions are dictated by the types of ammunition, types of targets, and types of firing activities allowed on the range. A basic SDZ consists of three parts: impact area, ricochet area, and secondary danger area (Figure 1). Figures 2 through 6 illustrate the application of the basic parts in the design of SDZs for various kinds of range activities.

(1) The primary danger area established for the impact of all rounds extends 5° to either side of the left and right limits of fire and downrange to the maximum range of any ammunition to be used on the range.

(2) The ricochet area is 5° to either side of the impact area and extends downrange to the maximum range of any ammunition to be used on the range.

(3) The secondary danger area is that area paralleling, and 100 yards outside of, the outermost limits of the ricochet area and extending downrange to the maximum range of any ammunition to be used on the range.

(4) Boundaries of SDZs must be posted with permanent signs warning persons of the danger of the live-fire range and prohibiting trespassing. The signs must be posted in a way that will ensure a person cannot enter

the SDZ without seeing at least one legible sign (i.e., usually 200 yards distant or less).

(5) Limit of fire markers, both external and internal, must be placed to denote right and left limits of fire. Where cross firing is to be conducted, internal limit markers must be emplaced to denote internal right or left limits of fire from specific firing positions.

(6) Ranges may be located parallel to one another if in compliance with Figure 19 for separation.

(7) When there is insufficient distance to lay out a new range with the required SDZ or utilize other ammunition with a maximum range that does not exceed the SDZ, engineered or administrative controls can be used to control firing on that range. Permission to deviate from established SDZ requirements must be granted by the DOE cognizant security authority and supported by a safety risk analysis.

(8) Administrative controls such as use of the low-ready position or engineered controls such as muzzle traverse/elevation limiters can be used to control the firearm. Natural terrain such as a mountain or a hill provides an excellent backstop for firing. The terrain should be high enough to capture rounds fired at up to a maximum 15° muzzle elevation.

(9) To change the size and shape of an SDZ, baffles may be installed. Partial and full baffle systems consist of the following components: overhead baffles, a canopy shield over firing points, bullet impact berm, and side berms, sidewalls, or side baffles. A fully baffled range must be constructed so all direct fire can be contained within the range (see Figures 7 and 8).

d. Support Facilities. Range planners should consider the site-specific need for the following range support facilities.

(1) Targets.

(2) Target storage.

(3) Bunkers, trenches, and protective barriers for personnel protection.

(4) Range control towers.

(5) Toilets.

(6) Range poles, banners, markers, and signs.

(7) Communication systems.

(8) Access and range roads.

(9) Parking areas.

(10) Potable water.

(11) Target maintenance.

(12) Ammunition storage.

(13) Power.

(14) Sewer.

(15) All other necessary utilities.

Table 1. Maximum Range of Small Arms Ammunition

Maximum Range of Small Arms Ammunition	
Caliber	**Maximum range of small arms ammunition (distance in meters)**
.22 long rifle	1,400
.38 revolver	
Ball, M41	1,600
Ball PGU-12/8	1,900
.40 pistol	
Ball	1783
JHP	1908
Frangible	1000
.45 pistol	1,500
.45 submachine gun	1,600
.357 magnum	2,160
9mm pistol	1,740
9mm submachine gun	1920
.44 magnum	2,290
.50 machine gun	
Ball, M33	6,500
AP, M26	6,100
12 gauge shotgun, riot 00 buckshot	600
.30 rifle and machine gun	
Ball, M23	3,100
AP, M2	4,400
.30 carbine	2,300
5.56mm rifle	
Ball, M193	3,100
7.62mm rifle and machine gun	
Ball, M80	4,100
Match, M118	4,800
40mm	
M79	400
Mk-19 40mm	2200

e. Design Criteria.

(1) Firing Line Items. Provide the following components.

(a) Floor Surface. The surface should be smooth, firm, and graded to drain away from the targets. A slight side-to-side grade of 1 percent to 2 percent should be provided for storm water runoff. Transverse firing line grading should match target line transverse grading. The distance between the firing line(s) must be sufficient to support the type of training conducted. Firing lanes must be clearly marked on the surface to match the targets. Depending on the number of personnel to be supported and the funds available, the following surfaces should be considered:

1 ground firmly compacted with mown grass;

2 sand or fine gravel;

3 wood decking of sufficient thickness and support to prevent movement; and

4 concrete topped with appropriate cushioning material.

(b) Overhead Containment. On partially and fully baffled ranges, a ballistic canopy (see Figure 9) should be provided over all locations where a weapon may be expected to be discharged (firing line, by definition). Figure 9 represents one construction approach, but the canopy must contain the direct fire effects of the most energetic round fired on the range. This canopy should begin at least 3 feet behind the firing line. General structural requirements may dictate more distance. The canopy should extend forward a minimum distance of 13 feet minimum, which will work geometrically with the first overhead baffle to prevent a weapon from firing directly out of the range (see Figures 16 and 17). The canopy should be constructed of ballistic material with sacrificial cladding as described below. Sound reduction ceiling waffles should be considered. Weather roofing is required above the ballistic material and it must slope sufficiently to drain.

(2) Firing Point. The depth of the firing point is determined by the shooting activity; e.g., rifle firing requires more depth than pistol firing.

(a) The minimum depth of the firing point is the area required for the shooter, shooter's equipment, scorers, and range officers. For example, a pistol range might have a firing line approximately 6 to 10 feet deep, while a rifle range would have a firing line up to 20 feet deep. This variation is based on available space, type of

shooting, size of target frames and carriers, and the spacing of target frames or carriers.

(b) For rifle ranges, each firing point should be 9 feet wide (see Figure 10). Firing lanes for pistols and shotguns should be 5 feet center to center (see Figure 11).

(3) Ballistic Material. The purpose of this material is to absorb, deflect, or fragment projectiles. Material for baffles on partially and fully baffled ranges is shown in Figures 12 and 18. Wood that is used should be of middle grade exterior timber or plywood. Timber in contact with the ground must be pressure-treated for this purpose. Avoid exposed connectors if possible. Refer to Table 2, Thickness of Material for Positive Protection Against the Caliber of Ammunition Listed, for the thickness of various materials.

(4) Sacrificial Cladding. Provide ¾-inch thick plywood with a ¾-inch air gap on any surfaces (baffles, wing walls, metal connectors, etc.) that are within 11 yards of the firing line to prevent back splatter.

(5) Firing Line Cover Material. The firing line should be covered to protect the shooter and allow activities to be held regardless of the weather. On ranges with several firing lines, the cover is generally installed at the longest firing distance. The firing line covers described below are for shelter only and should not be confused with the ballistic firing line canopies required on baffled ranges. Material that can be used for firing line covers includes wood, concrete, steel, and plastic. Most covers are constructed from wood products and are a shed or gable roof design. In some cases, corrugated metal or fiberglass roofing material can actually increase sound levels at the firing line and in areas around the range. Therefore, to reduce noise, corrugated metal or fiberglass roofing material should not be used unless it is acoustically treated. The structure should be designed to include the following:

(a) The shed roof should have a 6-inch (15cm) cavity filled with fiberglass insulation (or equivalent) and be enclosed on the bottom with 19mm (¾-inch) plywood or insulation board. Although this will not provide a completely effective sound barrier, sound waves will strike and penetrate the inside layer of plywood, and the sound will be reduced;

(b) A plywood shed roof should have a 15cm (6-inch) hollow core enclosed with a small grid mesh screen and a six-mil polymer barrier to retain the insulation. The intervening space should be filled with blown-in insulation to trap sound waves and reduce the drum effect of an open roof; and

(c) A gable roof has a large hollow area above the joists; however, additional sound damping materials should be installed to reduce the drum effect and the sound pressure level as they are reflected onto the firing line area. The underside of the roof surface will require a minimum of 4 inches of insulation to fill in between the rafters and a minimum of 3 inches of insulation above the ceiling and between the joists. This will reduce the drum effect caused when sound waves strike surface material (e.g., corrugated metal) and will absorb a portion of the reflected sound waves.

(6) Surface Material. Positions should be hard-surfaced (e.g., concrete, gravel, wood, asphalt, or sod).

(a) For ranges where prone shooting is conducted, gravel or similar materials may cause difficulty for the shooter. When the surface material is concrete or asphalt, shooting mats or padding will be required when the kneeling or prone positions are used.

(b) For ranges with multiple firing lines, hard-surfaced firing lines located downrange of another firing line should be recessed or shielded from bullet impact to avoid ricochets off exposed edges.

(7) Landscaping. The site should be landscaped to provide for erosion control, noise abatement, maintenance, appearance, fire protection, and safety.

NOTE: Any landscaping will complicate the removal of lead in the berms, especially on impact surfaces, and will create higher maintenance costs.

(a) Berms should be planted with grass to prevent erosion. Ground cover is acceptable on existing berms that have been maintained and where erosion is not a problem.

(b) When grass is selected as a ground cover, it should be appropriate for the geographic area and should readily grow and provide good coverage. The degree of shading caused by overhead baffles will determine the type of grass for the range floor. Use grasses and cover for earth berms that will not be accessed by moving equipment so that natural growth heights will be acceptable. In areas where the soil is poor or extremely sandy, plants such as Bermuda grass, ice plant, or vine root can be used to control soil erosion.

(c) Heavy landscaping may be used to cut down on noise transmission. Plants and trees may be planted behind the firing position shelters to alleviate noise transmission problems.

Soundproofing the firing line structures should be considered in problem areas. Trees should be kept away from firing lines to allow range control officers to see all shooters.

(d) For windbreaks, trees may be planted along the length of the range with partial side berms or wing walls where strong prevailing crosswinds are problems to shooting accuracy.

(e) Densely planted rows of fast-growing, compact, and thorny shrubs may be planted below the trees at ranges with partial berms or wing walls to abate noise, prevent encroachment, and alleviate crosswind problems.

(8) Target Line and Mechanisms. Components must be as follows.

(a) The target line should be a minimum of 30 feet from the toe of the impact berm. The distance between targets must be the same as the distance between firing positions.

(b) Target line bases must match grading with the firing line. Mechanical target support bases must be protected from the direct line of fire. They may be buried flush with the ground or placed behind a protective wall. Note that a small raised earth berm at this location generates significant ricochet. The complexity of the mechanism will dictate the protection requirement. See Figure 13 for wall or trench protection of high cost target line mechanisms.

(c) Target supports can be made of steel angles and channels, PVC pipe or wood. Do not use metal parts within 33 feet of the firing line where direct fire strikes are anticipated. Discharging weapons close to metal surfaces is extremely dangerous. Present the smallest surface area that is structurally sound to the line of fire to minimize ricochet. Design the target holders for easy and inexpensive replacement. Portable, self-supporting 2- by 4-inch wood frames or 2-inch by 2-inch wood plank placed into buried PVC pipe work well on simple ranges. The full face of the target must be visible to the shooter.

(d) Turning targets and the display time are at the discretion of the user. Commercially available, electrically motorized target carrier and electronic scoring systems should be considered where economically feasible.

(e) On open ranges, a single target line with multiple firing lines is preferred. On partially or fully baffled ranges, in most instances, a single firing line with multiple target lines will produce the most cost-effective range because of the firing line canopy. An

extremely advanced target mechanism may be significantly more expensive than multiple canopies used to shift the advantage.

(9) Impact Structures. The structure varies depending on the type of range. Natural terrain such as a mountain, cliff, or steep hill may be incorporated into impact structures provided the completed structure complies with the minimum requirements of this Section. Acceptable structures by range type are listed below.

(a) For open ranges, the top elevation of the earth impact berm should be 26 feet above the range surface for ranges 100 yards long or longer and 16 feet above the range surface for ranges 50 yards long or less. The impact berm should extend 50 yards beyond where the target line ends for 100-yard-long ranges and 16 feet, or until joining with the side containment, if provided for ranges 50 yards long or less.

(b) The suggested elevation may be met by designing a combination of earth berm and vertical baffle (see Figure 14). The earth berm portion should have a top elevation of 16 feet above the surface of the range. The vertical baffle should be constructed of ballistic material and designed to withstand local seismic and wind loads. This combination arrangement would reduce the footprint and the amount of material in the earth berm.

(c) The preferred slope of the impact berm face is 1 to 1 or steeper. The steeper the slope, the more likely the berm is to absorb projectiles. The top should be 10 feet wide. The impact slope should be constructed with a 3-foot layer of easily filtered soil (to reclaim the lead projectiles) free of boulders, trees, rocks, stones, or other material that will cause ricochet. The rear slope should be appropriate to the native soil and maintenance requirements.

(d) For partially and fully baffled ranges, the top elevation of the impact structure will vary depending on the overhead baffle and impact structure arrangement. The impact structure for a partially baffled range can be: standard impact berm, bullet trap, or hybrid. For fully baffled ranges, the impact structure must be a bullet trap. In all instances, the impact structure must connect to the side containment. The top of the berm should be at an elevation 5 feet above the point where the highest line of direct fire can strike the berm.

(e) Outdoor bullet traps can be constructed by placing the last vertical overhead baffle over the last target line and placing a sloped baffle to connect from the top of the earth berm to the back of the last vertical baffle. The bottom of this lower-sloped overhead baffle

should be 2 feet above the highest point on the berm where direct fire might strike. See Figure 15 for material and construction details. Rainfall runoff from the sloped baffle onto the berm must be considered.

(10) Side Containment. For partially and fully baffled ranges (Figures 7 and 8), the top elevation of the side containment must geometrically mate with the overhead baffles to be high enough to prevent any direct fire from exiting the range. Full-side height containment should extend 3 feet to the rear of the firing line. Locate the side containment at least 10 feet outside of the centerline of the outermost firing lane. Construction may be in the following forms.

(a) Earth Berm. Construct earth berms to an inside slope of 1 to 1.5. If native soil characteristics will not produce a stable slope at this angle, provide geotechnical fabric reinforcement in the fill. The top width of the berm should be at least 10 feet. No rocks are permitted in the top 3 feet of the inside surface. Generally, earth berms cannot be used on partially or fully baffled ranges; however, earth berms are permissible if the firing range is small and the overhead baffle and berm geometry intercept ricochets.

(b) Continuous Walls. Construct continuous walls of ballistic material to withstand local wind and seismic loads. Provide sacrificial cladding to 13 feet forward of the firing line and 3 feet behind the firing line. Continuous walls are preferred for fully baffled ranges.

Table 2. Thickness of Material for Positive Protection Against the Caliber of Ammunition Listed

Cover material	Caliber and thickness required to stop penetration		
	5.56 mm	7.62 mm and Cal. 30	Cal. 50
Concrete (5,000 lbf/in^2)	5 inches	7 inches	12 inches
Gravel-filled concrete masonry units	8 inches	12 inches	24 inches
Broken stone	14 inches	20 inches	30 inches
Dry sand	16 inches	24 inches	32 inches
Wet sand	25 inches	36 inches	48 inches
Oak logs (wired)	28 inches	40 inches	56 inches
Earth			
Packed or tamped	32 inches	48 inches	60 inches
Undisturbed compact	35 inches	52 inches	66 inches
Freshly turned	38 inches	56 inches	72 inches
Plastic clay	44 inches	65 inches	100 inches
NOTE: Figures are based on new material. Degradation may occur over time.			

(c) Wing Walls. Wing walls (side baffles) are discontinuous side protection set at 45° to the line of fire. Locate the wing walls so that they are overlapped by 6 inches based on any line of fire that may strike them. Construct the wing walls of ballistic material to

withstand wind and seismic loads. Additionally, provide sacrificial cladding on wing walls closer than 30 feet to the firing line.

(d) End Walls. End walls may be constructed at the firing lane edge on the firing line in lieu of extending side containment 3 feet behind the firing line. Walls should be long enough to close off any line of sight between the end of the side containment and the rear 3 feet mark. The end walls should be constructed of ballistic material with sacrificial cladding extending from the canopy to the firing line surface.

(11) Overhead Baffles. Overhead baffles must be located so that no direct fire can exit the range from any firing position. The first overhead baffle must be geometrically coordinated with the firing line ballistic canopy (see Figure 9). The top elevation of the top of each following baffle should be 6 inches higher than a line of fire that just clears beneath each preceding baffle (see Figure 16). Overhead baffles should be the same height and spaced apart down range to achieve the required geometry (see Figure 17). The last baffle should be placed so the line of fire will strike the impact structure no higher than 5 feet below the top elevation of the structure. On a fully baffled range, the last overhead baffle must be over the last target line.

(a) On partially baffled ranges, overhead baffles must extend laterally to within 1 foot of the side containment. On fully baffled ranges, the overhead baffle must tie into the side containment.

(b) The vertical dimension of an overhead baffle when it is vertical varies with the number and spacing of the baffles. Normally, the height is between 5 and 8 feet when considering structural support size and costs.

(c) The baffles must be constructed of ballistic material. Baffles within 11 yards of the firing line should be covered with sacrificial cladding. See Figures 12 and 18 for possible configurations.

(d) Space the structural columns as far apart laterally as possible to open firing lanes. If possible, do not construct columns within the range. Design columns or beams to withstand local wind and seismic loads, and provide protective steel plate on the faces of the columns exposed to the firing line in accordance with Figures 12 and 18. Provide sacrificial cladding if the column is within 10 yards of the firing line. Overhead baffles may be placed on a flatter slope and overlapped to function as firing line canopies if multiple firing lines are to be used (see Figure 17). This arrangement is cost-effective for baffled combat lanes.

5. INDOOR RANGE DESIGN.

a. Use of Indoor Ranges.

(1) Indoor ranges must be designed so projectiles cannot penetrate the walls, floor or ceiling, and ricochets or back splatter cannot harm range users. Considerations should be made for cleaning of all surfaces and handling of hazardous wastes.

(2) Lead exposure requirements must be reviewed for applicability.

b. Site Selection.

(1) Walls and Partitions. Indoor ranges must incorporate walls and partitions capable of stopping all projectiles fired on the range by containing or redirecting bullets to the backstop.

(2) Existing Buildings. If there are existing drawings of the facility, copies should be obtained from the original owner, architect, engineer, builder, or building permit. If original drawings of the building are not available, a sketch can be made of each floor of the building with a special emphasis on the load-bearing walls. The following considerations should be used when making the initial evaluation of an existing building.

(a) General Construction. Buildings constructed of wood products should be avoided. Modifications to reinforce the structure to support metal backstops or to reduce fire hazards may not be cost-effective.

(b) Exterior Walls. The type of exterior wall construction (e.g., masonry, wood, concrete, metal, combination, other) should be identified. Masonry buildings should be given primary consideration, especially those constructed on concrete slabs.

(c) Floors, Walls, and Ceilings. Floors, walls, and ceilings must be able to contain a bullet fired as well as the sound.

1 The ideal wall is made of poured concrete a minimum of 6 inches thick.

2 To aid in range cleaning, concrete floors should be finished so they have a nonporous surface.

3 Ceilings should be 8 feet high and enclosed to reduce air turbulence created by ventilation systems.

4 Evaluate the structural support designs of older buildings for their ability to withstand new loading. Original design

considerations usually do not allow for installing heavy backstops and other range equipment.

5 To decide if modifications are necessary, slab buildings must be analyzed carefully to determine the capacity for floor loading. If there are no floor drains and it is economically feasible, modifications should also include adding one or more floor drains.

6 Ceiling joists may require strengthening to support baffles and shielding material.

(d) Electrical. Electrical needs may require the installation of heavy-duty wiring both internally and externally to accommodate the added power needs of range ventilation, heating, lighting and target-carrier mechanisms.

(e) Plumbing. Plumbing does not usually require major modifications; however, heavy metals may be prohibited from area wastewater treatment collection systems. Therefore, an approved filtration system may be necessary for disposal of hazardous waste material; e.g., lead.

(3) Precast Buildings.

(a) Precast concrete companies can provide complete precast buildings (job site-delivered) if engineering specifications for steel placement are provided on a set of plans (drawings) for the proposed building.

(b) Precast assembly allows for installation of a roof design more suitable for an indoor range. Gabled or hip roof designs should not be used.

(c) Hollow, precast concrete panels provide an option to bar joists, eliminating bullet ricochet or splatter. A flat bar joist design is the recommended alternative to hollow, precast concrete panels.

(d) The flat roof design also provides support for heating, ventilating, and air conditioning (HVAC) equipment outside of the range, which saves space and reduces cost.

(4) New Construction. New indoor construction projects require the same guidelines as existing buildings; however, they offer the advantage of building a structure specifically for an indoor shooting range.

c. Range Planning. Design work for ventilation, wall structures, floors, ceiling, acoustics, backstops, and lighting will depend on how the range will be used.

(1) A determination for the type of building required includes the following considerations.

(a) Can the range be built in an existing building or is a new one required?

(b) How large should it be?

(c) How many shooters will it be expected to serve?

(d) Will it be used for competition?

(e) Should space be allowed for classrooms?

(f) How much will the facility cost?

(2) The planning process should include:

(a) obtaining ordinances, zoning regulations, building codes, soil conservation regulations and other information pertaining to legal requirements;

(b) for evaluation, identifying a site for a new building or several existing buildings that may have the suitable design characteristics; and

(c) gathering other technical information relevant to the project. This information includes zoning requirements, onsite information, and range design criteria. Local zoning codes or health department regulations normally will provide answers or solutions on how the project is to be handled.

d. Design Criteria. Based on the site selected, type of shooting, number of users, and site layout, the next step is to design the facility by preparing detailed drawings showing specifications and necessary dimensions. The four main considerations for indoor ranges are shooter needs, type of shooting activity, number of firing points, and number of users. Special consideration should be given to ventilation, lighting, safety baffles, and backstop design. The following standard and optional features for indoor ranges should be considered.

(1) Backstops and Bullet Traps.

(a) The design of a backstop or bullet trap is a contributing factor to the service life of the unit. Steel should be installed according to

the type of ammunition to be used and to proven angle configurations.

(b) The design criteria should be based on the planned use of the facility. Metal plates selected for use in a backstop or trap must resist repeated stress according to the degree of stress applied. Necessary characteristics are resistance to abrasion, resistance to penetration, surface hardness, thickness, and alloyed strength to resist metal fatigue.

(c) The main backstop is generally a fabricated steel plate or series of plates used to stop bullets fired on a range. Backstop configurations and plate thickness will change according to type of shooting activity.

(d) Steel backstops with sand or water pits are common; however, a few indoor ranges use earthen or sand backstops.

CAUTION: Earthen or sand-filled backstops are not recommended because they can create health hazards for maintenance workers from silica and lead dust. They also cause excessive wear on ventilation fans.

(e) Backstops must extend from side to side and from ceiling to floor to protect the end of the range completely from penetration by direct bullet strike and prevent ricochets, back splatter, and splatter erosion of side walls.

(f) Four basic backstop and bullet trap designs are used for indoor ranges: Venetian blind, escalator, Lead-a-lator®, and the angled backstop (45°) back plate. Other backstop designs exist and should be researched for applicable use.

1 Venetian Blind Backstop. Requires less space, but without proper installation and regular maintenance it can cause back splatter problems from exposed edges of each main segment of the backstop. Keeping the exposed edges ground to original specifications is time-consuming, difficult, and requires skilled personnel.

a To control back splatter, a curtain should be hung in front of the backstop. Tests have been conducted on materials including canvas, burlap, cardboard, insulation board, and synthetic rubber. Properly installed, these materials effectively stop back splatter. Walls using insulation board or a synthetic rubber curtain are best.

b The main advantage of the venetian blind backstop is minimal space requirements. While an angled plate or an escalator will use 14 feet of space, the venetian blind uses only 5 feet.

2 Escalator Backstop. Sets up with flat steel plates laid out on a framework sloping away from the shooter. Between each series of plates, an offset allows a bullet sliding down the facing surface to drop into a hidden tray for easy cleanup. At the top or back of the backstop, a swirl chamber is provided to trap the bullets or bullet fragments as they exit the backstop surface. Once the bullet's flight ends in a spin-out chamber, the bullet or pieces fall into a cleanup tray.

3 Lead-a-lator®. A variation of the escalator-type backstop that uses a curved instead of flat piece of steel. The surface is concave and operates so that a bullet will follow the contour of the surface into a dry lead spinout chamber where it is trapped.

4 Angled Backstop (or 45° Inclined Plates). Uses a sand or water trap and has been the traditional alternative for indoor ranges.

a The angle of the plate should never exceed 45° from the ground. The 45° plate and pit backstop is relatively inexpensive, but there are several disadvantages. Sand traps require frequent cleaning to remove bullet fragments. Cleaning operations require workers to wear high-efficiency particulate air (HEPA) filter masks if material is removed dry. It is best to dampen the sand trap material before and during cleaning operations to eliminate dust. To maintain a healthier internal environment, frequent removal, disposal, and replacement of lead-laden sand is required. The surface should be continually raked to keep the sand level and to guard against splatter as lead buildup occurs.

b The cleaning operations are easier when a water trap is used. However, a water trap requires chlorine and other chemicals to retard algae growth and antifreeze in colder months to prevent freezing. Installing a water pit requires a different approach to foundations and footings, especially in areas affected by earthquakes or freezing.

(2) General Range Cleaning. Both dry and wet methods can be used to clean the range. The method selected depends on the frequency of use. The wet method is preferred when floor drains are available, and keeping materials wet during cleaning operations reduces or eliminates release of microscopic dust particles. When dry methods must be used, workers must use the appropriate personal protective equipment (PPE) that has been established by local industrial hygiene personnel. After cleaning operations are complete, workers must shower and have work clothing laundered.

(3) Backstop Steel Plate Specifications.

(a) Steel plates supported by concrete or masonry should be anchored by expansion bolts or toggle bolts, as suitable for construction, with flush countersunk heads not more that 12 inches on center of all edges of each plate. Joints and edge lines should be backed with continuous ½-inch thick plate no less than 4 inches wide. Bolts should pierce both the facing and back plates. Expansion bolts should penetrate concrete not less than 2 inches. Steel plates must have milled edges at all joints.

(b) Joints must be butted flush and smooth. After the plates are erected, they must not have any buckles or waves. Exposed edges must be beveled at 42° to a fillet approximately ½-inch thick. There must be no horizontal joints in any steel plate work.

(c) Welding must meet the American Welding Society code for welding in building construction. Steel plates joined at, and supported on, structural steel supports must be spot-welded to steel supports not more than 6 inches on center.

(4) Baffles, Deflectors, and Shields. Baffles on indoor ranges protect lighting fixtures, HVAC ducts, ceilings, and target carrier apparatus. Baffles are designed to protect against the occasional errant bullet but not for repeated bullet strikes.

(a) To cover or protect vulnerable ceiling areas or range fixtures, baffles must extend the entire width of the range and downward. Spacing of baffles on a 50 to 75 feet range depends on the ceiling design. Range distance (firing line to target line) and height are factors. Ceilings must be impenetrable.

(b) Baffles or deflector plates must be used when modifying an existing building, especially in a building constructed of wood. This will prevent bullets from escaping or penetrating. Baffles should be a minimum of 10-gauge steel covered with a minimum of 1 inch of soft wood to prevent back splatter. The wood traps the

projectile, whereas bare steel redirects it downward into the range area. A wood surface must be applied to overhead baffles, because ranges with untreated baffles usually show significant damage to concrete floors and often complete penetration through wood floors.

(c) Baffles should be installed at a 25° angle as measured from the horizontal plane of the ceiling. The baffle size and placement depends on what surface areas require protection. For example, ceiling baffles are wider than side baffles. See Figures 14 and 15 for baffle placement.

(d) Unlike baffles, deflectors are installed vertically and horizontally to redirect wide-angle shots into the backstop area. Deflector shields protect pilasters, leading edges of sand traps, bottom edges of backstops, doorways, windows, ventilation registers along the wall, etc. Deflectors are not covered with wood generally, but may be. These devices are also installed at a 25° angle either to the wall surface or floor. See Figure 16 for deflector installation.

(e) To protect ceiling areas, special impenetrable shields are installed above the firing line, especially in wood frame buildings.

1 Shields should extend the entire width of the range and 12 feet forward of the firing line. Floor shields may be required on wood floors.

2 Shields must be constructed from metal sheets according to planned use. For example, 10-gauge steel covered with a minimum of 1 inch of soft wood is effective in stopping most pistol calibers.

(5) Floors, Walls, and Ceilings. Indoor range facility floors, walls, and ceilings must be impenetrable; therefore, an existing building must have a structural analysis to determine loading factors that may exceed original design specifications. Wooden buildings may require modifications to support the increased weight. Specifications for new construction call for either poured-in-place concrete, pre-cast concrete, or dense masonry block. Solid cinder block should be used in place of hollow-core block. Specifications for modifying existing buildings call for adding additional materials to prevent bullet escape, which can be done with wood and steel laminated shields. Laminated shields can be constructed onsite by placing sheet-steel or steel plates between two sheets of ¾-inch plywood. While this method is more expensive than the extended booth design, it allows for an open firing line and better visibility for the range officer. Walls should be treated beginning 3 feet to the rear of, and extending forward of,

the firing line until all vulnerable surfaces are protected. Acoustical material should be applied to the surfaces to aid in sound control.

(a) Floors. The range floor should be constructed by using a single pour and a fine, uniform-aggregate mix of concrete. Reinforcement should be No. 4 steel rods placed 12 inches on center along with 6- by 6-inch 8/8-gauge welded wire fabric. This may vary according to soil conditions. Very large floor areas may require two or more pours with expansion joints between each slab.

1 The floor should be designed to slope down toward the target line, beginning at the firing line, ¼-inch per foot.

2 The floor should be no less than 4 inches thick.

3 Floor size is governed by design. Larger size will result in higher costs for ventilation, lighting, heating, and overall building design. The decisions should be based on expected number of users versus overall cost.

(b) Floor Guards. Floor guards are provided to protect leading edges or protrusions, e.g., drains, traps or other protrusions from the floor area. Floor guards are designed to redirect errant bullets into the backstop area, which minimizes range damage.

1 Floor guards are constructed from 10-gauge steel and may be covered with wood.

2 Floor guards are installed horizontally along the floor surface parallel to the firing line.

3 Floor guards typically slope away from the firing line at a 25° angle to the horizontal.

4 Floor guards should extend only as high as necessary to protect exposed surfaces.

(c) Floor Drains. Floor drains should be constructed of cast iron soil pipe. The drain pipe should be attached to a lateral drain located 1 foot forward of the backstop floor guard. The drain pipe must lead to a filtration system approved by the cognizant environmental, safety, and health organization on the site.

(d) Walls. Poured concrete or masonry is preferred for wall construction, but wood may be used. Wall thickness must conform to acceptable engineering standards and comply with Federal, State, county and local zoning codes. Usually, no less than 3-inch

thick, reinforced walls should be constructed to prevent the exit of any projectiles.

NOTE: This specification usually requires the use of steel or similar material where wooden walls are used. The size depends on building design, geological conditions, and climate. Size includes the height, thickness, and length of the running wall.

(e) Ceiling. Ceiling material should reduce sound, protect lighting devices, reflect light and be impenetrable. Typically, ceilings include 10-gauge steel baffles, 2- by 4-feet white acoustic panels, and clear-light panels.

1 The ceiling should be a minimum of 8 feet above the floor level and have an acoustically treated, smooth surface to allow for positive air movement downrange.

2 Baffles to protect adjoining areas should be above a false ceiling or designed into the roof/ceiling structure.

(6) Shooting Booths. Commercial or locally built shooting booths may be desirable on pistol ranges; however, they are not recommended for rifle ranges. Shooting booth panels can provide an impenetrable barrier between shooters, reduce sound levels, restrict the travel of brass, and act as a spray shield when revolvers are used.

(a) Shooting booths should be omitted for ranges that use only rifles.

(b) A shooting booth should never extend more than 18 inches behind the firing line because greater extension may obstruct the range control officer's visibility.

(c) Bullets fired from any firearm used on the range must not be able to penetrate booth panels. The booth panel must be able to withstand the impact of a bullet fired at any angle to the surface and at point-blank range.

(d) Design criteria for the construction of booth panels are as follows:

1 Cover the 10-gauge steel plate with a nominal 2 inches of soft wood. In a series of tests using 10-gauge steel plate, firing all lead bullets at right angles, the plate covered with a nominal 2 inches of soft wood withstood direct hits from all standard pistol calibers up to, and including, .44 caliber magnum;

2 Use special acoustical materials to ensure that panels reduce muzzle blast effects on all shooters and range personnel;

3 Ensure that panels do not restrict airflow;

4 Ensure that panels do not restrict the range officer's visibility of the firing line; and

5 Construct panels so they extend from the floor to a minimum height of 6 feet. Panels should be ceiling height.

(7) Target Carriers and Turning Mechanisms. An indoor range can be operated more efficiently and safely by installing a target transport system. This system may be a simple, hand-made device or a completely automatic, electrically powered system. Either one will enhance safety by eliminating the need to walk downrange to replace targets. Target carrier systems speed up range operations. A turning target mechanism is available that faces the target parallel to the line of sight and then turns the target 90° to the line of sight to begin the stated time period. The target carriers should position the targets in the approximate center of the backstop.

(8) Control Booth. Range control booths must allow for maximum visibility and provide for easy access into and out of the range and ready area. The control booth should provide seclusion from and immediate access to the range environment. This design protects the range officer from frequent exposure to high sound levels and lead emissions.

(9) Communications. A communications system capable of relaying range commands distinct and separate from the sounds generated by shooting activities is required. Communications systems must account for shooters who wear two pairs of hearing protectors and persons who have substantial hearing loss.

(10) Ventilation and Filtering Systems. This section deals with the design or redesign of ventilation systems for indoor firing ranges. Administrative or engineering controls must be instituted to prevent shooters from being exposed to airborne lead levels exceeding acceptable limits. Administrative controls are used either when engineering controls fail to reduce exposure or when range use exceeds HVAC system specifications. Administrative controls are especially applicable to reducing risks on existing ranges.

(a) Administrative controls used to reduce exposure levels on an indoor range must be rigidly followed and enforced, and

compliance must be recorded in a log book for purposes of analysis and reference.

(b) The following administrative controls are provided and must be used where individuals are frequently exposed to airborne lead.

1 Provide range maintenance personnel with appropriate PPE, e.g., safety glasses and respirators.

2 Provide proper HEPA filter cleaning equipment. The equipment must be able to remove accumulated lead dust from floors, walls, and ledges and must include attachments capable of removing lead-laden sand from the backstop area.

(c) A ventilation system must be installed that will provide clean air in the user's breathing zone to reduce exposure to potentially dangerous materials to safe levels.

(d) Adopt administrative controls that monitor and control exposure time for a given user and/or assigned range personnel.

(11) Lighting.

(a) A visually safe facility should be free of excessive glare and major differences in light levels. Therefore, floors and ceilings should be designed to provide light reflection. In the event of a power outage, battery-powered emergency lighting must be provided for emergency exits.

(b) Rheostat-controlled lighting fixtures, which can reproduce near-daylight and low-light conditions, are best suited for indoor ranges. Range lighting involves three systems: general lighting, local lighting, and semi-direct lighting.

1 General lighting provides uniform light levels over the entire range area and adjoining areas and is usually installed in a symmetrical arrangement to blend with the architecture.

2 Local lighting supplements general lighting along the firing line to provide better visibility for those tasks associated with the loading and firing of firearms.

3 Semi-direct lighting distribution directs 60 to 90 percent of the lighting on the target with a small upward component to reflect from the ceiling and walls to soften shadows and generally improve range brightness. When ceilings are

white, lighting fixtures mounted too close together create excessive glare.

(c) Lamp specifications for general lighting must be adjustable to provide 0.2 to 50 foot-candles of luminance measured at a point 7 yards from the target line. Local lighting should produce 0.2 to 60 foot-candles of luminance on the firing line. Semi-direct lighting on the targets should achieve 0.2 to 100 foot-candles of luminance. Glare should be reduced or eliminated by incorporating pastel colors in the interior design.

(d) Lighting designs should also seek to balance the color of light emissions. For example, most fluorescent fixtures produce high levels of blue, which alone are not suitable for indoor ranges. If fluorescent fixtures are used, green tubes or other light sources should be installed to balance the colors.

(12) Plumbing. Plumbing requirements specify that there must be a fresh water supply for personal hygiene and for range cleaning chores. There also must be a waste removal system for normal waste material and material removed from the range. An approved filtration system must be provided for range cleaning waste. Floor drains should be connected to this alternate waste system. Restrooms, showers, and sinks should be connected to a regular sewer system.

(13) Sound Control. Sound control on indoor ranges includes two distinct components: airborne and structure-borne sound. For airborne sound, all leaks into outer areas should be sealed, which includes airtight insulation around doors, windows, HVAC ducts, walls, and ceilings. Structure-borne sound reduction is necessary to protect adjoining, occupied rooms. Acoustical material should be applied to walls, HVAC ducts, floor, and ceiling areas.

(14) Range Control. Range control provides rules and supervision that encourage safe and proper use of a range. Safety devices control the physical use of an indoor range and may include warning lights, alarm bells, switch locations, etc. For example, an indoor range with a door in the downrange area should be equipped with an alarm. The door could also be secured by a mortise lock or barred from within but must remain a fire exit. Fire codes generally prohibit bars on doors that would delay escape from a building. Emergency personnel must be able to access the doors. Any door that can be accessed from the outside must be marked with warning devices to indicate when the range is in use. When installing doors on indoor ranges, refer to Life Safety Code National Fire Protection Association (NFPA) 101.

(15) Target Carriers. Target carriers are used for the convenience of shooters to allow them to continue shooting without delay when target changes are necessary. For health considerations, target carriers keep shooters out of the high lead concentration areas and safely behind the firing line.

(16) Heaters. Protected heating units should be installed behind and above the firing position to provide a comfort zone for shooters.

(17) Gun Racks. Gun racks should be mounted behind the firing positions as an additional safety feature to reduce gun handling and to keep the range areas orderly. Appropriate material should be used to construct the gun racks, and the design must correspond to the weapons being used.

6. LIVE FIRE SHOOT HOUSE.

a. Introduction.

(1) A live fire shoot house (LFSH) is intended for use in advanced tactical training for Security Police Officers. Use of this facility includes individual tactics or Special Response Team force option training. All LFSHs must have an elevated observation control platform (EOCP). The following sections illustrate recognized construction methods for LFSHs. However, they do not eliminate the requirement for sound professional engineering design and validation.

(2) Administrative controls not directly related to design and construction must be in place during facility use. The administrative controls and engineering design allow for a reduction in physical barriers that prevent rounds from escaping the facility. Designed barriers must prevent a round fired with a vertical upward error of 15° from escaping the facility.

b. Site Selection.

(1) Site selection for an LFSH is similar to that for any range facility. Terrain features, noise, and availability of utilities and access roads must be considered, as already discussed in previous sections for indoor and outdoor ranges. The LFSH should be placed adjacent to other range facilities whenever possible so that it may utilize the same support facilities, access roads, etc.

(2) Facility design, target and shooter placement, and other administrative controls minimize the possibility of rounds being fired over the top of the walls and leaving the structure and mitigate the need for an SDZ outside the confines of the LFSH proper.

c. Design and Layout.

(1) The interior layout of the facility is based on the mission and training requirements of the site. Facility design should incorporate a wide variety of room configurations. Some of the room configurations that should be considered are: multiple floors, an L-shaped room, stairwells, rooms within a room, hallways, and closets.

(2) The floor plan design should accommodate the movement of target systems, bullet traps, and other equipment into and out of the LFSH.

(3) Exposure to airborne contaminants for a fully enclosed LFSH must be controlled by adequate ventilation. The lighting requirements are similar to those for indoor ranges.

d. Wall Construction.

(1) Wall Height. Exterior walls of the LFSH must be designed to absorb the most energetic projectile identified for use within the facility. Wall height must be a minimum of 8 feet. The wall height should allow a maximum error angle of 15° from horizontal standing shooting distance from the target and still enable a projectile to be contained by the wall, which can be described by the following equation: Wall Height is equal to the muzzle height plus 0.27 (tangent 15°) times the target distance. The following table assumes a muzzle height of 5 feet.

Distance from Muzzle to Ballistic Wall (Feet)	Wall Height (Feet)
11' 1"	8' 0"
13' 3"	8' 6"
14' 10"	9' 0"
17' 0"	9' 6"
18' 6"	10' 0"
20' 9"	10' 6"
22' 2"	11' 0"
24' 5"	11' 6"
25' 11"	12' 0"

If the distance from muzzle to ballistic wall exceeds the required wall height, other administrative, engineering or natural ballistic wall controls must be administered or considered such as shooter-to-instructor ratio, canopies, baffles, natural terrain, existing SDZ, standard operating procedures, and training.

(2) Ballistic Walls. Ballistic interior walls are the preferred method of construction. Where non-ballistic interior walls are used, additional administrative controls must be applied to target placement and team

choreography. Ballistic walls are required in all cases where containment of the round and protection of personnel is paramount.

(a) Footings. Footings must be designed using the engineering criteria that best ensures structural integrity and stability of wall construction.

(b) Composite Walls.

1 A combination of ¾-inch exterior grade plywood and steel is effective. Minimum thickness will be ¼-inch mild steel with an exterior-grade plywood separated by a minimum of ¾ inch with a maximum of 1½ inches from the steel surface.

2 Other combinations are possible. The main criterion is that the wall must stop any round fired and contain bullet fragments.

(3) Non-Ballistic Walls. These walls are constructed of materials that offer no protection to personnel or equipment in adjoining rooms. Material used for these walls must not contribute to or enhance ricochet or splatter. Additional administrative controls must be applied such as target placement and team choreography.

e. Doors. All doors must be constructed of wood with no glass. Additionally, at least a portion of the rooms must have working doors, some opening inward, some opening outward, and doors opening left and right.

NOTE: All devices in the LFSH, such as brackets and hangers, used to secure walls to floors or secure doors must be covered or protected to mitigate any tripping or ricochet hazards.

f. Ceiling or Roofs. Ceilings or roofs can be of value when the shoot house is required for year-round use in areas with severe weather conditions. Exposure to airborne contaminants must be controlled by adequate ventilation. The lighting requirements for fully enclosed shoot houses are similar to those for indoor ranges. When training exercises require target placement above the wall design, the ceiling or roof must be protected unless firing into an approved SDZ.

g. Floors.

(1) Floor construction must be selected for its ability to absorb direct fire, minimize ricochets, and provide a walking surface free of slipping/tripping hazards. Floors should provide the same ricochet protection as walls. Options include:

(a) exterior-grade plywood floor constructed in accordance with American Plywood Association guidelines over smooth finished concrete;

(b) concrete with brushed surface that minimizes slip and tripping hazards;

(c) asphalt;

(d) exterior-grade plywood;

(e) shredded bias-ply tires; and

(f) earth, free of rocks and debris that could cause ricochet.

(2) Construction joints between walls and floors must be designed to contain projectiles within the LFSH.

h. Bullet Traps.

(1) General Information.

(a) Targets used in LFSHs must be placed so that fire is directed into a bullet trap designed to capture the rounds.

(b) Bullet traps must be constructed to contain the most energetic projectile to be fired into them without dimpling/pitting the steel and contain splatter and fragments in all directions. The size and shape of a bullet trap may be altered, but materials may not be substituted.

(2) Specifications for construction.

(a) 5.56mm conventional ammunition must not be used when shooting into bullet traps without further testing and development of containment materials. Only 5.56mm non-toxic frangible ammunition can be used.

(b) Bullet trap steel must be set at a minimum 7° angle off vertical based on the most probable line of flight of the bullet. The greater the angle of the bullet trap, the less the deterioration on the steel plate. A bullet trap constructed similar to the DOE National Training Center design (see Figure 20) and then leaned against the wall of the shoot house with the base of the trap out approximately 1 foot provides adequate angle of the steel backing.

(c) Bullet trap steel must be constructed of a minimum ¼-inch, 500 Brinell hardness or equivalent rifle-grade steel. Quality

assessment and ballistic test sheets certifying the grade and quality of the steel backing plate must accompany every steel backing plate utilized.

(d) An anti-splatter shield must be used in front of the steel to prevent back splash. Two layers of 7/16-inch nylon-impregnated rubber belting material or ¼-inch self-sealing co-polymer sheeting are good examples of material to use.

(e) An air space must be left between the face of the steel and the facing material to allow fragments to collect in the rear of the trap. A 1¾ -inch air space is an accepted construction standard.

(f) Linatex™ rubber backing material between the fascia and steel backing plate is not recommended because it deteriorates rapidly when using 5.56mm frangible ammunition.

(g) Plywood under the fascia material and in front of the steel plate is not recommended because the material deteriorates rapidly with 5.56mm frangible ammunition.

(h) Bullet traps must be constructed for easy inspection of the inside of the fascia material and the front of the steel plate. Frequent inspection of the interior of the bullet traps must be conducted when rounds are fired into one general area.

(i) The fascia material must be inspected, replaced or repaired when the integrity of the fascia material allows the round to start dimpling the steel backing plate.

(j) The bullet trap steel backing plate, when used in the standard bullet trap design, must be replaced when 50 percent of the material in one general area has been chipped away.

(k) The requirement to remove from service any steel target when dimples exceed 1/16 inch does not apply. Steel backing plates must have a protective cover installed between the plate and the shooter that protects the shooter from back splash.

i. Elevated Observation Control Platform.

(1) EOCPs enhance the ability to observe and control LFSH operations. Administrative controls must be considered when constructing the EOCP. Platform construction and location is based on the training to be conducted. EOCPs must be constructed in accordance with all applicable regulations for elevated work platforms.

(2) EOCPs must be constructed to:

(a) maximize instructors' observation and control of the entry team fire and movement;

(b) facilitate communication between instructors on the EOCP and the floor;

(c) position the lowest point of the horizontal walking surface higher than the 15° vertical error for any target engaged;

(d) provide ready access;

(e) integrate instructors' movement with team flow;

(f) maximize instructors' ability to see shooters clearly at all times; and

(g) have supporting structures placed so that they pose no additional hazards such as tripping, ricochet, splatter, etc.

ATTACHMENT 1 -- RANGE DESIGN FIGURES

Figure 1. Surface Danger Zone (SDZ) for Small Arms Firing at Fixed Ground Targets

Figure 2. SDZ for Small Arms Weapons Firing at Moving Ground Targets

Figure 3. SDZ for Small Firing at Fixed Ground Targets with Rocky Soil or Targets Causing Ricochet

Figure 4. SDZ for Firing M79, M203, and M19 40 mm Grenade Launchers

Figure 5. SDZ with Impact Berm for Small Arms Firing at Fixed Ground Targets

Figure 6. Open Range with Impact Berm and Side Protection SDZ for Small Arms Firing at Fixed Ground Targets

Figure 7. SDZ for Partially Baffled Range (Small Arms Firing at Fixed Ground Targets)

Figure 8. SDZ for Fully Baffled Range (Small Arms Firing at Fixed Ground Targets)

Figure 9. Ballistic Overhead Canopy

Figure 10. Outdoor Rifle Range Layout

Figure 11. Pistol Range Layout

Figure 12. Ballistic Material

Figure 13. Ballistic Protection of Target Mechanism

Figure 14. Impact Berm for Open and Partially Baffled Ranges

Figure 15. Outdoor Bullet Trap

Figure 16. Baffle Range Profile

Figure 17. Baffle System Geometry

Figure 18. Overhead Baffle Ballistic Designs

Figure 19. Parallel Ranges

Figure 20. National Training Center Bullet Trap

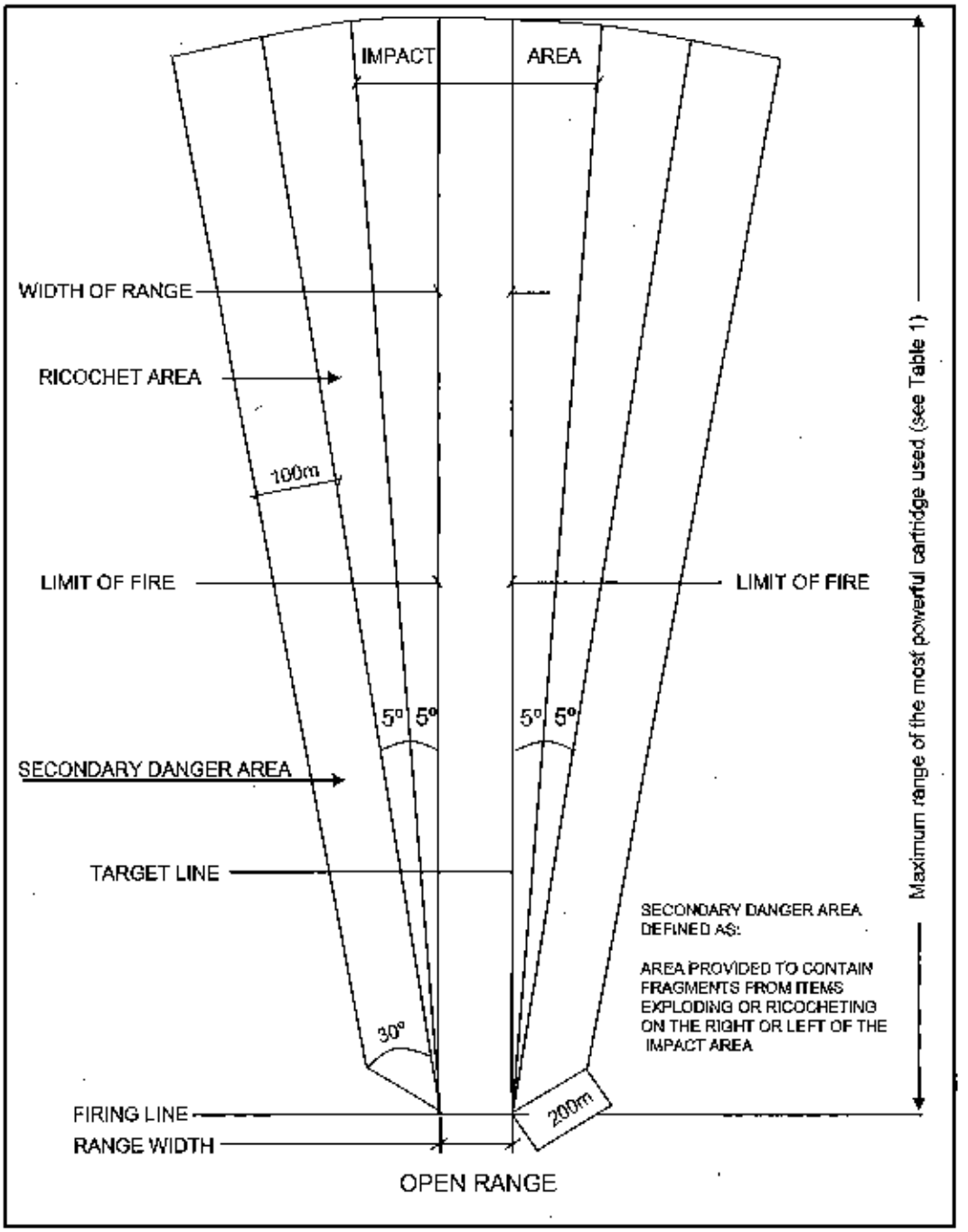


Figure 1
Surface Danger Zone for Small Arms
Firing at Fixed Ground Targets

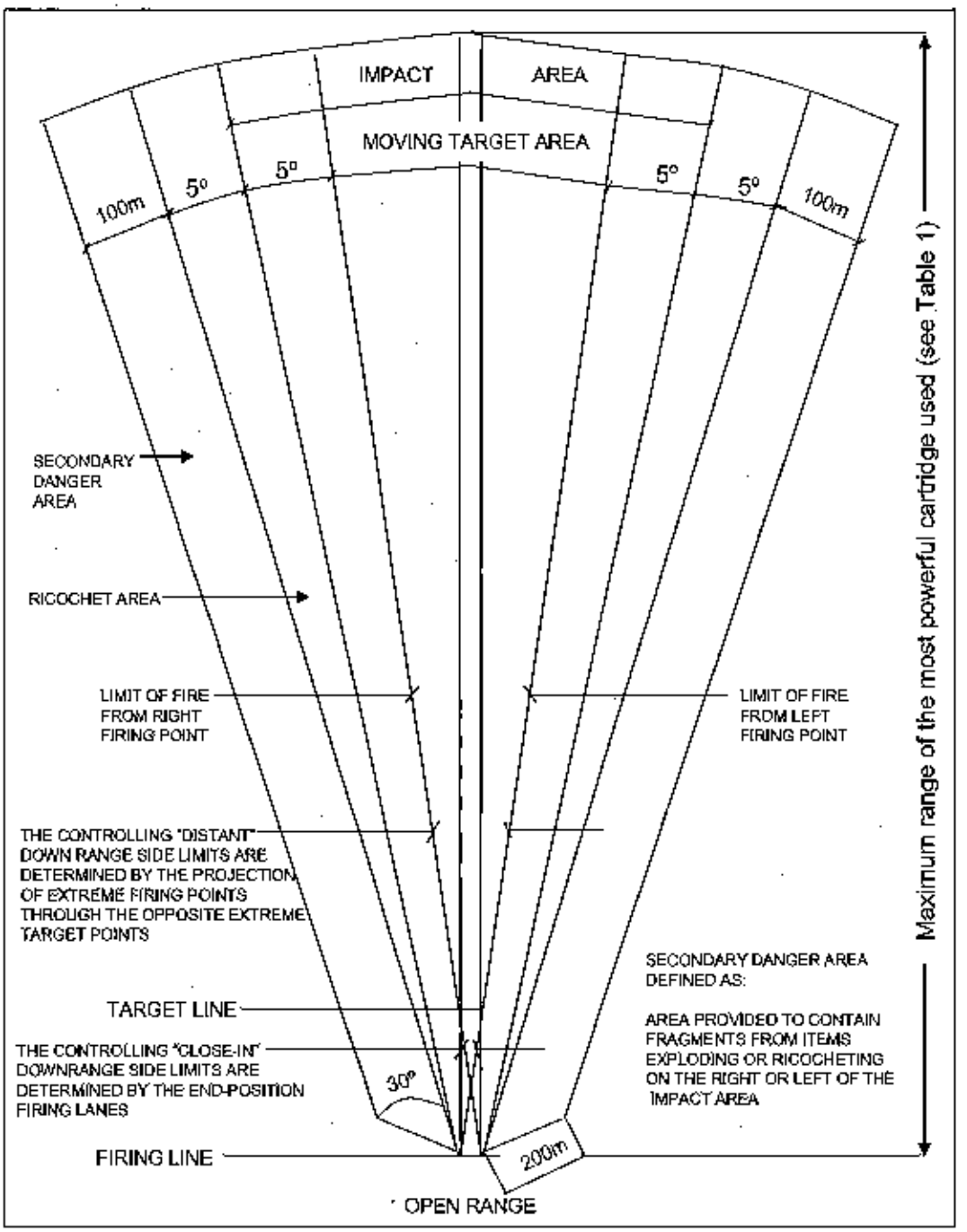


Figure 2
Surface Danger Zone for Small Arms Weapons
Firing at Moving Ground Targets

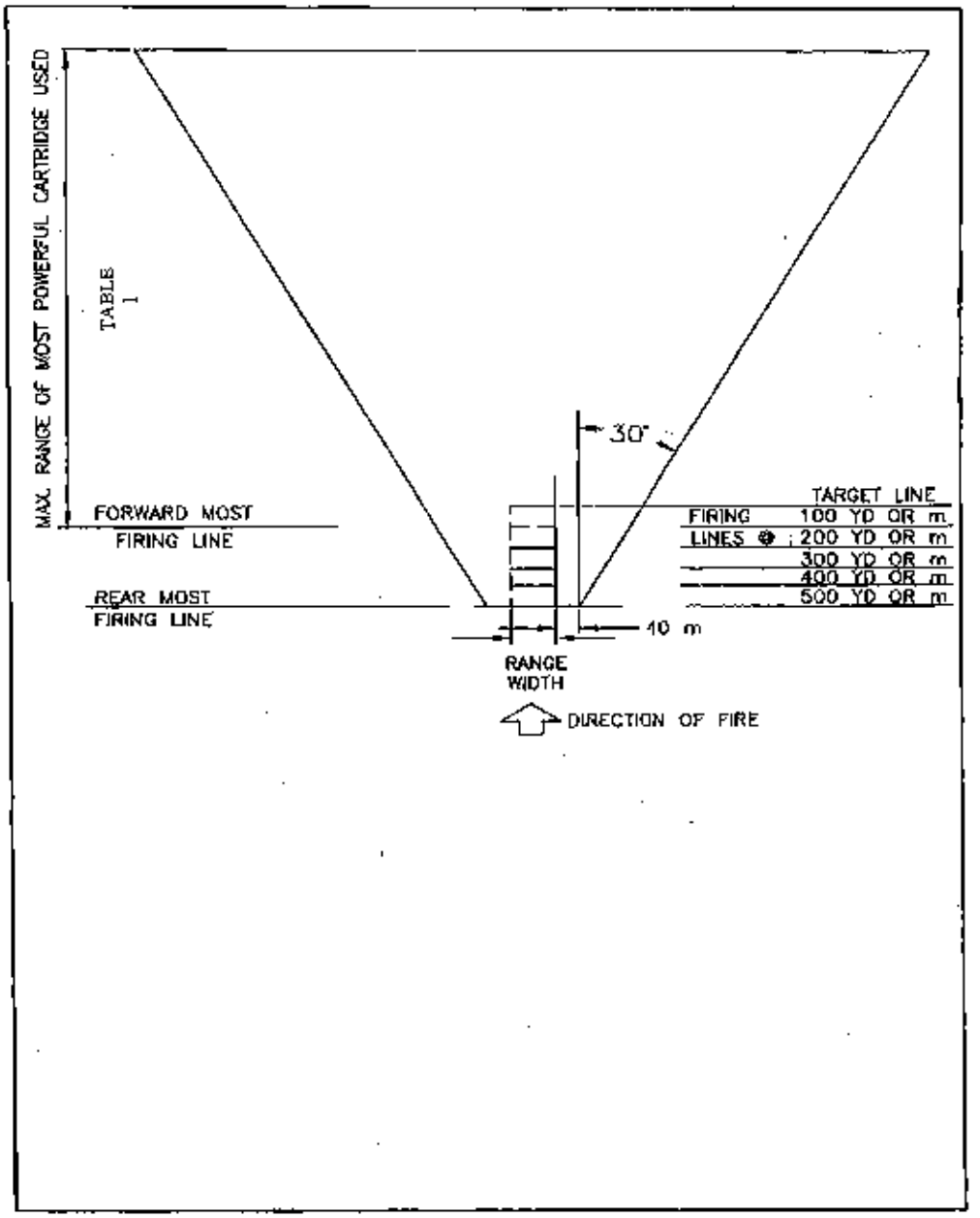


Figure 3
Surface Danger Zone for Small Arms Firing
At Fixed Ground Targets with Rocky Soil
Or Targets Causing Ricochet

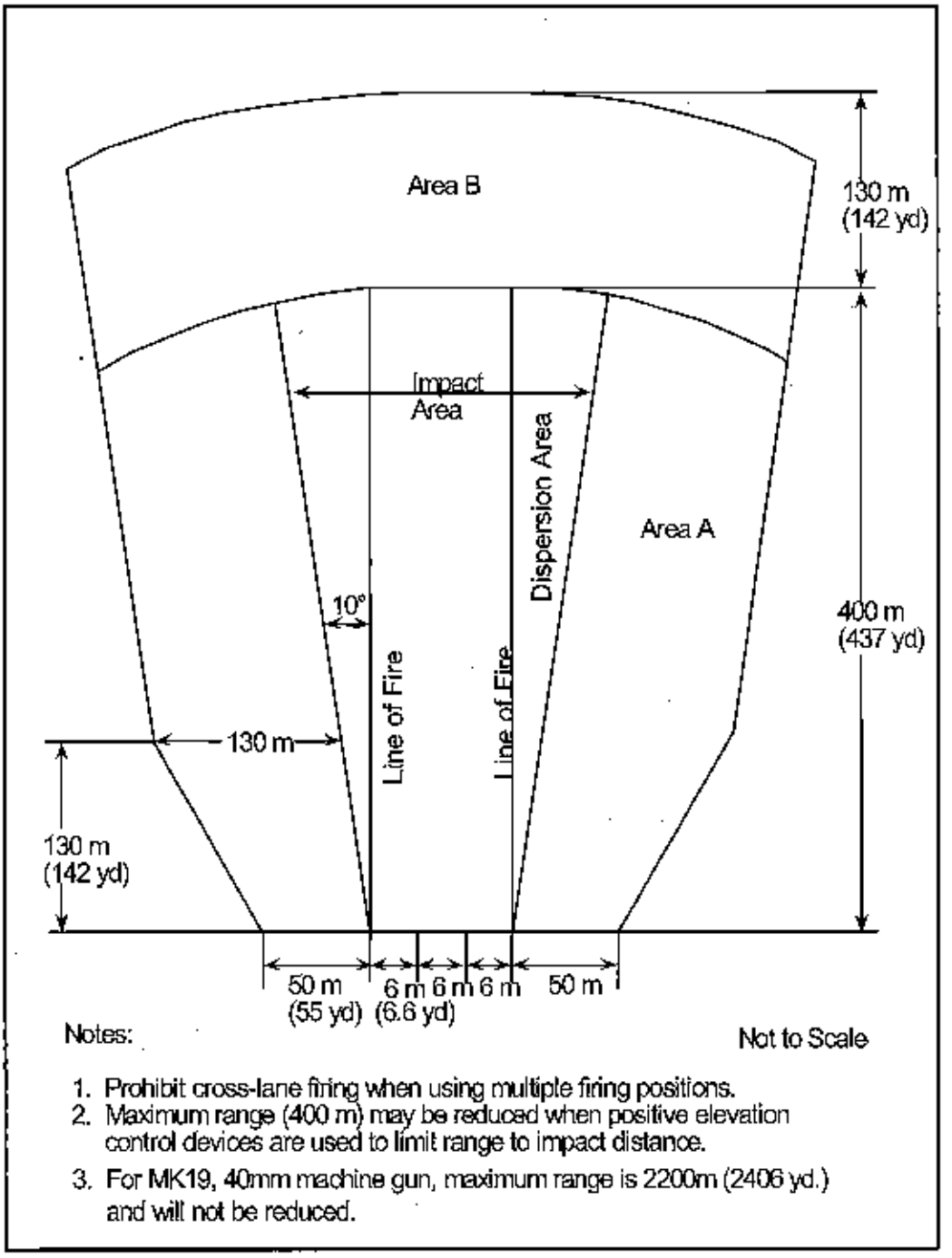


Figure 4
Surface Danger Zone for Firing
M79, M203, and M19 40mm Grenade Launchers

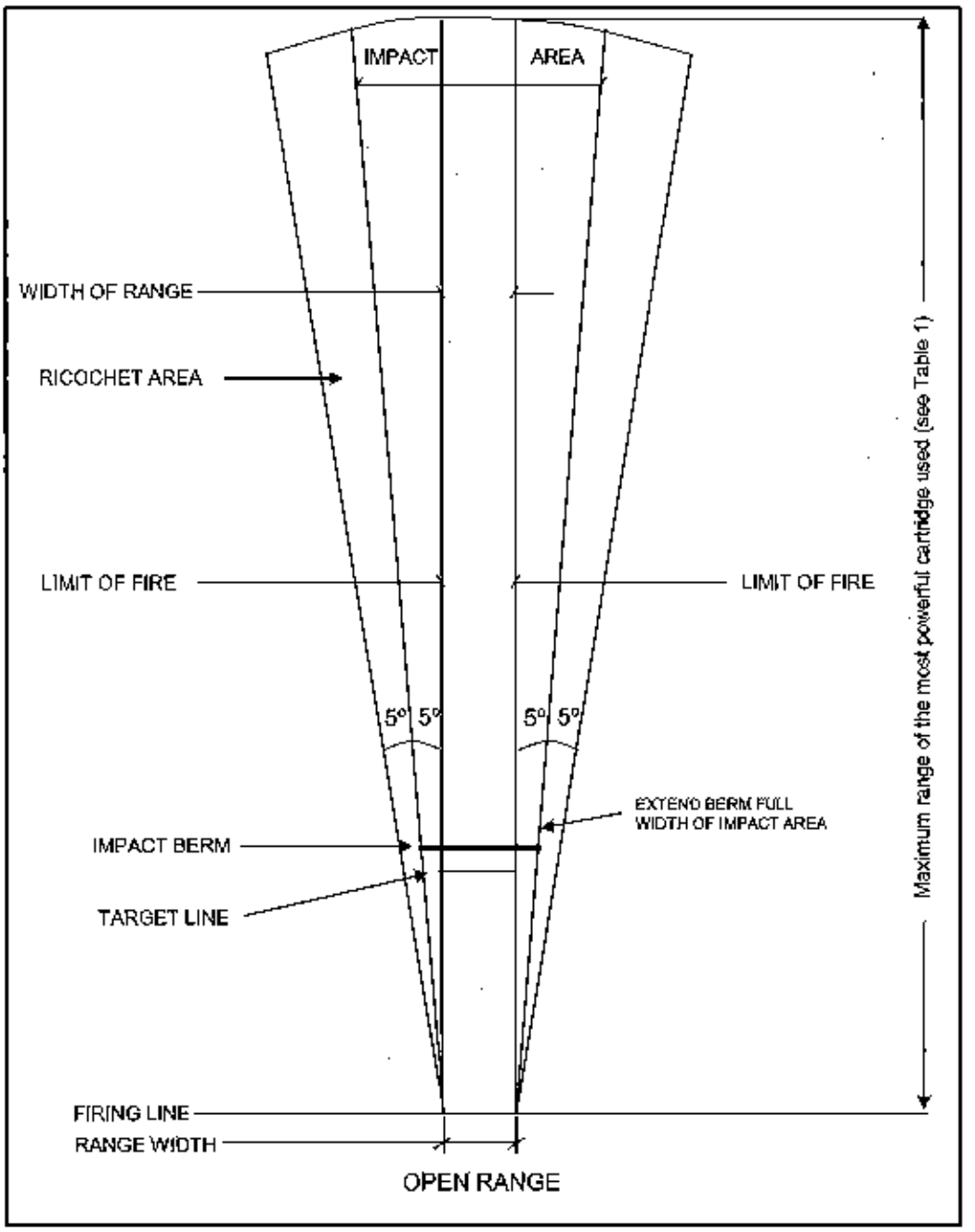


Figure 5
Surface Danger Zone with Impact Berm
for Small Arms Firing at Fixed Ground Targets

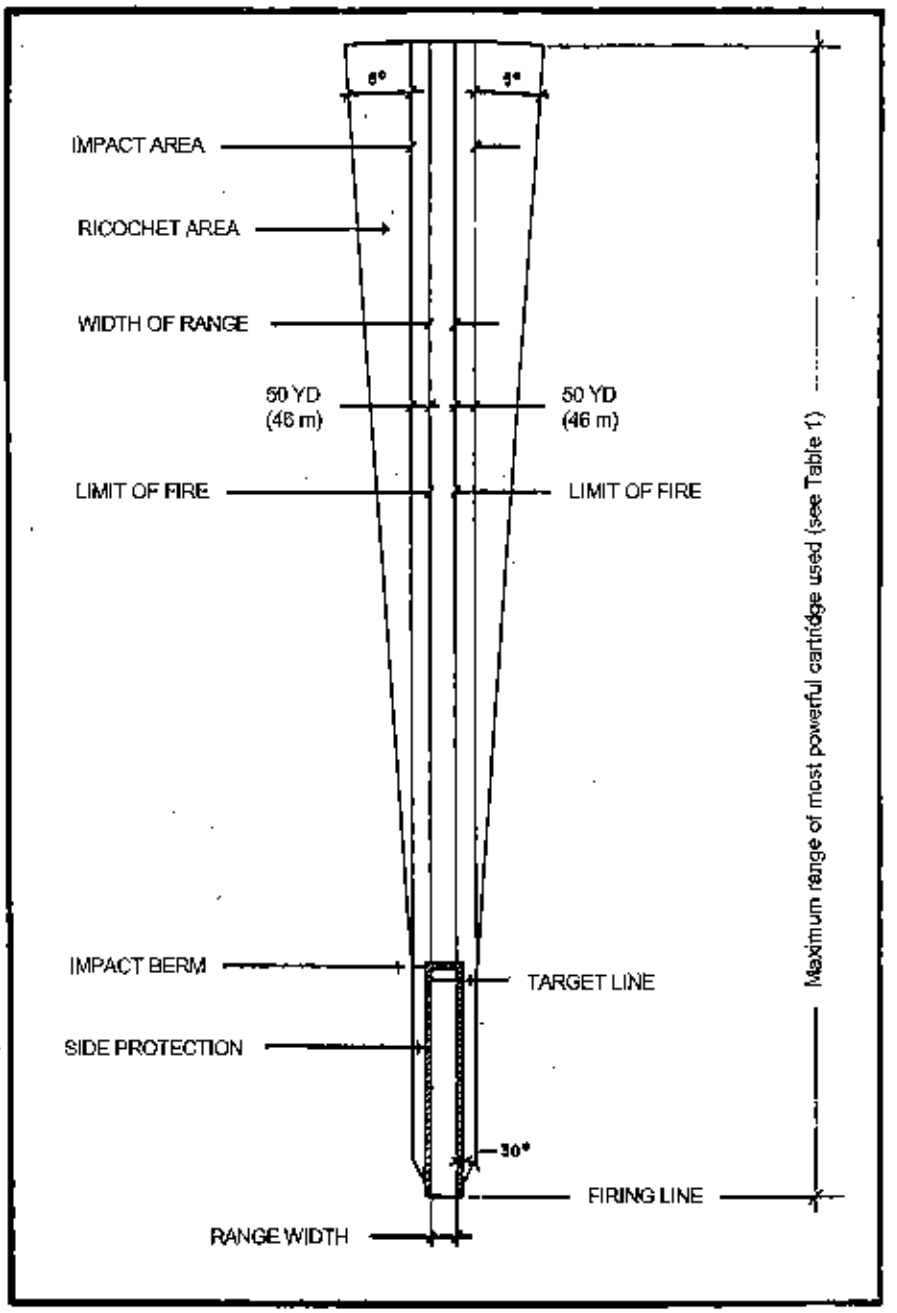


Figure 6

Open Range with Impact Berm and Side
Protection Surface Danger Zone for Small Arms
Firing at Fixed Ground Targets

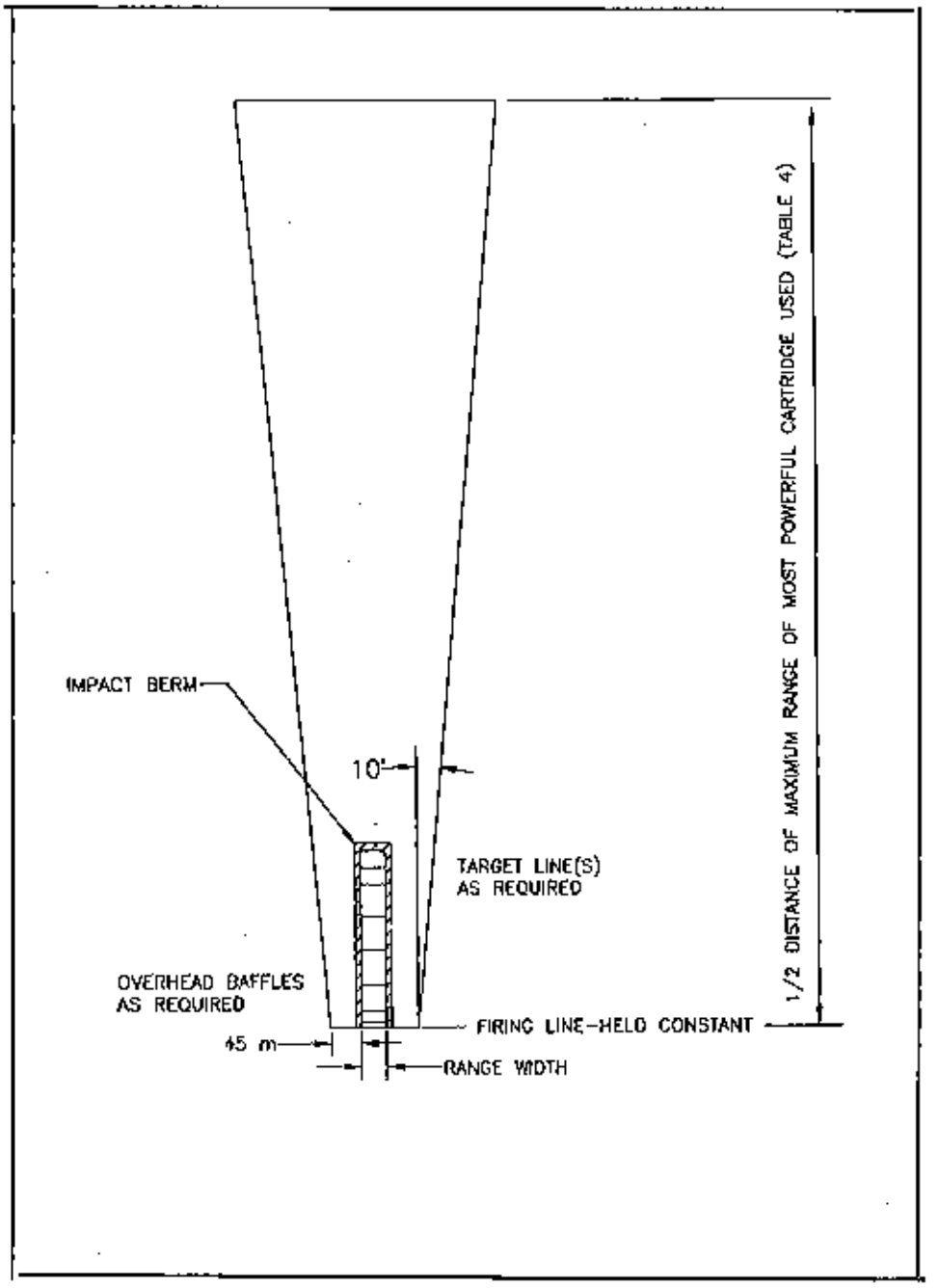


Figure 7
Surface Danger Zone for Partially Baffled Range
(Small Arms Firing at Fixed Ground Targets)

(TABLE 1)

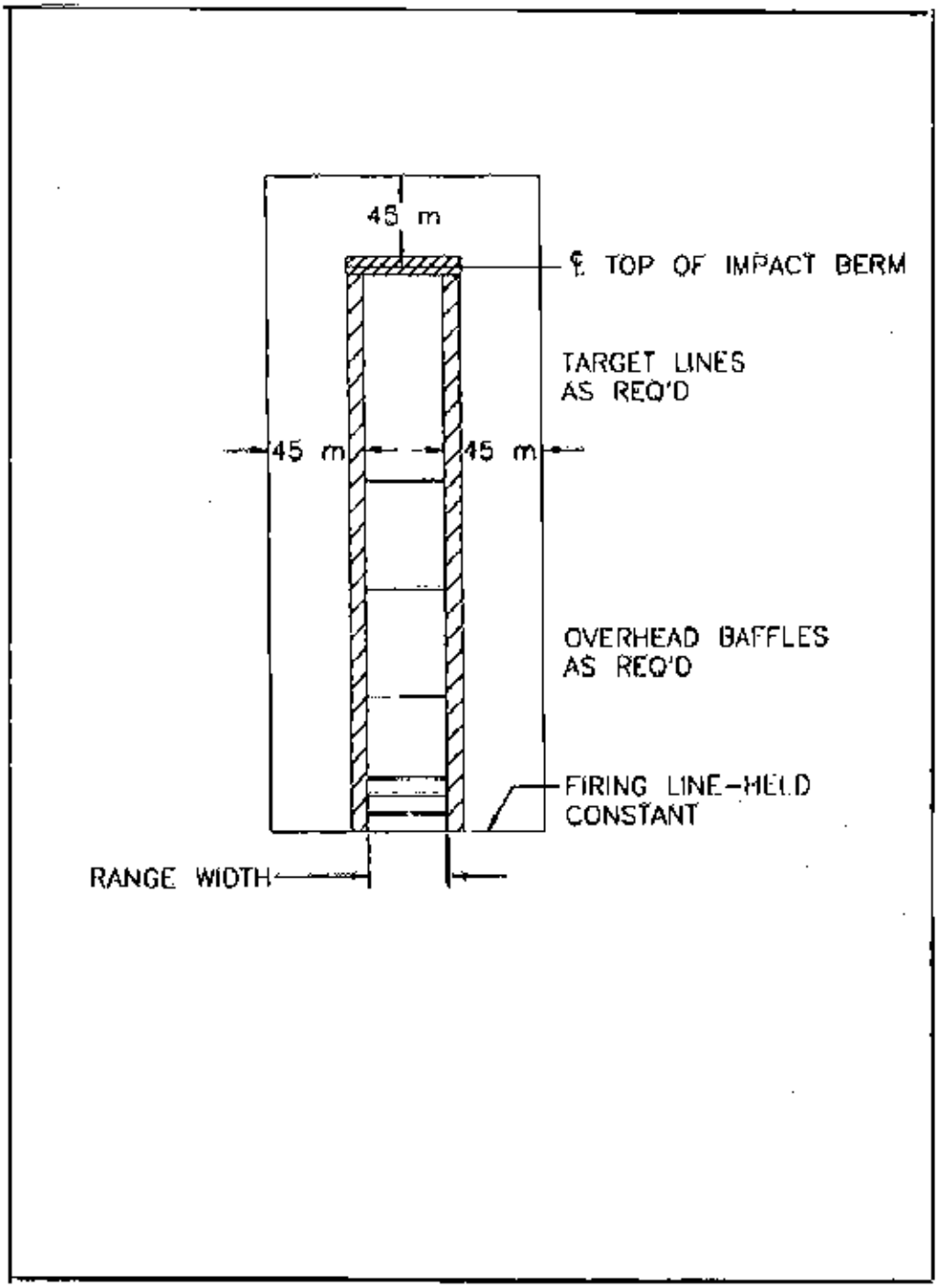


Figure 8
Surface Danger Zone for Fully Baffled Range
(Small Arms Firing at Fixed Ground Targets)

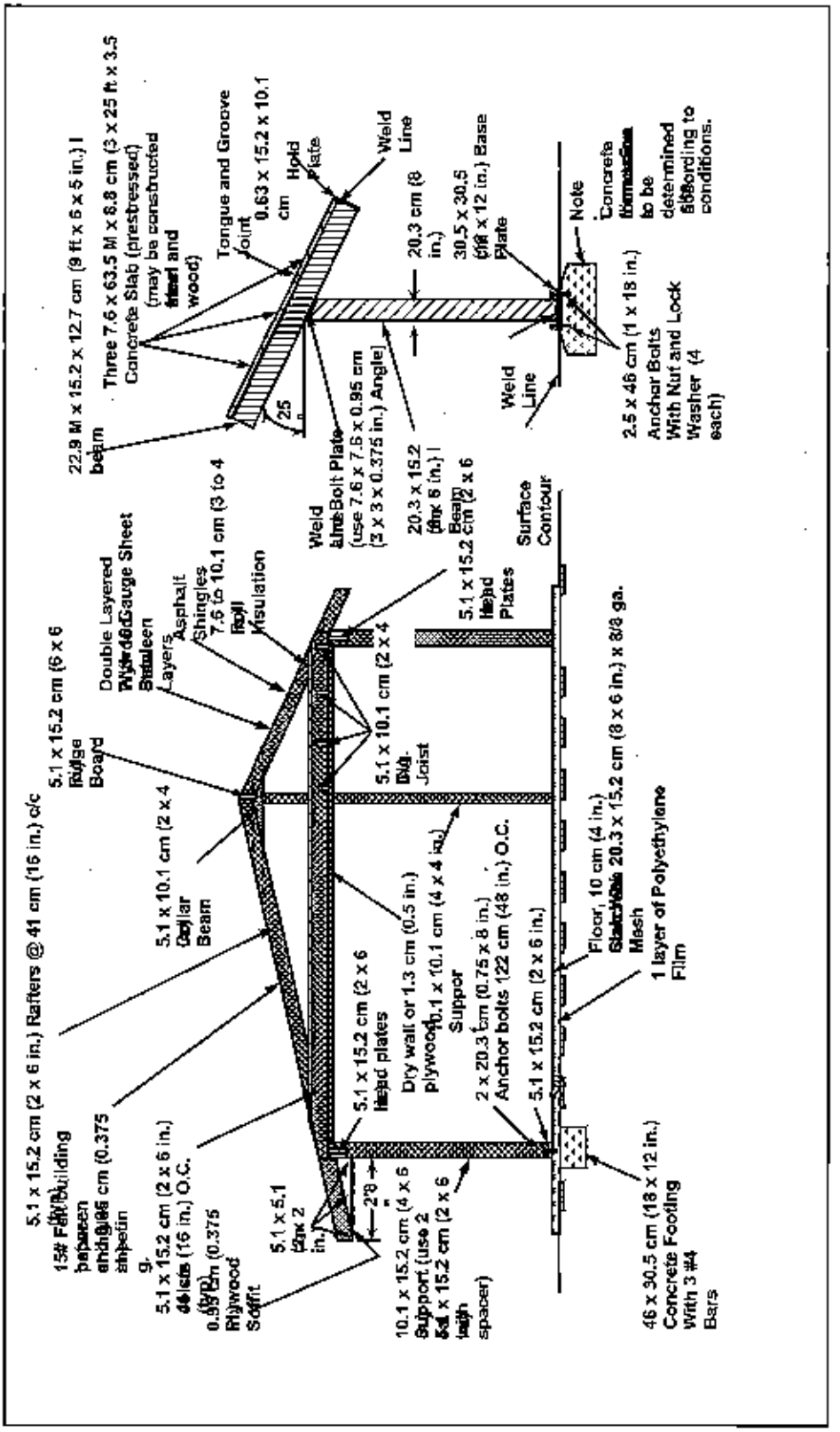


Figure 9
Ballistic Overhead Canopy

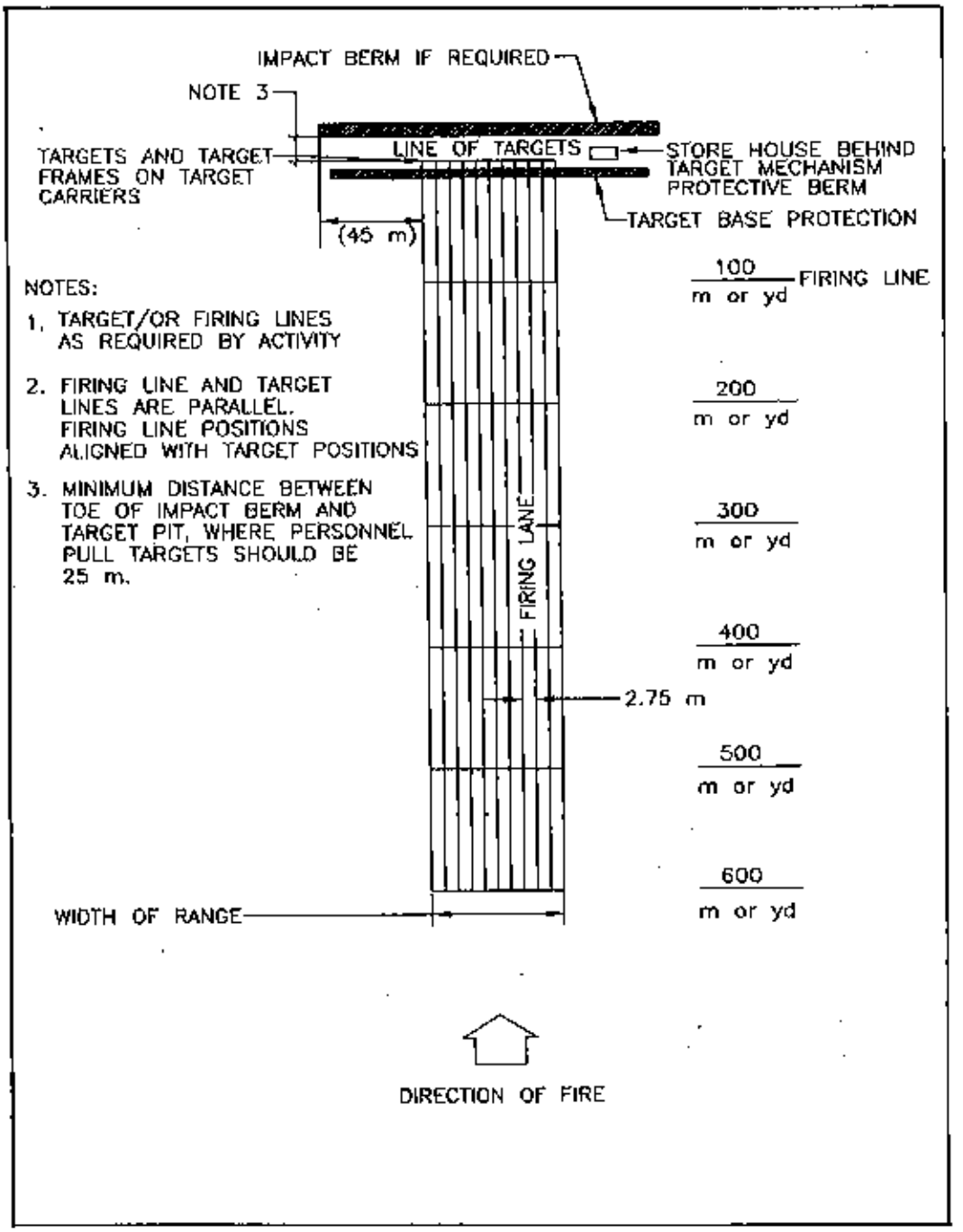


Figure 10
Outdoor Rifle Range Layout

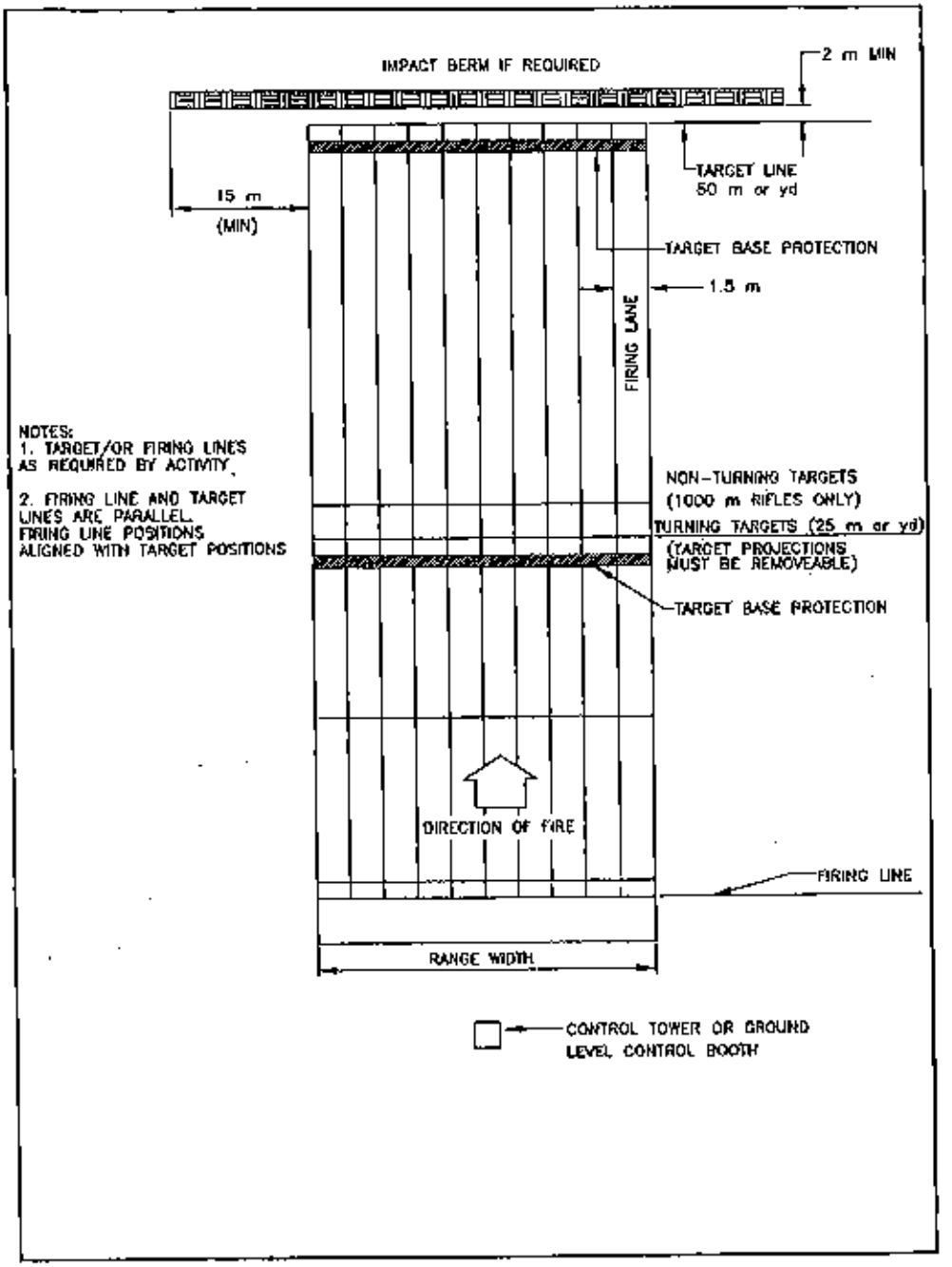


Figure 11
Pistol Range Layout

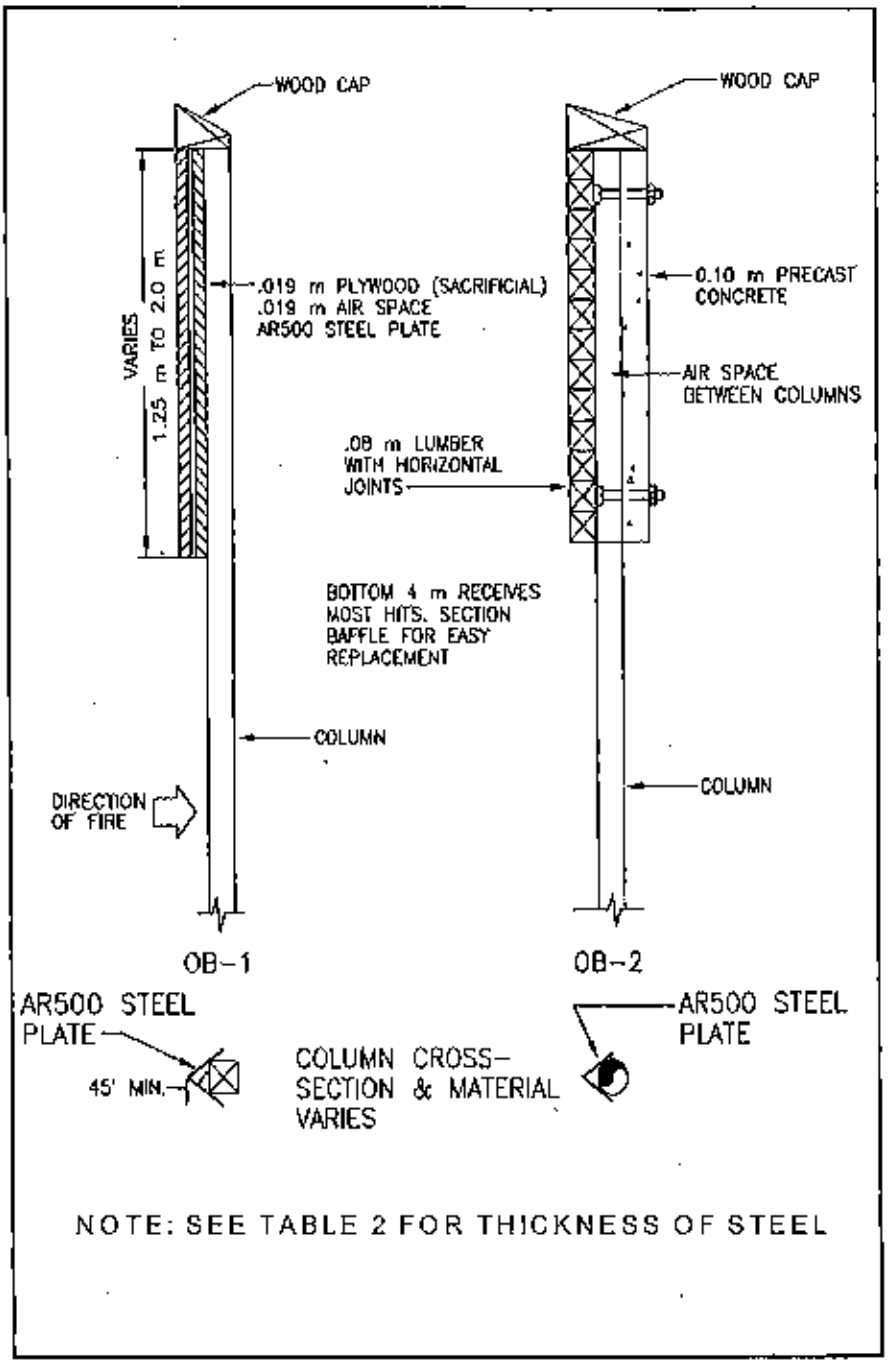


Figure 12
Ballistic Material

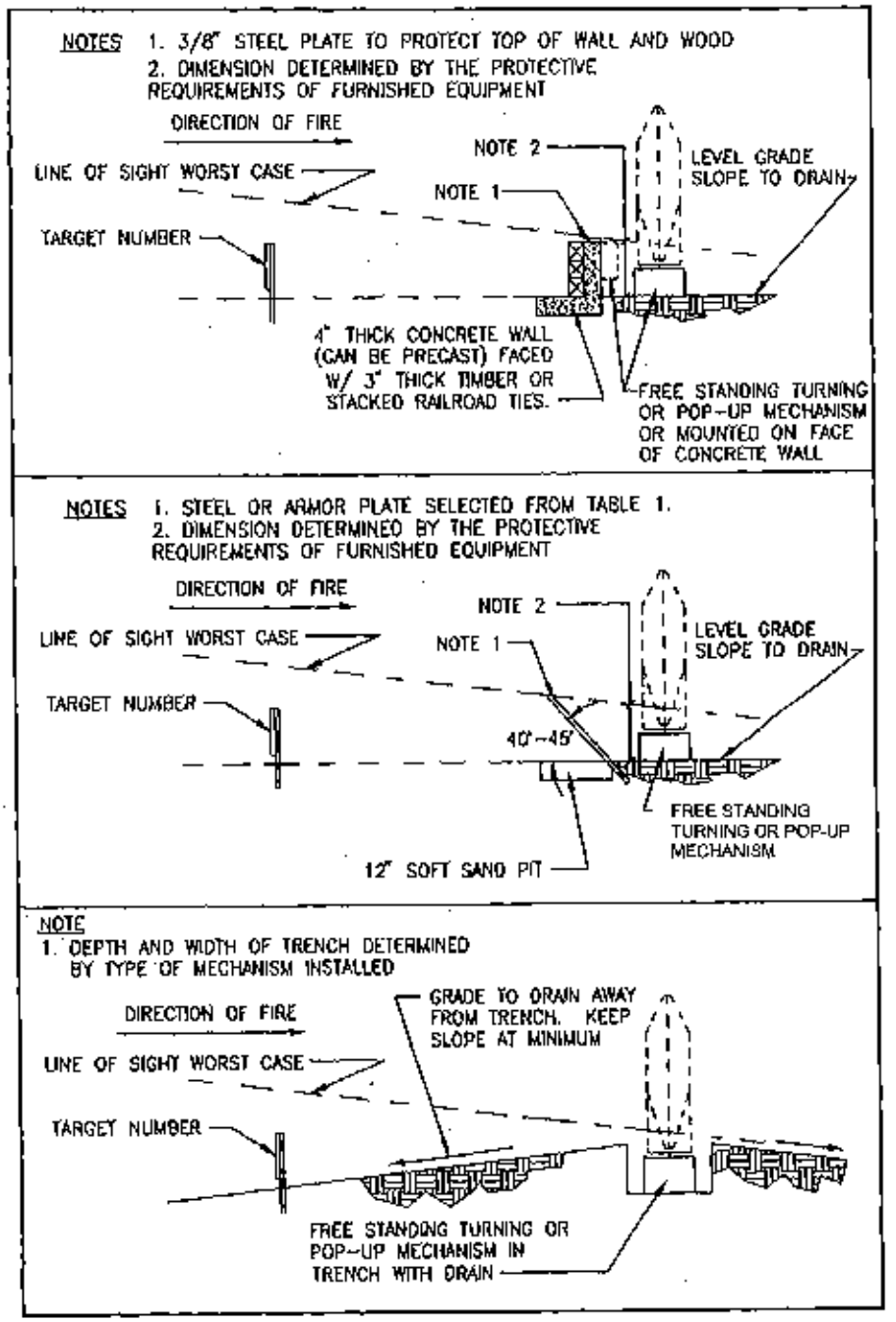
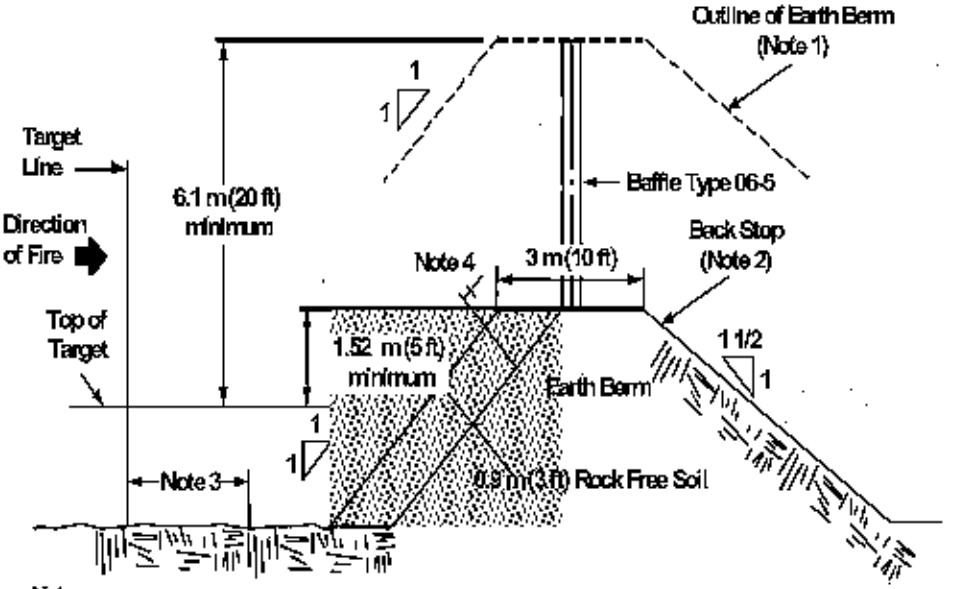


Figure 13
Ballistic Protection of Target Mechanism



Notes:

1. Outline of impact berm if all earth berm is used in lieu of combination earth berm/baffle.

2. Back slope may be increased or decreased dependent upon soil stability, erosion potential, or maintenance equipment.

3. Provide adequate distance between berm and target line for maintenance of target and slope of berm [minimum 9 m (10 yd)].

4. Preferred slope of impact berm face is 1:1 or steeper. For shallower slopes a bullet catcher is required. Top baffle must be placed as shown if used in lieu of all earth berm. Bullet catcher is 0.95 cm (3/8 in.) steel plate positioned above point of bullet impact at 90° angle to face of berm slope. Plate protrudes at least 0.6 m (2 ft) from face of berm.

Figure 14
Impact Berm for Open and
Partially Baffled Ranges

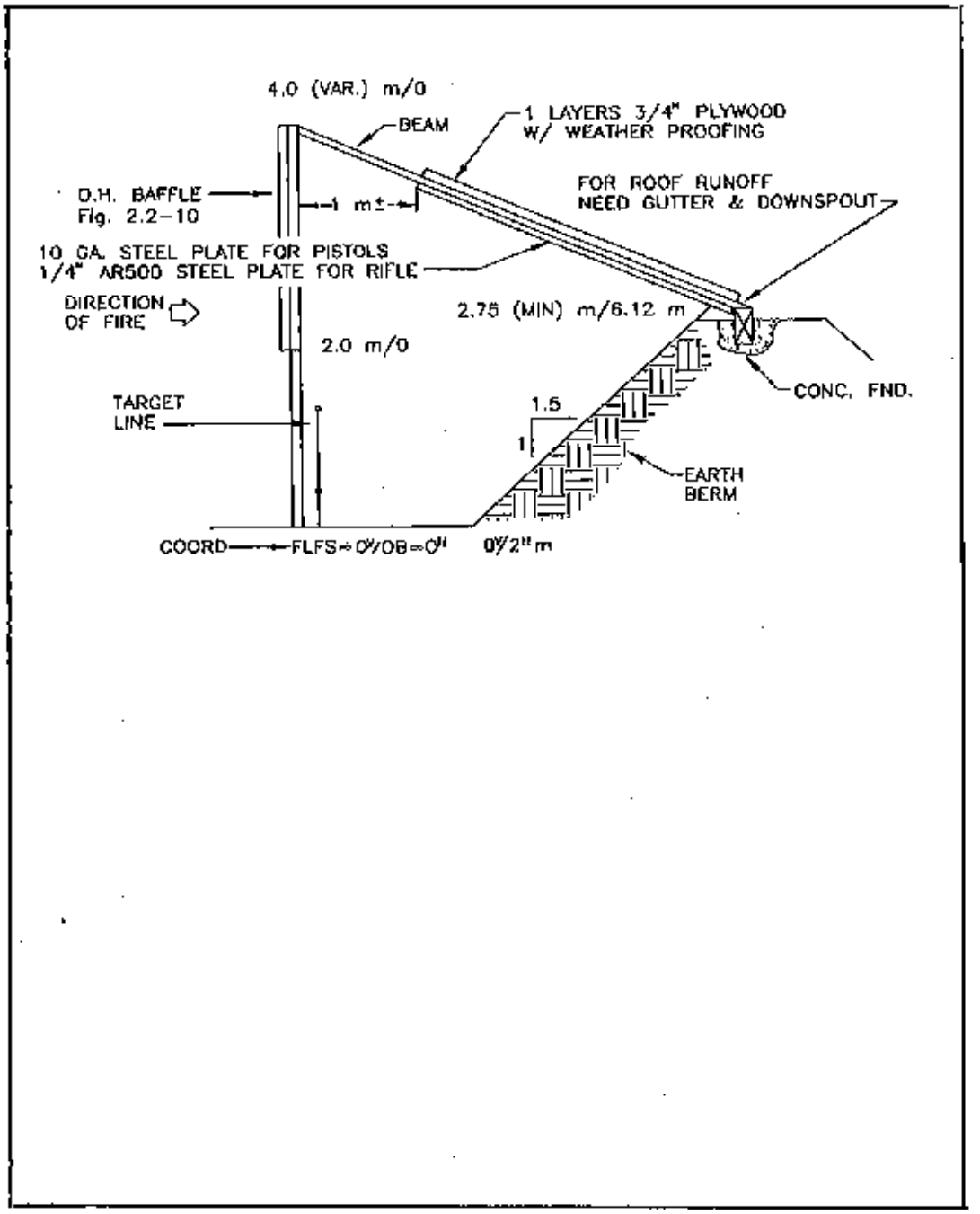


Figure 15
Outdoor Bullet Trap

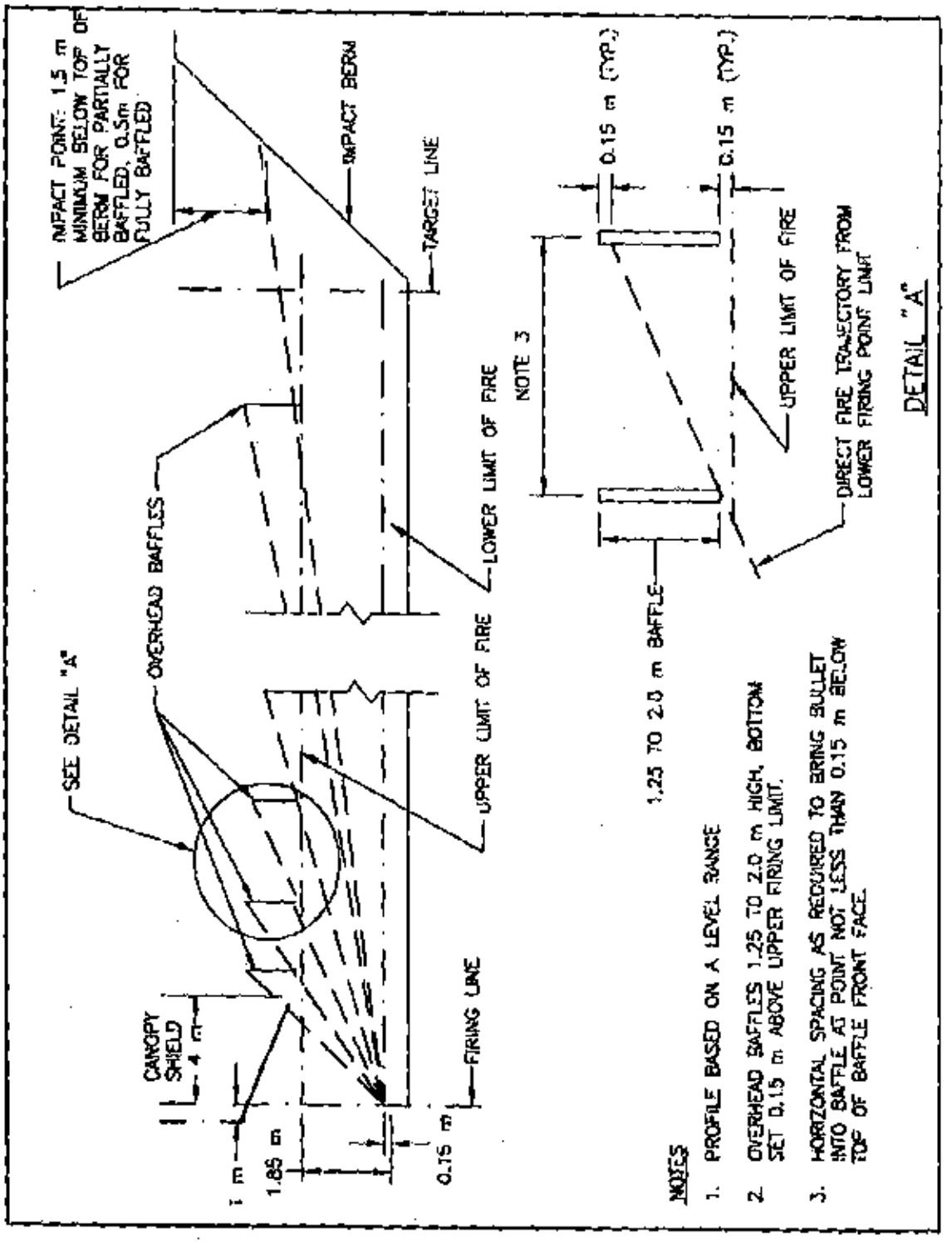
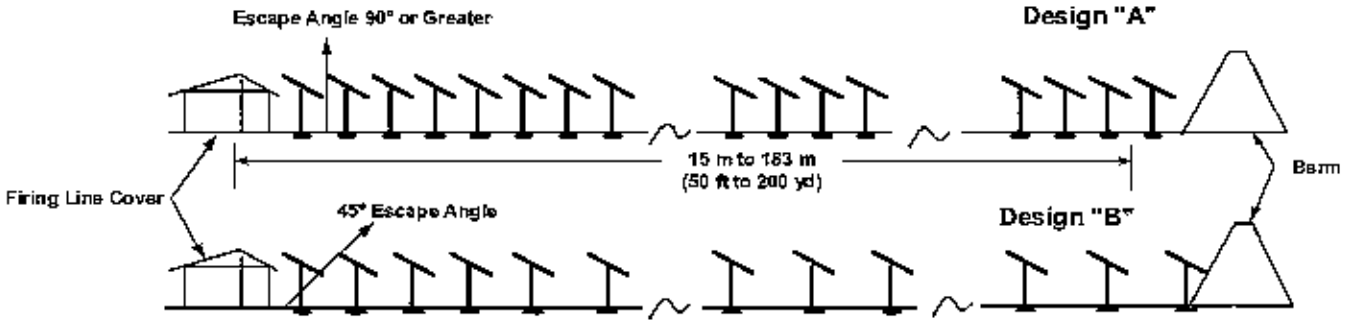


Figure 16
Baffled Range Profile



Notes:

1. These are typical examples of a baffled range.
2. Baffles are spaced according to the downrange area.
   a. Where inhabitants are less than 0.4 km (0.25 mi), use design "A."
   b. Where controlled areas extend beyond 0.4 km (0.25 mi), use Figure 13b.
3. Baffle installation may not be required where terrain features such as mountains exist.
4. When baffles may be required as encroachment occurs, plan a program of installation over a 5-year period.
5. See Figure 13b for firing line cover details.
5. See Figure 9 for firing line cover details.

Figure 17
Baffle System Geometry

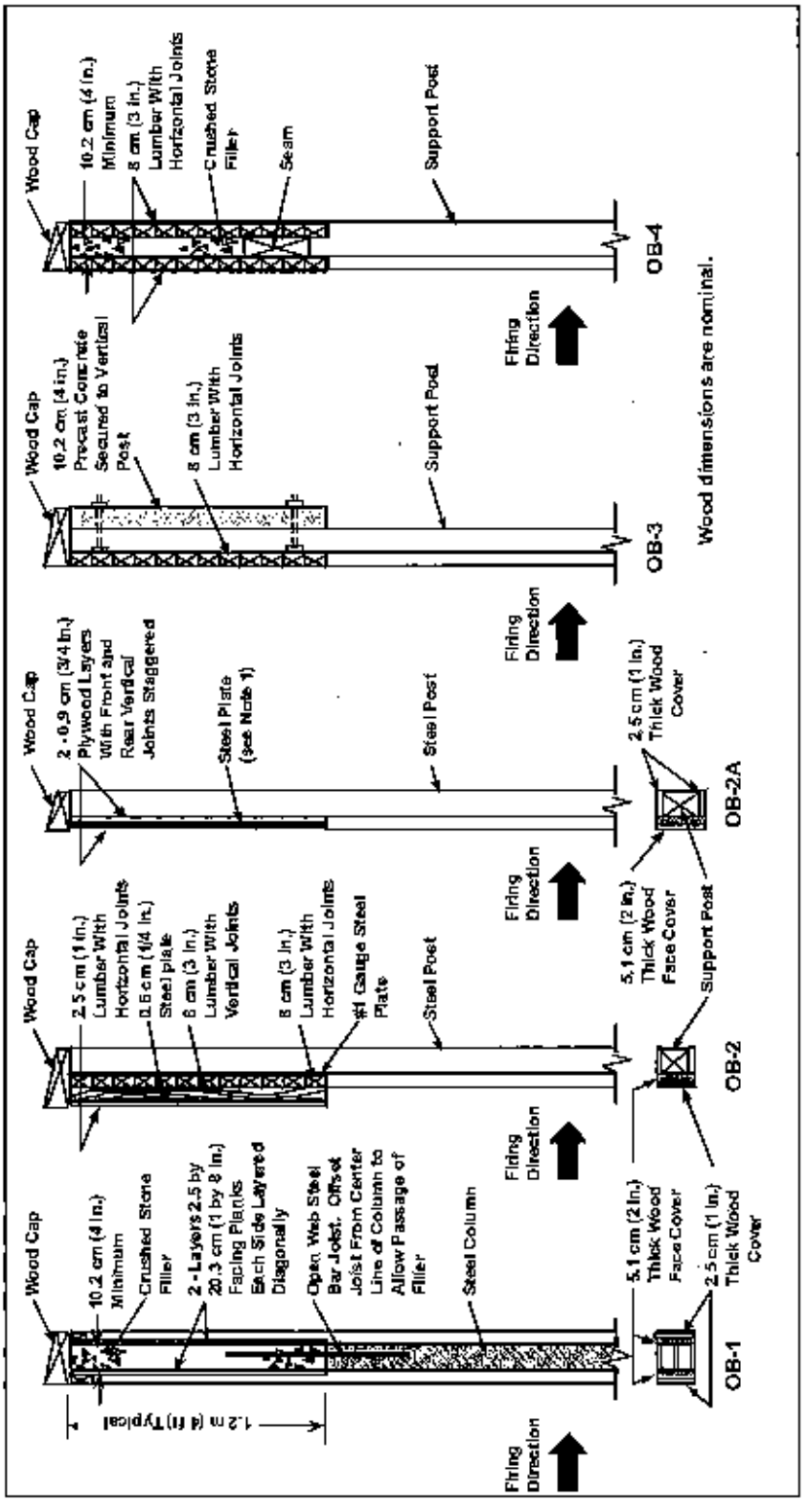


Figure 18
Overhead Baffle Ballistic Designs

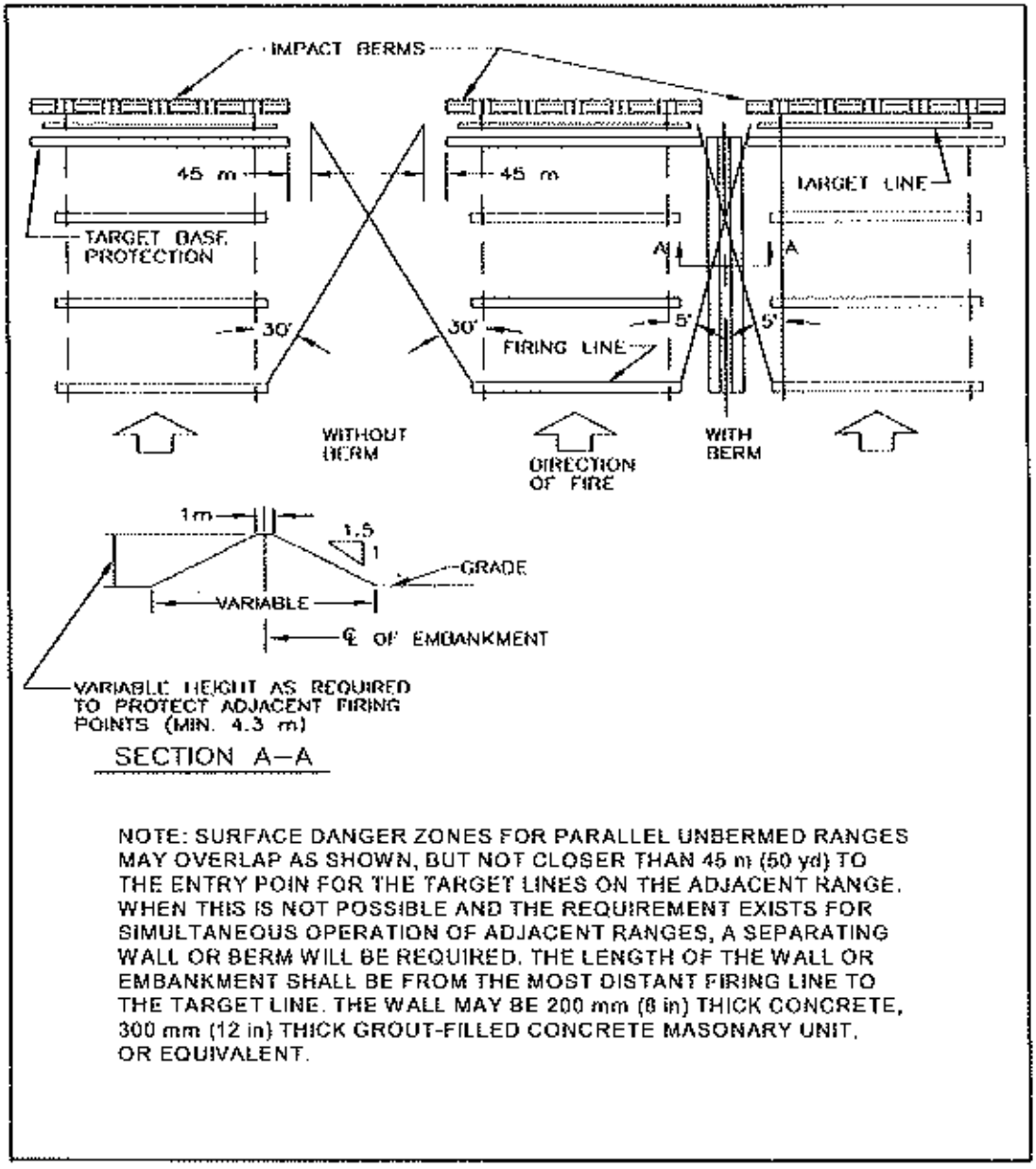
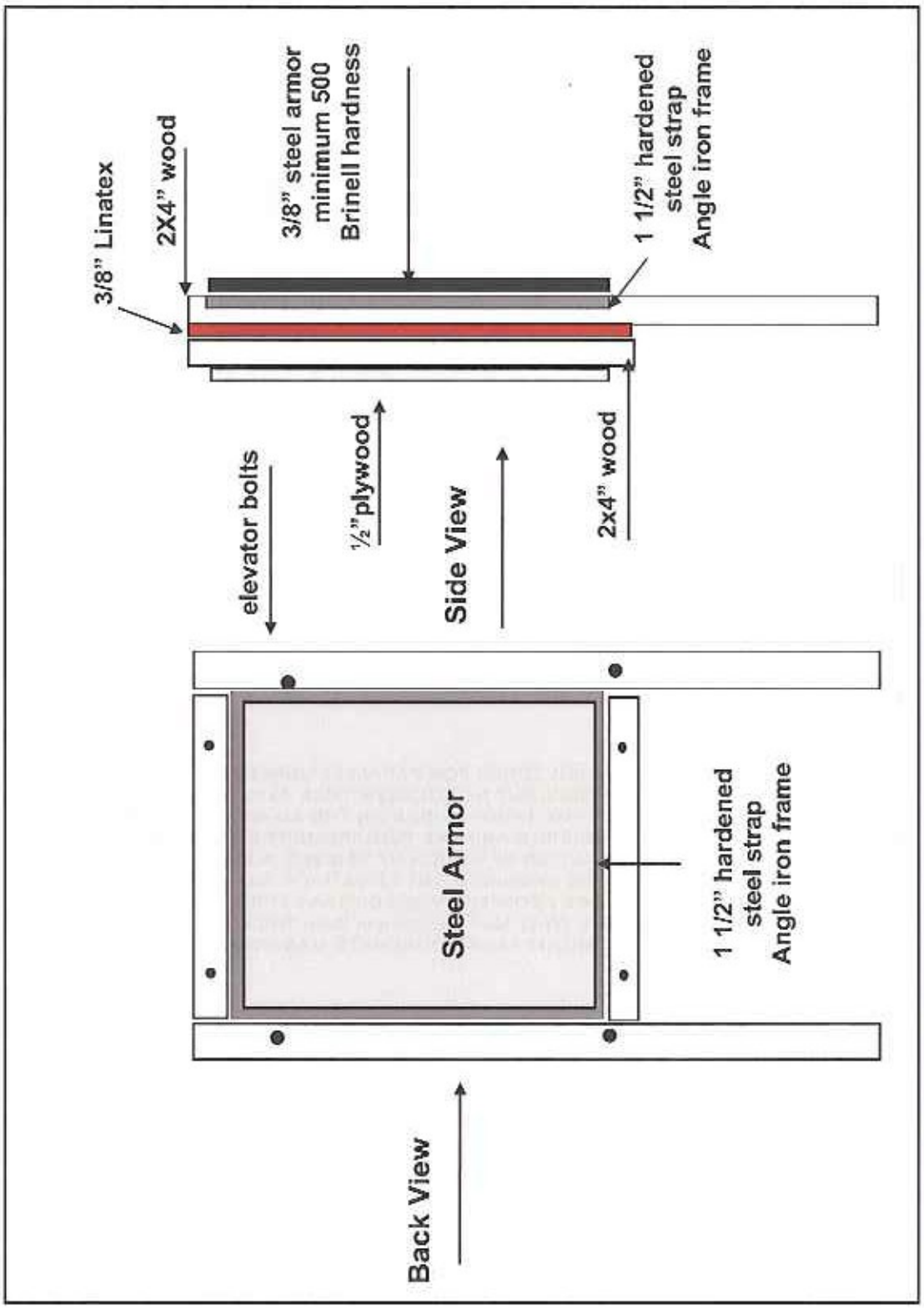


Figure 19
Parallel Ranges


3/8" Linatex
2X4" wood
3/8" steel armor
minimum 500
Brinell hardness
1 1/2" hardened
steel strap
Angle iron frame
elevator bolts
½"plywood
Side View
2x4" wood
Steel Armor
1 1/2" hardened
steel strap
Angle iron frame
Back View

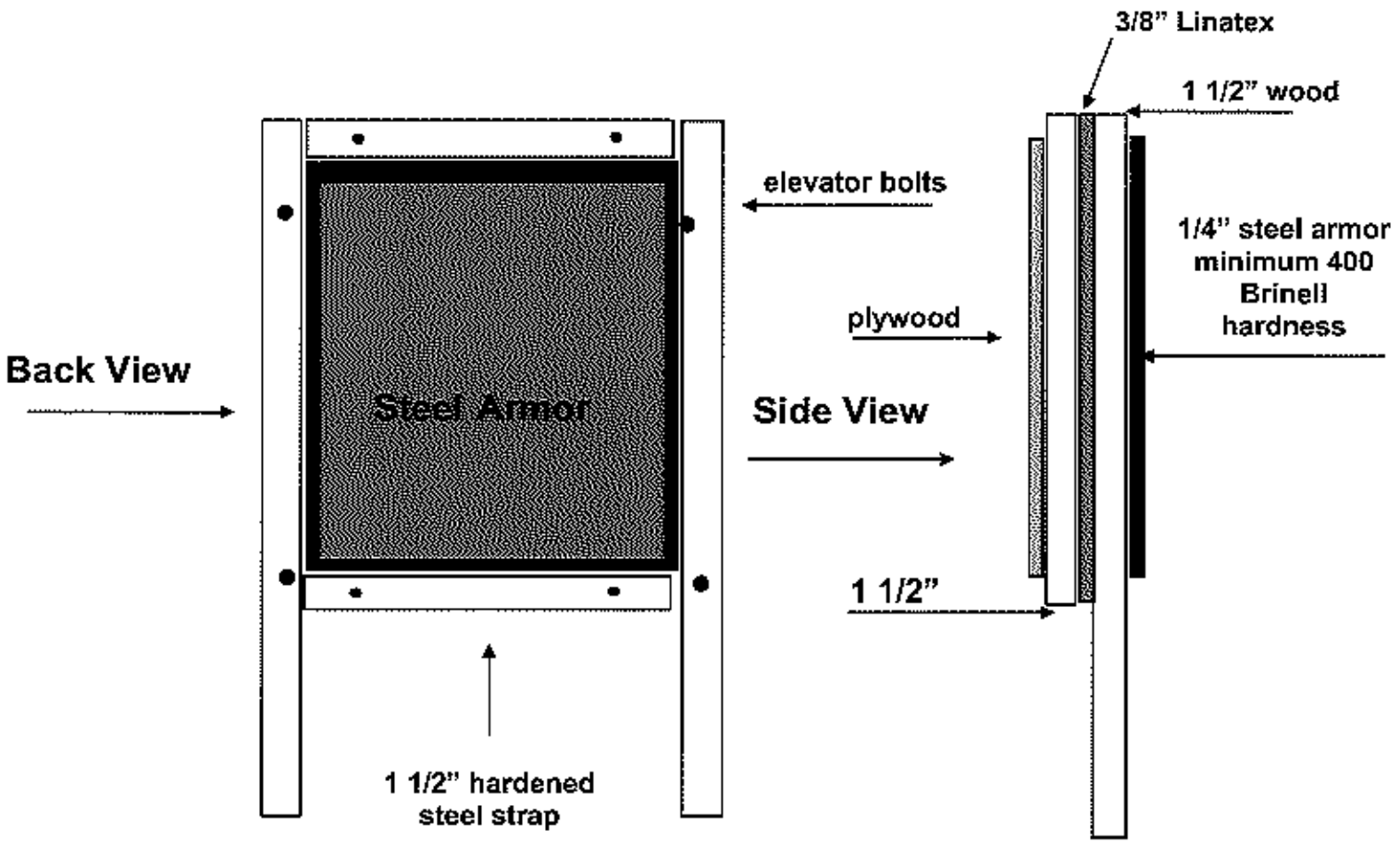


Figure 20
NTC BULLET TRAP

Mary Miller

From: Bill Roth [wroth@hughes.net]
Sent: Sunday, July 24, 2011 11:28 PM
To: Mary Miller
Subject: FOP CUP

Mary-

There has not been enough time for me to review the FOP's latest revision to their CUP, however, I would offer a few cursory comments.

If the Sheriff's Department and the Lawrence Police Department have a jointly agreed to set of requirements, they should make them available to the public. In that way the FOP can determine if they can meet them. If they can't then it will be necessary for the County/City purchasing department to make a request for bids to see who can meet the specifications. As it now stands we have an incestuous situation where the requirers are the providers and it is not possible to make a proper selection, as there do not appear to be any any definitive requirements, other than we want our Club House and we'll run it for ourselves as we see fit.

My comments on the FOP's submittal are:

1. There were distinct operating hours for; the law enforcement training, what I assume was non law enforcement training (group) and members recreational shooting. This is not appropriate as shooting is shooting and the neighbors can not be expected to call 911 and inquire who is shooting. The times specified must be the same for everyone, as it is not the neighbors responsibility to monitor range operations.

    a. 08:00 am til 9:00 pm on weekdays.
    b. 09:00 am til 7:00pm on Saturdays
    c. 12:00 pm til 5:00 pm on Sundays

2. The noise decibel level is be not more that 65db per the NRA Acceptable level stipulated in NRA Range Source Book Section one, Chapter Six, Section I-6-10, para 3.03.3.1. The FOP must make a firm commitment that they will construct sound deadening devices to ameliorate the noise which emanates from the pistol range.

3. No helicopter operations.

4. Signage is to be stipulated as every 50 feet on the perimeter and the sign on the front gate is to state that this is the FOP firing range.

5. A nit, para 13) should read reports "for" each range.

6. In addition to soil testing for lead, Washington Creek must be monitored to assure that lead is not leaching from the watershed into the creek.

Please advise me if you intend to have the meeting on Wednesday night. There are several of us that will have to cancel other commitments that we had made.

Thank you for your diligence in pursuing this effort. i hope that my comments have been constructive.

Bill Roth

suggested: no shooting on Sundays at all, later starting times and earlier ending times for both weekdays and Saturdays, and scheduling one night a week for shooting that could extend until 9 pm.

4. We request that the FOP inform the neighbors when any special training events will take place, such as night shooting, emergency vehicle operation on the grounds, or other notable special training.

The closer the neighbor lives, the stronger the support for this issue.

These were the specific items we agreed on at the end of our meeting.

Many issues were discussed and will no doubt be resolved during the application for a conditional use permit. But this is the list that we felt could be presented to the county administrator when the time is right.

If I missed anything or have some of it wrong, let me know.

Steve Lewis

Record of Meeting of Lone Star Neighbors April 29, 2006

A meeting of neighbors interested in the operation of the FOP was held on Saturday April 29th, 2006 in Steve Lewis's garage.

In attendance were:

Steve Lewis resident of 625 N 775 Rd.

Scott Mesler resident of 657 N 775 Rd.

Bill Roth resident of 640 N 775 Rd.

Karl Birns resident of 809 E 661 Diagonal Rd.

Charlotte and Harry Knoche resident of 798 E 661 Diagonal Rd.

Bryan Young resident of 813 E 661 Diagonal Rd.

Jim Lock resident of 643 N 750 Rd.

Tim Coldsnow owner of property west of E675 Rd.

Bryan Young, Harry Knoche, and Jim Lock attended the later portion of the meeting.

Besides being an opportunity for neighbors to meet, share, and discuss the concerns we have regarding the activities at the Fraternal Order of Police Lodge, the main goal of this meeting was to develop a list of suggested changes to the operation of the FOP lodge. This list could then be presented to the county administrator, and possibly other parties, as the issue is further considered.

Here are the recommendations.

1. Discontinue use of the lodge and grounds by the military. We agree there must be other locations the military can use for helicopter landings, detonation of ordnance, rifle practice and other such training.

2. Prohibit the detonation of any ordnance at the lodge and grounds.

3. Limit the hours of shooting guns. Here there was diversity of opinion as to what the hours of shooting should be, but all were agreed that a limited schedule of firing weapons is needed.

One recommended schedule was: Weekdays from 8 am to 8 pm, Saturdays from 9 am to 6pm, and Sundays from 10 am to 6 pm. This schedule was supported by the majority in attendance. Several variations were

Mary Miller

From: BNGWilson@aol.com
Sent: Friday, July 22, 2011 9:01 PM
To: Mary Miller
Subject: planning commision meeting

I find it unacceptable that you plan to tell us after the 25th whether or not a meeting on the 27th will include consideration of the FOP CUP. All other such notices have been received in writing at least a couple of weeks in advance of the meeting. There is no possibility of such advance notice in writing to people affected by the FOP's behavior in this case. I would like to object formally. I have made other plans for the 27th and will not be able to be there. Submitting comments in writing in advance does not permit responses to comments made that evening by planners or other speakers. I waited on April 25 from 6:30 until 10:30pm for an opportunity to speak, which came sometime around 11:30pm. I don't enjoy walking the downtown streets to my can at midnight and driving home to the Lone Star area, but I will do that again if I am given reasonable notice of the meeting. Why can't the FOP get its act together? It was suggested to them by the planners last time that they meet with the neighbors to work something out that is mutually agreeable. They have made NO effort to meet with those of us who live close enough to be affected by their activities, and I would suggest that they have no intention of trying to work with us at all. Your allowing a meeting to include their request for CUP to be scheduled with less than 48 hours notice to neighbors is UNACCEPTABLE.

Beverley Wilson 625 N 750 Road 66047

765 E. 750 Road
Lawrence, KS 66047
July 25, 2011

Mary Miller
City/County Planner
6 East 6th Street
Lawrence, KS 66044

Hand Delivered

To Whom It May Concern:

This comment relates to CUP request No. 12-8-10 submitted by the FOP. The FOP property shares well over 1/2 mile of common boundary with our farm which is located at 765 E. 750 Rd.

Our focus is safety. Naturally we expect the range to be designed, constructed and operated in a manner consistent with the highest generally accepted standards established for such facilities.

Very truly yours,

Jeffrey O. Heeb

Mary Miller

From:	Karl Birns [kbirns@gmail.com]
Sent:	Sunday, July 24, 2011 5:55 PM
To:	Mary Miller
Cc:	'Terry Shistar'; 'Bill Roth'
Subject:	FOP CUP Comments 7-24-11
Attachments:	Record of Meeting of Lone Star Neighbors April 29.docx
Importance:	High

The following are the comments of Karl Birns and Terry Shistar, residing at 809 East 661 Diagonal Road

Mary:

We received your revised draft CUP for the FOP shooting range on Friday, 7/22. You'd sent it to Bill Roth at close to 2PM with a requirement that comments be submitted in writing to you by 10AM on the following Monday. That gave us just 4 business hours to reply to a document that has taken you and the FOP months to prepare. Therefore, we request that this item be postponed at least until the August commission meeting to give the citizens sufficient time to review and comment. Further, we request that you freeze your document revision discussions with the FOP so that the document that we review is not changing behind closed doors while we review a prior draft.

General Comments:

1. Training of law enforcement officers is a responsibility of the county and municipal law enforcement agencies. Therefore, the FOP is not the group that should build and operate a shooting range for this purpose. A long range plan should be adopted for the public law enforcement agencies in the area to build a state-of-the-art range that meets accepted standards for noise, safety and environmental control. Continued use of the FOP for this purpose should be allowed only as a -out during transition to a government-operated training facility. If such were the case, then there may be justification for relaxed standards in the interim at the FOP. Otherwise, the FOP should be required to meet those design and operation standards as contained in documents previously submitted to you by Mr. Roth, the NRA The Range Source Book, A Guide to Planning and Construction, revised January 2004. Regardless, standards should have enforceable criteria and limits, rather than vague statements that are left up to the operators to interpret.
2. The CUP recognizes that lead used in shot and ammunition represents a potential problem. Lead ammunition should be replaced with other materials (e.g. steel shot for shot guns), wherever available. The county Health Dept should be required to monitor the site for lead run off and soil contamination, and standards set to trigger mandatory mitigation and clean up if contamination is found.
3. The Lone Star Neighbors Association has meet with both county officials and the FOP. A document was prepared with recommended practices for the range. This represents a fair consideration to the concerns of local residents. Attached is a record of that meeting. Besides being an opportunity for neighbors to meet, share, and discuss the concerns we have regarding the activities at the Fraternal Order of Police Lodge, the main goal of this meeting was to develop a list of suggested changes to the operation of the FOP lodge to present to the county administrator, and possibly other parties, as the issue is further considered.

   Here are the recommendations.

a. Discontinue use of the lodge and grounds by the military. We agree there must be other locations the military can use for helicopter landings, detonation of ordnance, rifle practice and other such training.

b. Prohibit the detonation of any ordnance at the lodge and grounds.

c. Limit the hours of shooting guns. Here there was diversity of opinion as to what the hours of shooting should be, but all were agreed that a limited schedule of firing weapons is needed.

One recommended schedule was: Weekdays from 8 am to 8 pm, Saturdays from 9 am to 6pm, and Sundays from 10 am to 6 pm. This schedule was supported by the majority in attendance. Several variations were suggested: no shooting on Sundays at all, later starting times and earlier ending times for both weekdays and Saturdays, and scheduling one night a week for shooting that could extend until 9 pm.

d. We request that the FOP inform the neighbors when any special training events will take place, such as night shooting, emergency vehicle operation on the grounds, or other notable special training.

4. The public should have access to the lead abatement and noise abatement reports including testing results, mitigation activities and lead disposal.

Detailed Comments on proposed CUP

In the short time available for review, it appears that the CUP is more of a list of recommendations rather than a requirement with enforceable standards for operation of the facility. This is an abrogation of the county's responsibility to its citizens to protect their health and welfare. The CUP should address health, noise and environmental impacts. It must contain specific sound standards, emissions standards and action levels, with pre-designated mitigation measures triggered by exceedance of these standards. The local Health and Environmental regulatory agency is the appropriate party to monitor these aspects of the facility's operations and require implementation of the mitigation plans. I did not see them referenced in the document nor am I aware whether they were consulted as part of the CUP document development process.

Examples of the abrogation of the county's responsibility can be found in the revised language of the CUP, which has become more permissive and vague regarding the maintenance of the tree buffer areas and the site lead control activities. The buffer areas are not designated with any regard for actual plat location or standards for arboreal control such as tree density, type or height. Even the standard for tree harvest was removed. Further, the lead abatement language doesn't even address ground water contamination or surface water runoff from lead collection sites.

Given additional time, we would have liked to research and compare these permit requirements to those on shooting ranges used in other jurisdictions. This FOP range must have similarities to other ranges in our state and around the county. The county should have done this research. How has permitting been addressed by local governments elsewhere?

Submitted Karl Birns and Terry Shistar, July 24, 2011

From: Mary Miller <mmiller@lawrenceks.org>
Date: July 22, 2011 1:47:25 PM CDT
To: 'Bill Roth' <wroth@hughes.net>
Subject: RE: FOP cup

Bill,
The FOP CUP is scheduled for the July 27th meeting, at the Commission room in City Hall (6 East 6th Street). The FOP board is reviewing the proposed conditions and hopes to have their comments in by Monday the 25th. If not, it may be necessary to defer this item to another month to allow the board time to review the conditions and propose alternatives, where necessary.

I've attached a copy of the revised conditions. The PC agenda is available on the Planning Website at http://www.lawrenceks.org/planning/documents/pcagendaJulyFull11.pdf If a deferral is necessary, the request will be submitted to the Planning Commission for their consideration.

The deadline for written communications on this item is Monday, July 25th, at 10:00 AM. If you provide comments in writing (fax, mail or email) before that deadline they will be placed on the agenda for the Commissioners consideration.

(One item was placed on the agenda erroneously. It is titled 'develop an environmental stewardship plan for the shooting range'. This is a draft document that I was using for notes and it will be removed from the agenda as soon as possible.)

Please let me know if you have any questions. The website will update the agenda occasionally with new materials.
Thanks,
Mary

Mary K Miller, AICP, City/County Planner- mmiller@lawrenceks.org
Planning Division | www.lawrenceks.org/pds
P.O. Box 708, Lawrence,KS 66044
Office (785) 832-3147 | Fax (785) 832-3160

-----Original Message-----
From: Bill Roth [mailto:wroth@hughes.net]
Sent: Friday, July 22, 2011 1:32 PM
To: Mary Miller
Subject: FOP cup

For Mary Miller-

Considerations which the revisions to the FOP's CUP must address are-

Committment to take positive actions to abate the noise produced by training sessions
Sunday hours are to be from Noon till 5:00 (a sociable time to allow neighbors to enjoy a Sunday evening with friends)

Night time shooting is to cease at 9:30

When you have the final ideas on the positions in the revised CUP, will you please forward them to me so that our neighborhood can assess the situation?

Again Thanx for your diligence.

Bill Roth

ITEM NO. 2 CONDITIONAL USE PERMIT FOR THE FRATERNAL ORDER OF POLICE SHOOTING RANGE; 768 E 661 DIAGONAL RD (MKM)

CUP-12-8-10: Consider a Conditional Use Permit for the Fraternal Order of Police shooting range, located at 768 E. 661 Diagonal Road. Submitted by Dan Affalter, for Fraternal Order of Police, property owner of record. *Deferred by Planning Commission on 4/25/11.*

STAFF PRESENTATION
Ms. Mary Miller presented the item and went over the conditions.

Commissioner Finkeldei recused himself from the item.

APPLICANT PRESENTATION
Mr. Mike Riling, attorney representing Fraternal Order of Police (FOP), said the FOP operated a range for its membership and that the use was minimal. He said they hoped the city and county would get their own range at some point but when that happened the FOP would be stuck with the conditions. He said this was not fair. He stated the FOP has allowed the police and sheriff's department to use the range for some 40 years. He did not think enforcement would be a big deal in terms of telling when the range would be used by the police or sheriff's department. He stated the FOP had been burned by setting regulations. When the law enforcement center was built many years ago there was a range deep inside of it which never got fired upon by any training. It was designed and made to be used and it was never used. He said the FOP was frustrated in trying to get a handle on the conditions. He said soil testing through the Extension office was not available. He said noise abatement was something that needed to be done but that the driving force behind it was the sheriff and police departments who were the ones making the noise. He said the city and county had direct control over those departments. The FOP was being squeezed in the middle. He said trying to do noise abatement within 6-months was a probably not possible. He asked that noise abatement not be included. He said it was the city and county creating the problem. He said regarding the contact number on the gate they were fine with that. He said the hours of operation was different between the FOP and the police and sheriff training. He felt it was only fair to set apart the training hours versus the FOP general use.

Mr. Dan Affalter said regarding lime he talked to Dr. Cohen who was one of the environmental companies listed in the NRA Range Source book. Dr. Cohen claims to have written many of the things the EPA Best Practices regulations were based on. He said you could not just throw lime on a problem because it may inadvertently create arsenic. He said it would involve some science to figure out abatement for lead.

Mr. Riling said the FOP was fully aware that if lead got in the water supply it was a problem. He said they have been monitoring it and there was no sign of lead contamination in the water. He said the Kansas Department of Health and Environment (KDHE) had been to the property. He said the soil had a high content of lime so the facility was already in a good location. He said the facility had to exist somewhere and the reality was that nobody would want it built in their backyard as a new facility. He stated this site had been there for 40 years.

Mr. Ken McGovern, Douglas County Sheriff, said currently there were 140 employees in the agency and needed flexibility for shooting hours. He said they plan on letting the neighbors know when they will be there doing training and the hours.

Mr. Tarik Khatib, City of Lawrence Police Chief, said sharing the range was not an ideal situation. He said 70% of law enforcement firearm encounters occur during nighttime conditions. He said there was no substitute for having an outside training facility to have real world experience.

Mr. Riling said regarding trees as a buffer it was not a big issue because there were no plans to cut trees. He said the big issue was the shooting times and it was important to draw the distinction between the two uses so the individual members could use the range in a more expanded fashion than the training facility. He said noise was a problem but the FOP could not fulfill what they were being asked to do because nobody could lay

a solid plan out. He said an artificial time period for noise abatement was going to be difficult and the FOP did not want to do something that would create a bigger problem. He said regarding the environmental factor the FOP was aware of the need to keep an eye on the lead but there were other agencies already regulating that area, such as KDHE and the Environmental Protection Agency (EPA).

Mr. Affalter said the FOP had preliminary conversations with city and county officials regarding funds to accomplish whatever noise mitigation needed to happen. He said he could not get them to agree to pay for something without a guarantee a permit would be in place.

Mr. Riling said the police would be subject to City Commission and suggested neighbors talk to City Commission about the use of the range. He said the City Commission could impose their own limitations on the police department. He said he did not want to commit to something that may or may not work. He asked Planning Commission to adopt the Conditional Use Permit (CUP) for the FOP.

PUBLIC HEARING

Mr. Ron Wilson said he lived within the ½ mile zone. He inquired about a building in the woods and what it was made out of and what they were using it for. He wondered if this was a law enforcement or recreational establishment. He agreed with the fact that the Extension office could not test for lead. He said he found the name and number of someone who could test for lead and it was $35, which he would be willing to pay for. He said he looked at the KDHE health findings and did not see any factual numbers about lead. He said he related weapons fire with someone trying to kill him. He did not like the noise of firing and felt it should be taken care of. He wondered if they would be going over this again in 10-15 years when his house becomes part of the suburbs of Lawrence.

Mr. Bill Roth, lives west of the range, thanked Planning Commission and staff. He said the neighbors were not against law enforcement personnel. He said the range was set up before the EPA was established in 1970. He felt they should look at the CUP in another 5 years. He mentioned Topeka's firing range by hiring a consultant and had an excellent range with berms. He said they only occasionally fire at night. He felt the hours should be more restricted.

Ms. K.T. Walsh felt there should be signs along Washington Creek to indicate the beginning and end of the property so canoeists would know.

Mr. Eric Knoche said his property was probably the closest house to the firing range. He expressed concern about the times. He agreed with the times that staff set up and felt those times should fit everyone's needs. He wanted to be notified if there would be late night shootings. He did not want any military usage of the range.

Mr. Karl Birns, lives within ½ mile of the range, said Mr. Riling raised a lot of issues that were not directly related to the permit. He said the overburden of additional usage by city and county employees was the issue and that if they had their own facility it would not be an issue. He said he found numerous handbooks by military, state, and county governments on the design and construction of outside shooting facilities. He was dumbstruck that the FOP acting like they had never heard of it. He was surprised that nobody from the county or city health department was not present. He said that reports filed should be made available to the public instead of just the applicant.

APPLICANT CLOSING COMMENTS

Mr. Riling said there were methods of mitigating and some may or not work well. The FOP did not have a lot of money to spend on it. He felt there needed to be noise mitigation but how and when that would come he did not know. He said the bulk of the problem was due to city and county use and he felt those entities should have enough motivation to work with the FOP to get the mitigation done. He said 6 months for noise abatement was unrealistic and could set them up for further problems.

COMMISSION DISCUSSION

Commissioner Singleton inquired about time constraints.

Mr. Riling said this case was in front of Judge Kittel and she made a ruling but that it was now in front of Judge Fairchild who would be in favor of this being worked out in the form of a CUP to the extent that it could. Once the CUP was issued then the FOP had the right to accept it or not. If the FOP was satisfied they would drop the lawsuit but if not the lawsuit would continue. He said the range was still operating and there was no firm time to stop it. Training was ongoing.

Commissioner Liese asked if in the past 40 years there had been any injuries at the site.

Mr. Riling said there was one injury.

Mr. Affalter said it was an on-duty officer.

Commissioner Liese inquired about funding.

Mr. Riling said the FOP talked to the city and county about helping develop the range. He said the County Commission would be in a quasi-judicial role when they hear this case and if they committed to funding that would put them in a bad spot. He said it was kind of a chicken and egg situation. He said the CUP needed to come first and then mitigation ideas could be discussed. He said the county was hamstrung from doing it at this time.

Commissioner Liese asked staff their thoughts.

Mr. McCullough encouraged Planning Commission and County Commission to act in their quasi-judicial manner. He said while it was interesting to hear the county's position as part of the group who uses the facility, they also have a role and responsibility to regulate it from a land use perspective.

Commissioner Liese asked what led to the accusation that a list of requests was submitted to the FOP but 'met a stonewall.' (He was referring to a letter from Mr. Karl Birns)

Mr. Affalter said at some point in 2006 the issue was brought to the FOP that neighbors were concerned. He said Mr. Craig Weinaug, Douglas County Administrator, contacted the board of the FOP and said they were in violation of zoning regulations. He said the county and city helped build the range and over the years have encouraged the building of the range.

Commissioner Liese felt communication should be better with the neighbors.

Mr. Riling said the FOP's reaction to the county was the fact a CUP was needed. He felt the county and city should be part of the solution for noise mitigation. He said they met with the neighbors and invited them to tour the range. He said the problem was not the FOP's use of the range, but rather the city and county training. He said the FOP had to get through this process first before any funding from the city and county could be received.

Mr. Birns said the reason he stated that was the neighbors got together and discussed issues. He said the FOP was starting to get involved in litigation with the county and did not want anything to do with the neighbors.

Commissioner Liese asked if he believed a good dialogue could exist between everyone.

Mr. Birns said he hoped so. He said the neighbors were not asking for much and he still thought it was possible. He said part of what they were dealing with was the uncertainly of what the future would bring. He said the neighbors would be willing to sit down and meet to discuss concerns.

Commissioner Singleton inquired about the noise from FOP members shooting versus training.

Mr. Riling said with FOP members it was typically one or two people shooting.

Mr. Affalter said a typical training had 8 people lined up shooting many rounds per second.

Commissioner Singleton inquired about noise testing.

Mr. Riling said he was not clear about what type of noise test and when, where, or who would measure it.

Commissioner Singleton did not feel the noise abatement plan should be the burden of the FOP since they were not the ones who were causing the aggravated noise to the area.

Mr. Affalter said before the litigation started he proposed to Mr. Welnaug to have the county get the CUP but he essentially said since it was FOP property it was the FOP's problem. He said if they could make it work they would certainly like to make that happen.

Mr. Riling said the FOP was not opposed to meeting with the neighbors and working things out but the CUP would have to come before the funding from the city and county, and then what to do would have to be figured out.

Commissioner von Achen inquired about lead abatement. She said under the recommended conditions it stated the property owner shall have the soil tested and the test would be maintained in the FOP office for review. She asked how those would be monitored and would they be available to the public.

Ms. Miller said no routine monitoring was planned, just would be available for the Douglas County Zoning and Codes office. She said the FOP would test the pH level of the soil, not lead, and then apply the necessary soil amendments.

Commissioner von Achen suggested forwarding those documents to an appropriate agency, such as the County Zoning and Codes staff.

Ms. Miller said they could forward to the County Zoning and Codes staff and the Planning office and also keep a copy available on site for the public.

Commissioner von Achen asked who the testing agency would be.

Ms. Miller said she would leave that up to the FOP and that the pH level could be tested by almost anyone.

Commissioner von Achen inquired about KDHE visiting the site

Ms. Miller said that information was with the original staff report. She said a complaint was made to KDHE and KDHE reviewed it and provided a response. KDHE looked at the pistol range and determined the berm was of sufficient height. They also looked at the distance of the trap range and did not feel it was a problem. KDHE said Washington Creek was carved into limestone and that it was not a issue at this time. She stated KDHE left a copy of the EPA Best Practices for the FOP and suggested they follow them. She said the complaint did not result in any findings.

Commissioner von Achen inquired about testing Washington Creek.

Ms. Miller said it would have to be proved the pollution came from the range.

Commissioner von Achen said a water test would be easy to do. She inquired about the condition that if another range was created out there it should be created outside of the floodplain.

Ms. Miller said when looking at a new location this location would not be seen as a good location for a new range.

Commissioner Blaser asked if mitigation was only being suggested for the pistol range.

Ms. Miller said on all the shooting ranges.

Commissioner Blaser said noise abatement/mitigation had a time duration and noise level so he was not sure that noise would turn out to be a problem. He said it may be a problem for the 4 second time period of shooting. He expressed concern about environmental issues. He said with the trap range that steel shot could be used instead of lead.

Mr. Affalter said there were non-toxic shots available but they were expensive.

Commissioner Blaser said there should be some sort of condition about testing of the soil. He said it sounded like Planning Commission needed to resolve something tonight because County Commission was waiting on Planning Commission. He said regardless of when the EPA was formed it did not make things grandfathered or exempt. He thought they needed the training area and needed to move this forward. He felt noise needed to be tested but he did not know that it would be a huge issue.

Commissioner Hird asked staff if there was any evidence now that there was a lead pollution problem.

Ms. Miller said no, there was no evidence of a problem because it had not been tested. She said the recommends the Best Management Practices but that they are not required.

Commissioner Hird asked if the EPA would regulate lead runoff into the creek.

Ms. Miller said KDHE would get involved.

Commissioner Blaser asked if there was a time limit for the CUP.

Ms. Miller said no time limit was suggested since it already existed for 40 years. She stated Planning Commission could do a review time or time limit.

Commissioner Hird agreed with Commission Blaser about moving this forward. He said it would be ideal to return it to a social club but that the FOP had been doing a wonderful service to the community by allowing the county and city to use the range. He said initially it seemed like a joint effort but that the FOP was taking the brunt of the problems caused by city and county training use of the facility. He felt the city and county should step up and provide funding. He said it was unfair for the FOP to be shouldering this when the city and county had an obligation. He said the FOP has been there more than 40 years and Mr. Jim Locks letter stated that most home owners knew it was there when they moved to the area. He thought the hours of operation should be resolved. He said they needed to listen to law enforcement about what they needed in terms of training. He said regarding a mitigation plan using Best Practices was a wonderful idea. He did not want to impose conditions on the CUP that could not be met. He felt they should provide a longer period for a mitigation plan, such as a year. He stated noise was caused by the city and county law enforcement training. He said he did not know if there was a noise problem but he did not want to create a problem if there was none. He said the range was an essential part of the community and he did not want to limit it unduly by imposing standards that could not be met.

Commissioner Singleton said the FOP was doing a huge service to the community and as a result had a burden placed on them because of that. She did not have a problem with 25 nights of training but felt the neighbors should get notice. She preferred the hours of operation put forth by the FOP and law enforcement. She felt regulations, such as Best Practices, needed to be followed for environmental and noise issues. She said the one year change made sense to her. She felt there needed to be a distinction in the language of conditions

that indicates when testing of noise was from FOP versus sheriff or police. She said the burden should be on law enforcement if they are the ones creating the noise and environmental issues. She felt the language should be very clear to protect the FOP. The biggest conditions were hours, noise abatement, and environmental impacts.

Commissioner Hird suggested including a soil testing and mitigation plan to head off an environmental problem. He said if it was impractical to come up with then there should be a mechanism for the FOP to come back to staff if they cannot come up with a plan, with a good faith effort to try. He did not feel 6 months was long enough but did feel it was reasonable to have a lead mitigation plan.

Commissioner von Achen said it seemed that KDHE was the appropriate agency to test the soil and Washington Creek and make the records available to the public.

Commissioner Liese agreed with Commissioner Blaser's suggestion that the CUP come under review in a number of years. He said he would vote to approve it but would love to see a time limit for review.

Commissioner Blaser said one year was fine with him for noise and environmental testing. He said he could go along with a 5 year review for base data. He was fine with 15 nights of shooting and the hours submitted by staff.

Commissioner Culver said he was not comfortable setting standards at a point in time when there were multiple users. He did not think the burden should be exclusively on the FOP at this point. He felt specific standards for mitigation would be premature. He said regarding the hours of operation he tended to agree with the police and sheriff department for their need of being able to shoot at night. He did not want to get ahead of themselves and impose standards/conditions that may or may not be needed or appropriate at this time.

Commissioner Belt said this could have been adverted with more leadership at the city level. He was disappointed the FOP had to hire a lawyer to deal with the issue. He said essential the facility was for the training of officers. He said he would have a minimum expectation from the FOP as stewards of the property. He said he would prefer a 6 month environmental check but he could live with 1 year.

Commissioner Britton was fine with the time extension for noise and environmental abatements. He said testing soil and noise were reasonable things to do in order to continue the essential use of the property. He felt that enough time should be given to achieve those conditions. He said the city and county need to step up with regards to their use of the property.

ACTION TAKEN

Motioned by Commissioner Hird, seconded by Commissioner Blaser, to approve the Conditional Use Permit for the Fraternal Order of Police shooting range subject to the following conditions:

The provision of a revised site plan with the following changes:

a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.

Uses which are approved with this CUP include the following:

a) Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events.
b) Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering.
c) The use of the firing ranges by the Fraternal Order of Police members and their guests.

The FOP will cooperate with the county and the city to try and obtain a reduced noise level from the ranges.

SIGNAGE:

a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress. The plan shall identify the approximate location of these signs.
b) Signs shall be posted at all ranges with the following safety information:
    - Organized group or training activities must have a designated range safety officer on site
    - Eye and ear protection must be worn when firing.
    - Alcoholic beverages are prohibited on the firing ranges.
c) A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies.
d) Similar identification signs shall be posted where Washington Creek crosses the property line for the benefit of canoe users of the Creek.

HOURS OF OPERATION:
The FOP shall not allow range operations on New Year's Day, Easter, Thanksgiving, Christmas Eve, and Christmas Day.
Restriction on hours of operation for the Firing Ranges.
Law Enforcement, Military Training and other groups on firing ranges.
The FOP shall limit use of shooting on its ranges by Law Enforcement, Military Training, Hunter Safety and other similar activities to Monday thru Friday 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 7:00 p.m., Sunday 11:30 a.m. to 7:00 p.m.
Law enforcement and the Military shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m. The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur. The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgment such modification is necessary for the proper training of Law Enforcement officers who have jurisdiction in Douglas county. When reasonably possible the Sheriff or chief shall notify the Douglas county Zoning and Codes department in writing of this decision.
Individual use of the ranges by FOP members
Individual use by FOP members. Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.
When there are training exercises involving the firing ranges, the range safety officer shall determine if any other activities may occur.
The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.
Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.
LEAD MANAGEMENT
a) Soil shall be tested for pH levels if practicable in consultation with KDHE to establish a baseline for lead content in soil.

The CUP shall be reviewed administratively in 5 years.

Commissioner Blaser said they should get a baseline on noise. He was convinced it would not turn out to be a problem.

Commissioner Singleton agreed with the hours falling with FOP. She did not agree with the changes to the noise level and lead. She said the language staff put in place needed to be adopted in reference to environmental protections. She said there needed to be tested within 6 months and within a year there needed to be a clear action plan. She said she would vote against the motion as it stood and would make an additional motion.

Commissioner von Achen said she would still like water monitoring be left in and that copies of the water and soil monitoring be sent to Planning staff.

Commissioner Belt suggesting the word 'recreationalists' for the signage on the creek.

Commissioner Liese said he would support amending the motion.

Commissioner Hird said he would amend the motion to get a baseline for noise. He felt that 6 months for lead testing and 1 year to fix it could be a problem. He said if they require testing within a year and it was a KDHE issue there were statues/regulations in place to address it and it was KDHE's responsibility.

Ms. Miller said there could be lead in the soil but it did not mean it would leach to the water. She said it depended on the pH level of the soil.

Commissioner Singleton said her suggested language would be 6 months to test for noise, lead, pH, and 1 year to have a plan. She said the city and county have responsibility to make sure environmental protections are in place based on actions they are taking. She said she was not saying it needed to be solved in one year, just a plan in place to solve it.

Mr. McCullough said staff was not necessarily trying to react to a problem or issue. These were Best Management Practices that would be imposed at a brand new location to monitor any firing range.

Motion amended by Commissioner Hird, seconded by Commissioner Blaser, to do testing to establish a baseline for noise, include requirement of lead and noise testing within 6 months and if a problem was indicated the FOP would adopt a plan within a year to mitigate that, included in the testing should be monitoring of the creek, copies of reports be sent to staff, and a sign for recreationalists on Washington Creek.

Commissioner Britton asked the FOP about the 5 year time limit review.

Mr. Riling felt a 5 year review should be on the law enforcement, not the FOP. He felt it may harm the ability to get funding.

Commissioner Hird said the FOP was the host and if the problem was caused by law enforcement then the FOP would need to take it upon themselves to do something.

Commissioner Liese suggested the FOP keep the community involved by inviting them out.

Commissioner von Achen asked if the motion was leaving in the revised staff recommended condition under lead management program.

Commissioner Hird said the motion was that there would be testing within 6 months and an abatement plan adopted within 1 year.

Commissioner von Achen asked if they were omitting staffs recommended conditions.

Commissioner Hird said he replaced them.

Commissioner Britton asked who would accept the mitigation plan.

Commissioner Hird said staff would advise if they did not think it was in compliance. If there was a problem then they would have to come up with a mitigation plan.

Commissioner Singleton asked if that would include the requirement of the EPA Best Management Practices for lead, noise, and lime in reference for outdoor shooting ranges.

Commissioner Hird said he was not declaring a standard. He said the FOP would have to come up with a mitigation plan if there was a problem. He said if the staff felt the EPA Best Management Practices for lead at outdoor shooting ranges should be adopted then they could advise Planning Commission at that time, but to require it now was not right.

Commissioner Singleton asked staff how that would be handled.

Ms. Miller said if they discover the pH level was low they should immediately apply the lime, not wait. She said the lead recovery could be a lot more costly and perhaps could take up to a year to decide how to do the recovery.

Commissioner Singleton was concerned the motion did not have enough standards/protections to create a plan and she felt the EPA Best Management Practices make sense.

Motion amended by Commissioner Hird, seconded by Commissioner Blaser, to approve the Conditional Use Permit for the Fraternal Order of Police shooting range subject to the following conditions:

1) The provision of a revised site plan with the following changes:
   Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
   Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.
2) Uses which are approved with this CUP include the following:
   Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and other similar events.
   Training exercises that utilize the remainder of the property as well as the firing ranges, such as orienteering.
   The use of the firing ranges by the Fraternal Order of Police members and their guests.
3) The Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points during a typical training event.
   This testing shall be completed within 6 months of the CUP approval date.
   Copies of the testing report shall be provided to the Lawrence-Douglas County Planning Office (6 East 6th Street, Lawrence, KS 66044) and the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence, KS 66047).
   If noise abatement measures are found to be necessary based on these tests, the Fraternal Order of Police shall provide a noise abatement plan to the Planning Office for approval within 1 year of the testing date.
4) SIGNAGE:
   'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress. The plan shall identify the approximate location of these signs.
   Signs shall be posted at all ranges with the following safety information:
   - Organized group or training activities must have a designated range safety officer on site
   - Eye and ear protection must be worn when firing.
   - Alcoholic beverages are prohibited on the firing ranges.

   A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies.
   Similar identification signs shall be posted where Washington Creek crosses the property line for the benefit of recreational users of the Creek.
6) HOURS OF OPERATION:
   Law Enforcement Training and other groups on firing ranges.

The FOP shall limit use of shooting on its ranges by Law Enforcement, Hunter Safety and other similar activities to
Monday thru Friday: 7:00 a.m. to 7:00 p.m.;
Saturday: 9:00 a.m. to 7:00 p.m.; and
Sunday: 11:30 a.m. to 7:00 p.m.
The FOP shall not allow range operations on New Year's Day, Easter, Thanksgiving, Christmas Eve, and Christmas Day.
Law enforcement groups shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m.
The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur.
The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgment such modification is necessary for the proper training of Law Enforcement officers who have jurisdiction in Douglas County. When reasonably possible the Sheriff or Chief shall notify the Douglas County Zoning and Codes department in writing of this Decision.

Individual use of the ranges by FOP members
Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.

7) When there are training exercises involving the firing ranges, the range safety officer shall determine if any other activities may occur.
8) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.
9) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.
10) LEAD MANAGEMENT
    Soil shall be tested for pH levels within 6 months of CUP approval and annually thereafter to insure proper pH levels and to monitor any changes. (Note: The ideal pH should be between 6.5 and 8.5. Do not add lime if the pH is above 8.5) Tests shall be conducted in the following locations:
        Pistol Range berm area;
        Area between the pistol range area and the nearest downgrade surface water; and
        The trap shotfall area.
    The water in Washington Creek shall be tested within 6 months of CUP approval and annually thereafter to check for lead pollution.
    Records of all soil and water tests shall be provided to the Planning Office (6 East 6th Street, Lawrence KS 66044) for distribution to KDHE, the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence KS 66047) and kept on file at the FOP office.
    Lime or other amendments shall be added as recommended by the Douglas County Extension Office, or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges to maintain a proper pH balance.
    The Fraternal Order of Police shall provide a lead management plan to planning staff for approval within 1 year of the determination date if:
        It is determined from the soil tests that it is not possible to manage the pH level effectively with soil amendments, or
        The water tests indicate lead pollution in Washington Creek.
11) The CUP shall be reviewed administratively every 5 years.

The Planning Commission revised the conditions and the conditions noted above have been revised to reflect the Commission's action. The Commission accepted staff's recommended conditions with the following exceptions:

- Condition 3 regarding noise was revised to require an initial testing—within 6 months of approval, but to defer any noise abatement decisions until the testing has been completed. If the testing indicates abatement is necessary, the FOP shall have 1 year to develop a plan.
- Condition 4 regarding signage was revised to include signage for recreational users of Washington Creek.
- The Commission accepted the FOP hours of operation, with separate hours noted for training and FOP members.
- Condition 10 regarding lead management was revised to require an initial soil test and a water test of Washington Creek within 6 months. Results are to be provided to staff for distribution to KDHE and kept on file. If it is determined that the soil pH or lead migration to the waterway can not be managed with soil amendments, the FOP shall provide a lead management plan within 1 year of this determination.
- The Commission did not set an expiration date on the CUP, but did recommend 5 year administrative reviews.

Motion carried 8-0-1, with Commissioner Finkeldei abstaining.

City *of* Lawrence
Douglas County
PLANNING & DEVELOPMENT SERVICES

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September 27, 2011

Dan Affalter
3428 Trail Road
Lawrence, KS 66049

RE: CUP-12-8-10: Conditional Use Permit for the Fraternal Order of Police shooting range located southeast of the intersection of N 775 Road and E 661 Diagonal Road.

Dear Dan:

The Planning Commission considered the CUP referenced above at their September 26, 2011 meeting and voted 8 to 0 to forward the CUP to the Board of County Commissioners with a recommendation for approval subject to the following conditions as revised by the Commission:

1) The provision of a revised site plan with the following changes:
   a) Show and label the backdrops for each firing range. The trap shooting range and shooting house are not required to have backdrops
   b) Add a note that the CUP is subject to conditions approved by the Board of County Commissioners.

2) Uses which are approved with this CUP include the following:
   a) Use of firing ranges for training exercises for law enforcement personnel, hunter safety courses and Activities sanctioned by the Law Enforcement agencies.
   b) ~~Training exercises~~ Activities that utilize the remainder of the property ~~as well as the firing ranges,~~ such as orienteering.
   c) The use of the firing ranges by the Fraternal Order of Police members and their guests (this does not include hosting large shooting events) .

3) ~~Fraternal Order of the Police shall contract with a noise specialist to measure the noise level at the receiving points during a typical training event.~~
   a) ~~This testing shall be completed within 6 months of the CUP approval date.~~
   b) Copies of the testing report shall be provided to the Lawrence-Douglas County Planning Office (6 East 6th Street, Lawrence, KS 66044) and the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence, KS 66047).
   c) ~~If noise abatement measures are found to be necessary based on these tests, the Fraternal Order of Police shall provide a noise abatement plan to the Planning Office for approval within 1 year of the testing date.~~

3) Within two (2) months of the approval ot ths CUP, plans for a safety/noise barrier for the west side of the pistol firing range will be submitted to the County Commissioners. This will include a cost estimate and completion schedule. NRA, CDC, DOE, and Corps of Engineers are sources for information on methods that may be appropriate. The goal will be to reduce the noise at the receiving points, i.e. the closest residents to the range, to 65db.

Within two months and prior to construction of the noise barrier, sound measurements will be taken at five receiving points around the range during an active training session to establish a baseline for future noise abatement enhancements. Firing at the trap, rifle,

and shooting tower will be considered as infrequent and no additional noise abatement procedures are to be required at this time.

Noise levels shall be measured at the ~~property boundary~~ **receiving points** ~~yearly~~ **annually during typical training events** and **the sound management plan revised with** additional noise abatement measures **and time frame** ~~implemented~~, if necessary. A record of the yearly noise levels shall be kept on file for review by the Douglas County Zoning and Codes Office.

4) SIGNAGE:
    a) 'No trespassing' signs shall be posted around the perimeter of the property at reasonable points of ingress (but not less than every 400 yards). The plan shall identify the approximate location of these signs.
    b) Signs shall be posted at all ranges with the following safety information:
        - Organized group or training activities must have a designated range safety officer on site
        - Eye and ear protection must be worn when firing.
        - Alcoholic beverages are prohibited on the firing ranges.
    c) A sign shall be posted on the main gate which identifies the area as a firing range, or as a high noise area approved with Conditional Use Permit, CUP-12-8-10. A contact number for a representative of the Fraternal Order of Police who is available to respond during the hours of operation of the firing ranges shall be included on the sign. The police dispatch or 911 number may be included for emergencies.
    d) Similar identification signs shall be posted where Washington Creek crosses the property line for the benefit of recreational users of the Creek.

6) HOURS OF OPERATION:
    a) ~~Law Enforcement Training and other groups on firing ranges.~~
        i) ~~The FOP shall limit use of shooting on its ranges by Law Enforcement, Hunter Safety and other similar activities to~~

        ~~Monday thru Friday: 7- 8:00 a.m. to 7 :00 p.m.;~~
        ~~Saturday: 9:00 a.m. to 7:00 p.m.; and~~
        ~~Sunday: 11:30 a.m. to 7:00 p.m.~~

        ii) ~~Law enforcement groups shall be entitled to use the range 25 days per year for extended shooting to 10:15 p.m.~~

        ~~The FOP shall provide a reasonable method neighbors can sign up for email notification of extended shooting hours. The FOP will send an email to the neighbors who have signed up for such notification at least five days before the use of extended shooting hours is going to occur.~~

        ~~The Chief of the Lawrence Police Department or the Sheriff of Douglas County may modify the number of days per year and the amount of time notice is to be given when in their judgment such modification is necessary for the proper training of Law Enforcement officers who have jurisdiction in Douglas County. When reasonably possible the Sheriff or Chief shall notify the Douglas County Zoning and Codes department in writing of this Decision.~~

    b) ~~Individual use of the ranges by FOP members~~

    ~~Shooting shall be limited to 8:00 a.m. to 9:30 p.m. every day of the week except for the holidays listed above.~~

6) Hours of Operation: The range shall not be in operation for any of the following holidays (or the days on which such holidays are observed by Kansas state government) New Year's Day, Easter, Thanksgiving Day, Christmas Eve and Christmas Day. The range may operate at the following times:
   - Monday through Friday 8 AM to 9 PM;
   - Saturday 9:00 AM to 7:00 PM
   - Sundays 12:00 PM to 5:00 PM.
   - Night shooting events may occur up to 15 times a year, with a time limit of 9:30 PM. Neighbors within 3 mile must be notified of night shooting events at least 3 days in advance through either email, letter or phone call.
7) When ~~there are training exercises involving the~~ firing ranges are in use, the range safety officer shall determine if any other activities may occur.
8) The 94 acres included in this CUP shall remain in the Fraternal Order of Police's ownership to serve as a buffer area. Any reduction in area shall require an amended CUP.
9) Trees may be selectively harvested, or removed to create trails provided the wooded areas included in the parcels surrounding the range areas remain intact to serve as buffers.
10) LEAD MANAGEMENT
    a) Soil shall be tested for pH levels within ~~6~~ 3 months of CUP approval and annually thereafter to insure proper pH levels and to monitor any changes. (Note: The ideal pH should be between 6.5 and 8.5. Do not add lime if the pH is above 8.5) Tests shall be conducted in the following locations:
        i) Pistol Range berm area;
        ii) Area between the pistol range area and the nearest downgrade surface water; and
        iii) The trap shotfall area.
    b) Pistol range back stop shall be inspected within 3 months of CUP approval and annually thereafter for lead buildup to guard against splatter and ricochets.
    c) The water in Washington Creek shall be tested within 6 months of CUP approval and annually thereafter to check for lead pollution.
    d) Records of all soil and water tests shall be provided to the Planning Office (6 East 6th Street, Lawrence KS 66044) for distribution to KDHE, the Douglas County Zoning and Codes Office (2108 W 27th Street, Suite 1, Lawrence KS 66047) and kept on file at the FOP office.
    e) Lime or other amendments shall be added as recommended by the Douglas County Extension Office, or as recommended in the EPA Best Management Practices for Lead at Outdoor Shooting Ranges to maintain a proper pH balance.
    f) The Fraternal Order of Police shall provide a lead management plan to planning staff for approval within 1 year of the determination date if:
        i) It is determined from the soil tests that it is not possible to manage the pH level effectively with soil amendments, or
        ii) The water tests indicate lead pollution in Washington Creek.

g) Within two months, an inspection of the pistol backstop area will be conducted to assure that there has not been a build up of lead which would cause richochetes or splatter. This area wil be inspected annually.

11) The CUP shall be reviewed administratively every 5 years.

The Planning Commission revised the conditions and the conditions noted above have been revised to reflect the Commission's action. The Commission accepted staff's recommended conditions with the following exceptions:

- Condition 3 regarding noise was revised to require an initial testing—within 6 months of approval, but to defer any noise abatement decisions until the testing has been completed. If the testing indicates abatement is necessary, the FOP shall have 1 year to develop a plan.
- Condition 4 regarding signage was revised to include signage for recreational users of Washington Creek.
- The Commission accepted the FOP hours of operation, with separate hours noted for training and FOP members.
- Condition 10 regarding lead management was revised to require an initial soil test and a water test of Washington Creek within 6 months. Results are to be provided to staff for distribution to KDHE and kept on file. If it is determined that the soil pH or lead migration to the waterway can not be managed with soil amendments, the FOP shall provide a lead management plan within 1 year of this determination.
- The Commission did not set an expiration date on the CUP, but did recommend 5 year administrative reviews.

This item is tentatively scheduled for consideration by the Board of County Commissioners at their October 19, 2011 meeting. The County Administrator is responsible for setting the agenda for the Commission meetings, however, so this date could change. The agendas are posted the Friday before the meeting on the County website at www.douglas-county.com The Commission meetings are held in the Commission Room, 2nd Floor, Douglas County Courthouse, at 11th and Massachusetts Streets and begin at 6:30 PM. The format for a County Commission meeting is very similar to the Planning Commission. The Commission will listen to staff and applicant presentations and accept public comment.

Please contact me at 785-832-3147 or mmiller@lawrenceks.us if you have any questions or concerns.

Sincerely,

Mary K Miller, AICP
City/County Planner II

C: Mike Riling, via email

Memorandum
10-13-11

To: Mike Riling, F.O.P. Attorney
Dave Reavis, F.O.P. President

From: Dan Affalter

Re: Soil Samples at F.O.P.

I called the Douglas County Extension Agent Bill Wood as suggested by Mary Miller in July to take advantage of the free soil testing. Mr. Wood said the testing done by the laboratory at Kansas State University is for nutrient content for agricultural purposes and not mineral content. Mr. Wood was able to give me the names of two laboratories which may be able to conduct the proper testing. At his suggestion I contacted Midwest Laboratories, Inc. in Omaha, Nebraska. The personnel at Midwest were very helpful and I was able to establish an account with them and order testing supplies. I ordered supplies to test both soil and water.

On October 1, 2011 I went to F.O.P. to gather samples for testing. I gathered three water samples and twelve soil samples. Each sample was placed into a separate container and was labeled with a numbered label. The water and soil samples were in different kinds of containers with different instructions for collection so the numbers on the labels and reports are a different series. Both the containers and labels were supplied by the lab. I recorded the time each sample was taken and logged it on both the sample label and sample log submitted to the lab with the samples (both logs and instructions attached). On the lab form I requested they test for both lead content and PH level of the soil. As I collected each sample I took a G.P.S. reading of the exact spot and photographed the spot and area. I transferred the G.P.S. unit to Jim Welsh who was able to download the G.P.S. coordinates and transfer them to a map of the F.O.P. (attached). The G.P.S. locations illustrated on the map are very accurate in marking the locations I indicated on my sample log.

The three water samples were taken from Lone Star Lake (control sample), Washington Creek at the point it first enters F.O.P. property and the point it leaves F.O.P. property. The soil samples were taken from the backstops and drainage areas of all four shooting areas in the CUP. I used a stainless steel trowel shovel to collect the samples and cleaned it off between each sample to eliminate cross-contamination. I kept the samples refridgerated at 40 degrees Farenhite in a cooler and monitored the temperature by thermometer to keep the samples at the desired temperature (below 43 and above freezing) until I was able to ship them on Monday morning, 10-3-2011.

On 10-7-11 I received the test results via e mail and later by US Mail. I called the lab Client Service Representative, Heather Ramig for explanation of the lab results. Her explanation is as follows: The As Received column shows the level of both the lead and PH. The Units column shows the ratio of lead in mg/kg (milligrams per killograms) which Heather explained as the exact ratio as parts per million.. The Detection Limit column shows the smallest level the lab is able to detect using the test method listed in the Method column. Heather said the lab does not assign a value as to what is or is not an acceptable level; they only determine the content levels. She did say that the water samples showed no detectable lead.

In reviewing the soil samples report it should be noted that the PH range of all shooting

areas is within the desired levels (between 6.5 and 8.5) as identified by Mary Miller and the EPA Best Practices. Also noteworthy is that the actual lead levels do not exceed 1200 parts per million anywhere except in the impact area of the pistol range and the ditch downhill from the range but no more than approximately 50 yards. The 1200 parts per million is from an excerpt of the EPA best practices:

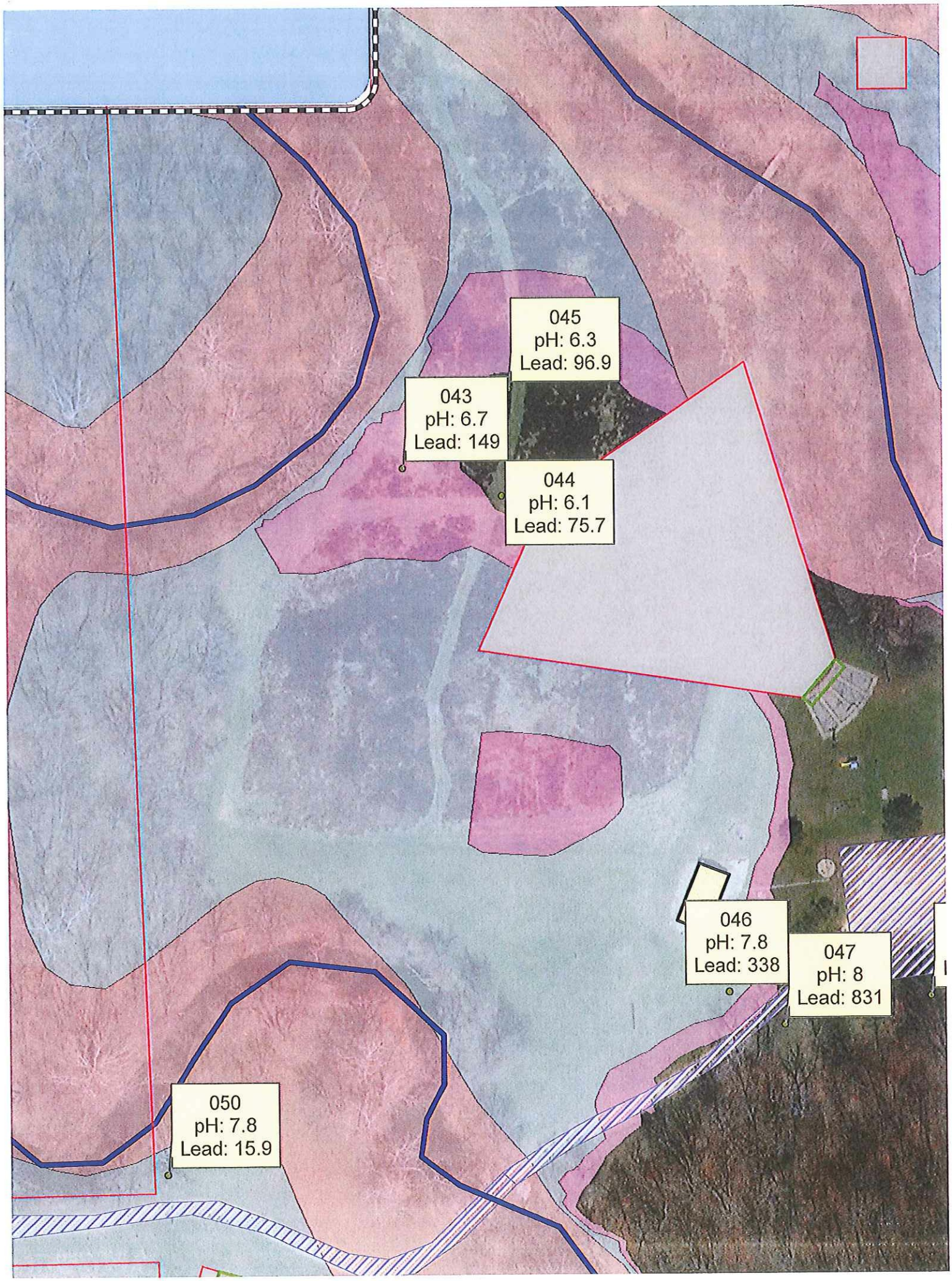
This data indicates to me that there is no immediate risk to the environment from the activities at F.O.P.

Very truly yours,

Daniel L. Affalter,
F.O.P. Range Committee

Attachments:

Soil and Water Sample Log 10-1-11
CUP-2011-10-1 Samples.pdf
soil sample log 1-10
soil sample log 11-12
water sample log
sample instructions
Lab Report Soil
LabReport


045
pH: 6.3
Lead: 96.9
043
pH: 6.7
Lead: 149
044
pH: 6.1
Lead: 75.7
046
pH: 7.8
Lead: 338
047
pH: 8
Lead: 831
050
pH: 7.8
Lead: 15.9

Soil and Water Sample Log

10-1-2011

Midwest Lab Sample ID #	GPS Way Point #	Description:
Water Samples:		
28466-417084-1A	036	Water Sample from Lone Star Lake Spillway
28466-417084-2A	037	Water Sample from Washington Creek at the Point the creek enters FOP Property
28466-417084-3A	038	Water Sample from Washington Creek at the point the creek leaves FOP Property downstream from all 4 shooting areas
Soil Samples:		
28466-417086-1A	039	Backstop area of Urban Range to Northeast
28466-417086-2A	040	Backstop area of Urban Range to the East
28466-417086-3A	041	Backstop area of Rifle Range (above 4A)
28466-417086-4A	042	Backstop area of Rifle Range (below 3A)
28466-417086-5A	043	Trap area Shot Fall Area (Max distance)
28466-417086-6A	044	Trap Area Shot Fall Area (Short distance)
28466-417086-7A	045	Trap Area Shot Fall Area (Short to north)
28466-417086-8A	046	Flood Plain below tube under the driveway from drainage from Pistol Range
28466-417086-9A	047	Pool area at mouth of tube under the driveway for water draining from the Pistol Range area
28466-417086--10A	048	Ditch on the south side of parking lot that drains from the Pistol Range
28466-417086-11A	049	Pistol Range Backstop
28466-417086-12A	050	Soil Control sample from property boundary by driveway away from shooting areas

Ref. Lab #: 417084
Report Number
11-280-2118

Midwest Laboratories Inc.®
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www.midwestlabs.com

REPORT OF ANALYSIS

For: (28466) FOP LAWRENCE KS LODGE #2
(785)764-9395

Mail to: FOP LAWRENCE KS LODGE #2
DAN AFFALTER
3428 TRAIL ROAD
LAWRENCE KS 66049

LEAD ANALYSIS IN CREEK

Date Reported: 10/07/11
Date Received: 10/04/11
Date Sampled: 10/01/11
Time Sampled: 1609

Lab number: 1906958

Analysis	Level Found	Units	Detection Limit	Method	Analyst-Date	Verified-Date
Sample ID: 28466-417084-1A Lead (total)	n.d.	mg/L	0.05	EPA 200.7	cjm-10/06	kkh-10/07
Sample ID: 28466-417084-2A Lead (total)	n.d.	mg/L	0.05	EPA 200.7	cjm-10/06	kkh-10/07
Sample ID: 28466-417084-3A Lead (total)	n.d.	mg/L	0.05	EPA 200.7	cjm-10/06	kkh-10/07

Notes:
n.d. - Not Detected.

For questions contact

Heather Ramig
Client Service Representative
heather@midwestlabs.com (402)829-9891

ORDER NUMBER:
417084

Midwest Laboratories, Inc.

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PAGE NUMBER:
1

ACCOUNT NO: 28466
FOP LAWRENCE KS LODGE #2
DAN AFFALTER
3428 TRAIL ROAD
LAWRENCE, KS 66049

SAMPLE DESCRIPTION
LEAD ANALYSIS IN CREEK

PO NUMBER:

COPY TO:

10-04-11A11:10 RCVD

Automatic Order Submittal Form

PLACED BY: heather on Sep 23, 2011

	SAMPLE ID	DATE/TIME SAMPLED	MX	TESTS REQUESTED	# CONT	COMMENTS
1	28466-417084-1A	10-1-11 @1609	WA	PB Lead content- & ~~PH Level~~	1	1906958
2	28466-417084-2A	10-1-11 @1635	WA	PB Lead Content	1	1906959
3	28466-417084-3A	10-1-11 @1655	WA	PB Lead Content	1	1906960
4						
5						
6						
7						
8						
9						
10						

(3) 1906958-1906960

Sampled by: (Signature) David L. Affalter 10-1-11	Temp on Arrival 5°C	Cooler arrived Intact?	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received in Lab by: (Signature)

CHAIN OF CUSTODY

Report Number: 11-280-2026
Account: 28466
Page: 1 of 2

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Date Reported: 10/07/11
Date Received: 10/04/11
Date Sampled: 10/01/11

FOP LAWRENCE KS LODGE #2
DAN AFFALTER
3428 TRAIL ROAD
LAWRENCE KS 66049

LEAD ANALYSIS SOIL AT SHOOTING RANGE

Analysis Performed	As Received	Units	Detection Limit	Method	Analyst Date	Verifier Date
Lab number: 1906972 Sample ID: 28466-418086-12A						
Lead (total)	15.9	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	7.8	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906971 Sample ID: 28466-418086-11A						
Lead (total)	8538	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	8.0	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906961 Sample ID: 28466-418086-1A						
Lead (total)	17.4	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	8.1	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906962 Sample ID: 28466-418086-2A						
Lead (total)	15.3	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	7.8	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906963 Sample ID: 28466-418086-3A						
Lead (total)	173	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	7.8	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906964 Sample ID: 28466-418086-4A						
Lead (total)	94.1	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	7.2	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906965 Sample ID: 28466-418086-5A						
Lead (total)	149	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	6.7	S.U.		EPA 9045	jdb/10-06	cmw/10-07

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Analysis Performed	As Received	Units	Detection Limit	Method	Analyst Date	Verifier Date
Lab number: 1906966 Sample ID: 28466-418086-6A						
Lead (total)	75.7	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	6.1	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906967 Sample ID: 28466-418086-7A						
Lead (total)	96.9	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	6.3	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906968 Sample ID: 28466-418086-8A						
Lead (total)	338	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	7.8	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906969 Sample ID: 28466-418086-9A						
Lead (total)	831	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	8.0	S.U.		EPA 9045	jdb/10-06	cmw/10-07
Lab number: 1906970 Sample ID: 28466-418086-10A						
Lead (total)	2008	mg/kg	5	EPA 6010	rrd/10-06	bab/10-06
pH	7.7	S.U.		EPA 9045	jdb/10-06	cmw/10-07

For questions contact
Heather Ramig
Client Service Representative
heather@midwestlabs.com (402)829-9891

SAMPLING INSTRUCTIC

Water or Wastewater Sample Collection Instructior

Open your sampling cooler and inspect the bottles an labels you have received. The label contains informati on it as to size and type of container, what preservative required (or if the sample should be cooled only), an what tests will be performed. The preservation listed the label shows what preservative should be added t that container after the sample has been collected. ALWAYS ADD ACID TO WATER. FILL THE CONTAINER WITH SAMPLE FIRST, THEN ADD ACI Fill the sample containers to the neck area.

Most environmental samples must arrive at the laborat chilled to less than 6 Degrees Celsius (43 degrees F **We suggest using plenty of bagged cubed ice to pack around the samples.** Complete the submittal form, place it inside the plastic zip lock bag and then p the bag inside the cooler.

Any questions about your sample kit, please contact Client Services at Midwest Laboratories at 402-334-7770.

ACID PRESERVATIVES

ORDER NUMBER:
417084

Midwest Laboratories, Inc.

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www.midwestlabs.com

PAGE NUMBER:
1

ACCOUNT NO: 28466
FOP LAWRENCE KS LODGE #2
DAN AFFALTER
3428 TRAIL ROAD
LAWRENCE, KS 66049

SAMPLE DESCRIPTION
LEAD ANALYSIS IN CREEK

PO NUMBER:

COPY TO:

Automatic Order Submittal Form

PLACED BY: heather on Sep 23, 2011

	SAMPLE ID	DATE/TIME SAMPLED	MX	TESTS REQUESTED	# CONT	COMMENTS
1	28466-417084-1A	10-1-11 @1609	WA	PB Lead content- & ~~PH Level~~	1	
2	28466-417084-2A	10-1-11 @1635	WA	PB Lead Content	1	
3	28466-417084-3A	10-1-11 @1655	WA	PB Lead Content	1	
4						
5						
6						
7						
8						
9						
10						

Sampled by: *(Signature)* Dan L. Affalter 10-1-11	Temp on Arrival	Cooler arrived Intact?	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received in Lab by: *(Signature)*

CHAIN OF CUSTODY

ORDER NUMBER:
417086

Midwest Laboratories, Inc.

PAGE NUMBER:
2

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www.midwestlabs.com

ACCOUNT NO: 28466
FOP LAWRENCE KS LODGE #2
DAN AFFALTER
3428 TRAIL ROAD
LAWRENCE, KS 66049

SAMPLE DESCRIPTION
LEAD ANALYSIS SOIL AT SHOOTING RANGE
PO NUMBER:

COPY TO:

Automatic Order Submittal Form

PLACED BY: heather on Sep 23, 2011

	SAMPLE ID	DATE/TIME SAMPLED	MX	TESTS REQUESTED	# CONT	COMMENTS
11	28466-417086-11 A	10-7-11 @ 1849	SO	PB Lead Content and PM Level	1	
12	28466-417086-12 A	10-7-11 @ 1903	SO	PB " " " " "	1	
13						
14						
15						
16						
17						
18						
19						
20						

Sampled by: *(Signature)* Daniel L. Affalter 10-7-11	Temp on Arival	Cooler arrived Intact?	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received in Lab by: *(Signature)*

CHAIN OF CUSTODY

ORDER NUMBER:
417086

Midwest Laboratories, Inc.

PAGE NUMBER:
1

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www.midwestlabs.com

ACCOUNT NO: 28466
FOP LAWRENCE KS LODGE #2
DAN AFFALTER
3428 TRAIL ROAD
LAWRENCE, KS 66049

SAMPLE DESCRIPTION
LEAD ANALYSIS SOIL AT SHOOTING RANGE
PO NUMBER:

COPY TO:

Automatic Order Submittal Form

PLACED BY: heather on Sep 23, 2011

	SAMPLE ID	DATE/TIME SAMPLED	MX	TESTS REQUESTED	# CONT	COMMENTS
1	28466-417086-1A	10-1-11@917	SO	PB Lead content and PH Level	1	PH Level if possible
2	28466-417086-2A	10-1-11 @1730	SO	PB " " " " "	1	
3	28466-417086-3A	10-1-11 @17:42	SO	PB " " " " "	1	
4	28466-417086-4A	10-1-11 @17:49	SO	PB " " " " "	1	
5	28466-417086-5A	10-1-11 @1809	SO	PB " " " " "	1	
6	28466-417086-6A	10-1-11 @1808	SO	PB " " " " "	1	
7	28466-417086-7A	10-1-11 @1816	SO	PB " " " " "	1	
8	28466-417086-8A	10-1-11 @1824	SO	PB " " " " "	1	
9	28466-417086-9A	10-1-11 @1831	SO	PB " " " " "	1	
10	28466-417086-10A	10-1-11 @1842	SO	PB " " " " "	1	

Sampled by: (Signature) Daniel L Affalter 10-1-11	Temp on Arrival	Cooler arrived Intact?	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received in Lab by: (Signature)

CHAIN OF CUSTODY

DOUGLAS COUNTY PUBLIC WORKS
1242 Massachusetts Street
Lawrence, KS 66044-3350
(785) 832-5293 Fax (785) 841-0943
dgcopubw@douglas-county.com
www.douglas-county.com

Keith A. Browning, P.E.
Director of Public Works/County Engineer

MEMORANDUM

TO : Douglas County Commission

FROM : Keith A. Browning, P.E., Director of Public Works / County Engineer
Michael D. Kelly, L.S., County Surveyor

DATE : October 24, 2011

RE : Colt Energy, Inc. - road crossing/pipeline request

Colt Energy, Inc. is installing various oil pump/collection facilities pertaining to their lease, located southeast of Lawrence in the vicinity of E1950 Road at approximately 675N. Part of their installation requires the placement of pipe under the roadway adjacent to their existing facilities. They have requested permission from the county to cross E1950 Road right-of-way.

This request is being brought to the Board's attention because Colt Energy, Inc. is not a public franchise utility. As you may be aware public utilities, by law, may locate their facilities in road right-of-way.

In previous instances the Board has approved such private requests when certain conditions have been met. After reviewing Colt Energy's request, staff provided the applicant with a list of items and documentation, based on previous process, which must be submitted in support of their request.

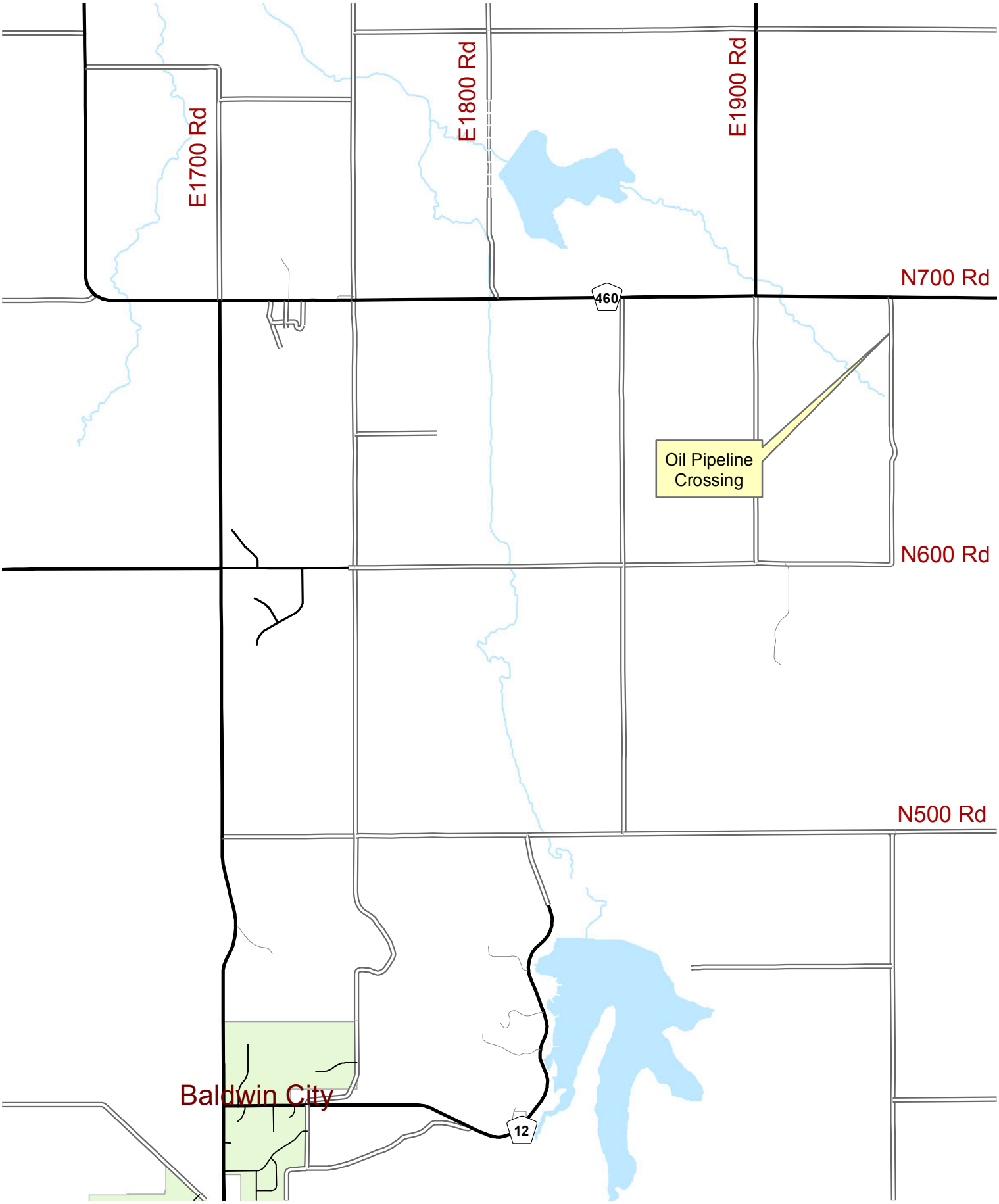
Colt Energy, Inc. has agreed to: 1) install the facility according to approved guidelines; 2) provide a 2 year duration $2,000.00 performance bond to defray potential road repair expenses incurred by Palmyra Township; 3) maintain at least $500,000 public liability insurance with Douglas County and Palmyra Township as a named insured; and 4) provide documentation indicating permission has been granted from the owners of the property under the road easement.

In addition, Colt Energy, Inc. has been in contact with Palmyra Township officials regarding this project and they have approved of the proposed installation.

Staff recommends approval of the Colt Energy, Inc. request.

ACTION REQUIRED: A motion is required to affix the Board's signatures to the "LICENSE TO CONSTRUCT AND MAINTAIN OIL/WATER PIPELINE" and direct the Public Works Department to oversee final execution of the document with Colt Energy, Inc.

Colt Energy
Road Crossing Location



LICENSE TO CONSTRUCT AND MAINTAIN

OIL/WATER PIPELINE

THIS AGREEMENT is made this _____ day of _____, 2011, between the Board of County Commissioners of Douglas County, Kansas, hereinafter referred to as "County", and Colt Energy, Inc., hereinafter referred to as "Licensee".

In consideration of the mutual promises and covenants hereinafter contained the County hereby grants to Licensee a permanent license and permission to construct and maintain a oil/water pipeline, hereinafter referred to as "Pipeline", in the road right of way of County and located in Palmyra Township (hereinafter referred to as "Township"), said Pipeline being more particularly shown upon the exhibits hereto attached and made a part hereof, subject to the following conditions and specifications:

1. Licensee must obtain easements from all abutting property owners in a form satisfactory to and approved by the County Counselor of Douglas County, Kansas.

2. The Pipeline must be installed in accordance with standards of the County Department of Public Works or industry standards, whichever are more stringent.

3. The Pipeline must be constructed as to not interfere with existing road improvements or utilities and the location of the Pipeline shall be clearly marked in accordance with standards of the County Department of Public Works.

4. Upon completion of construction, Licensee shall restore, at its own expense, all premises to their pre-existing condition. Licensee shall furnish a maintenance bond in the amount of $2,000.00 to insure the construction is in compliance with standards of the County Department of Public Works or industry standards, whichever are more stringent, and to defray County or Township expenses for repairing any settlement or maintenance problems created by the Pipeline. Said bond shall be effective for a period of two years (2) from the date of completion of the Pipeline. Release of the bond must be approved by the County Public Works Director and the Township Trustee.

5. Licensee shall at all times during construction and use of the pipeline maintain public liability insurance in the amount of $500,000.00 individually for Licensee, County and Township.

6. Licensee, as a further consideration and as a condition, without which this license would not have been granted, agrees to indemnify and save harmless County and Township, their commissioners or trustees, employees and agents and to assume all risk, responsibility and liability for death of, or injury to, any persons, including, but not limited to, employees, agents, patrons and licensee of the parties hereto, and for loss, damage or injury to any property, including, but not limited to, that belonging to the parties hereto, together with all liability for any expenses, attorneys' fees and costs incurred or sustained by County and Township arising from, growing out of, or in any manner or degree directly caused by,

attributable to, or resulting from the grant or exercise of this license or the construction, maintenance, repair, renewal, alteration, change, relocation, existence, presence, use, operation or removal of any structure incident thereto, or from any activity conducted on or occurrence originating on the area covered by the license unless due to sole negligence of County or Township, its employees and agents. Licensee agrees also to release and indemnify and save harmless County and Township, its commissioners, trustees, employees and agents from all liability to Licensee, and employees, agents, patrons or invitees, resulting from roadway use and maintenance, to the extent such liabilities or claims is/are directly based on structures or work under this license, at or near the area in which the license is granted unless the death, injury or damage resulting therefrom may be due solely to the negligence of the County or Township, their employees or agents. At the request of County or Township, the Licensee, upon receipt of notice to that effect, shall assume or join in the defense of any claim based upon allegations purporting to bring said claim within the coverage of this section.

7. The County Public Works Director shall at any time be entitled to inspect and must approve the construction and maintenance of the Pipeline.

8. Upon the request of County or Township, Licensee shall, at its own expense, and within a reasonable period of time following receipt of such notice, remove, move, or replace the Pipeline, when such removal, move, or replacement is necessary or desirable, in the opinion of the County or Township, for construction or maintenance of the roadways, ditches, bridges, other utilities, or for the health, safety, and welfare of the citizens of the County.

9. Upon cessation of the use of said Pipeline, or any part thereof, Licensee will notify County and Township thereof and, unless the parties otherwise agree, Licensee will remove the same and restore all affected premises in a manner satisfactory to County and Township. If Licensee fails to remove and restore within thirty (30) days after receipt of written notice from County or Township to do so, County or Township may do such work at the expense of Licensee.

10. Any approval given or supervision exercised by County or Township hereunder, or failure of County or Township to object to any work done, material used or method of construction, reconstruction or maintenance, shall not be construed as an admission of responsibility by County or Township or as a waiver of any obligations of Licensee under this Agreement.

11. Notice or other communications pursuant to this license shall be provided to the following persons, as appropriate:

For County:

Mr. Keith A. Browning, P.E.
Director of Public Works / County Engineer
Douglas County Department of Public Works
1242 Massachusetts Street
Lawrence, Kansas 66044-3350

For Township:

Ms. Sandy Elliot, Trustee
Palmyra Township
376 E1700 Rd.
Baldwin City, Kansas 66006

For Licensee:

Colt Energy, Inc.
4330 Shawnee Mission Pkwy, Suite 233
Fairway, Kansas 66205

12. This Agreement shall be binding upon the successors and assigns of the parties hereto, but no assignment hereof by the Licensee, its successors, legal representatives or assigns, shall be binding upon the County or Township without its written consent.

13. Each of the signators hereto represents that he has the authority to execute this agreement on behalf of the party for which he signs.

IN WITNESS WHEREOF the Parties have hereunto set their hands on the date first written.

THE BOARD OF COUNTY COMMISSIONERS
DOUGLAS COUNTY, KANSAS

_____
Jim Flory, Chair

Colt Energy, Inc.

By: _____

Its: _____

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2011, before me, the undersigned, a notary public in and for said county and state, came the Board of County Commissioners of Douglas County, Kansas, by Jim Flory, its Chair, personally known to be to be the same person who duly acknowledged execution of the foregoing instrument to be the act and deed of the Board of County Commissioners of Douglas County, Kansas.

IN WITNESS WHEREOF, I have hereunto subscribed by name and affixed my official seal on the day and year last above written.

_____
Notary Public

My commission expires _____

STATE OF KANSAS)
) ss:
COUNTY OF DOUGLAS)

BE IT REMEMBERED, that on this _____ day of _____, 2011, before me, the undersigned, a notary public in and for said county and state, came _____ personally known to be to be the same person who executed the within instrument of writing in behalf of said corporation, and duly acknowledged the execution of the same.

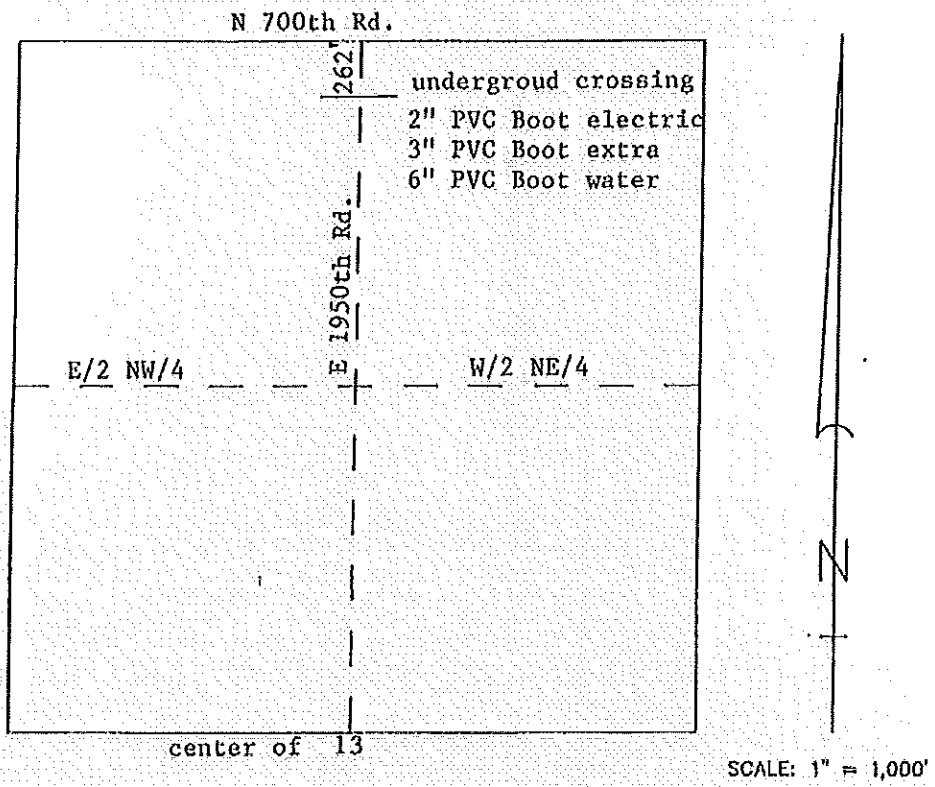
IN WITNESS WHEREOF, I have hereunto subscribed by name and affixed my official seal on the day and year last above written.

_____
Notary Public

My commission expires _____

LOCATION MAP

Section 13 Township 14 Range 20



APPLICANT COLT ENERGY, INC.

COMPANY W.O. # N/A

Please show section, township, range, road/route number, and approximate location of proposed installation.

Additional sheets may be used as needed.

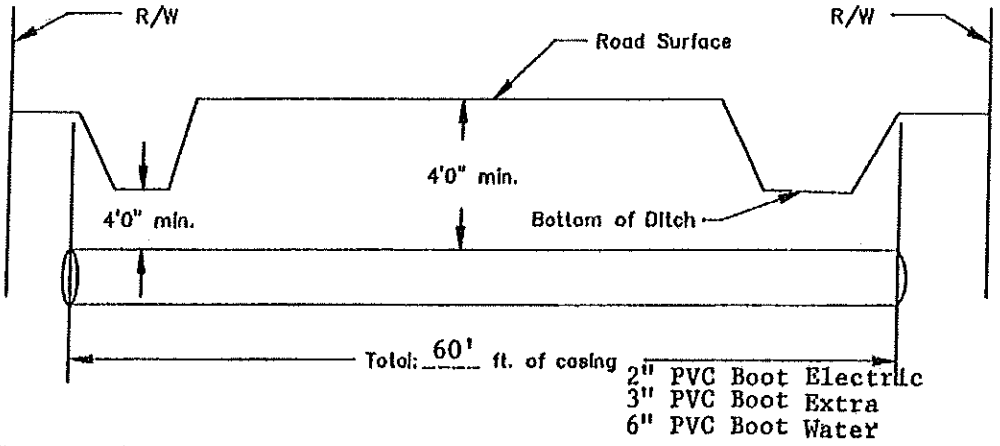
Please attach Company work drawings.

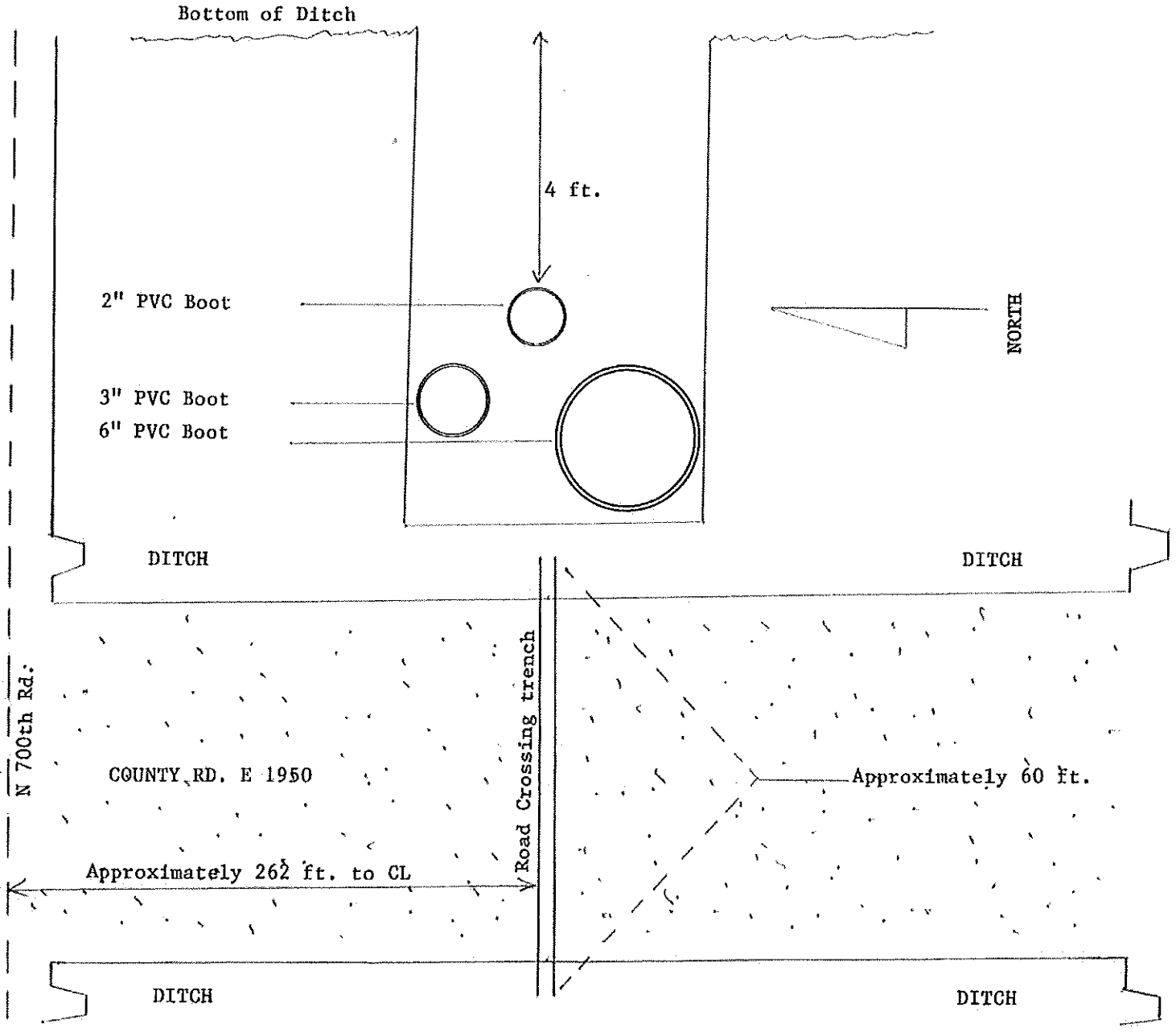
DCPW Form No. 508

COMPANY WORKING DRAWINGS

STANDARDS FOR UNDERGROUND UTILITY CROSSING COUNTY ROAD

Underground utility must be cased in steel or PVC pipe from back of ditch to back of ditch.
Underground utility crossing hard surface road must be bored or jacked.
Minimum clearance from road surface shall be 4'0".
Minimum clearance from bottom of ditch shall be 4'0".
Placement of any facility that crosses a travelway shall be perpendicular to the travelway.





PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That Colt Energy Inc., hereinafter called "Colt", and _____ as Surety, hereinafter called "surety", are held and firmly bound unto Douglas County Board of County Commissioners, Courthouse, Lawrence, Kansas 66044, as obligee, hereinafter called "owner" in the amount of Two Thousand Dollars ($2,000.00) for the payment where of Colt and surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Colt is preparing to cause to be constructed a oil/water pipeline within the right of way of the owner in accordance with the requirements of Douglas County, Kansas "LICENSE TO CONSTRUCT AND EASEMENT FOR OIL/WATER PIPELINE"; and

WHEREAS, after construction of said pipeline, Colt is obligated to restore all premises within the easement to their original condition, and to repair all settling or maintenance problems created by said construction for a period of two (2) years from the completion of construction.

NOW, THEREFORE, the condition of this obligation is such that if Colt shall promptly and faithfully perform such construction and repair in accordance with the requirements of the Easement for Pipelines all settlement or maintenance problems occurring within said easement for a period of two (2) years from the date of completion of construction, then this obligation shall be null and void otherwise it shall remain in full force and effect.

Whenever, the owner shall notify Colt that such work was not done in accordance with the requirements of Douglas County and Colt shall fail to cure any such deficiency the surety may promptly remedy the deficiency or shall obtain a bid for completing the construction in accordance with the requirements and make available as work progresses sufficient funds to pay the cost of curing any construction deficiency; but not exceeding, including cost and damages for which surety may be liable hereunder, the amount set forth in the first paragraph hereof.

Any suit under this bond must be instituted before the expiration of two (2) years from the date of notice by the owner of any such deficiency.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the owner named herein.

Signed and sealed this _____date _____ 2011

By _____
Colt Energy, Inc.

By _____
_____
Surety

_____
Title

_____
Title