The Muscatine County Zoning Commission met in the Environmental Learning Center, Discovery Park, on Thursday, July 13, 2017 with Chairperson Tom Harper and board members Carol Schlueter, Emily Geertz, and Clyde Evans present, Virginia Cooper was absent. Eric S. Furnas, Planning & Zoning Administrator and Dixie Seitz, Office Administrator was also in attendance.

Others present for this hearing: Dennis Hetzler.

Eric Furnas: Just a couple of things ladies and gentleman. I am Eric Furnas, the Muscatine County Planning & Zoning Director. There is a large crowd tonight and the acoustics might not be that great in here. We have a podium right here for anyone that wants to speak. If you haven't signed in already on one of the sign in sheets, please do so so we can make your attendance part of the public record. If you want to speak either for or against any of these cases we ask that you do come to the podium, state your name and your address. Because of the large crowd and the size of the room, I ask that you give the person opportunity to speak so we can hear all of the comments on both sides. I know there is a lot of interest in one of these cases particularly but please use the podium and the Zoning Commission will run the meeting from here. Thanks.

Tom Harper: Okay, we are opening this public hearing of the Muscatine County Zoning Commission. We do have three cases tonight. The case I assume the majority of you are here for will be the third case, so please bear with us. We have two other cases, two other applicants that will be first. Now I have a mission statement to read. The Muscatine County Zoning Commission is a five member group of residents of the County who are appointed by the Muscatine County Board of Supervisors. We serve as non-professionals and without compensation. Our purpose is to advise the Muscatine County Board of Supervisors on managing the growth of the County. This involves reviewing subdivisions, rezoning requests, the use of public property, and reports related to land use policy and long range planning. Recognizing that our decisions will not satisfy everyone, we attempt to base our decisions on what is best for the long term interest of the County. We ask for your input, pro or con, on issues before us in order that we may formulate the best decisions possible. Please take this opportunity to share your thoughts and concerns with us. Our recommendations are not taken lightly by the Board of Supervisors, but the Board of Supervisors, your elected representatives, make the final decisions on all issues. The first item is to approve the minutes from the last meeting. They were all emailed to the members. Are there any questions, comments or changes to the minutes? If not, I will entertain a motion to approve the minutes.

Emily Geertz: I will make a motion that we approve the minutes.

Tom Harper: Is there a second?

Clyde Evans: Second.

Tom Harper: A motion has been made and seconded to approve the minutes from the last meeting, all those in favor signify by saying Aye – 4; Opposed – 0; and Absent – Virginia Cooper. The motion carried. I need to tell all the applicants tonight that this is normally a five member board, today we have a member absent. So the vote would take three positive votes to pass a motion, a tie vote would be a no vote. The applicant has the opportunity to ask for us to table this request until the next month, when we may or may not have a full board or we can proceed with the four members tonight. Alright, Eric can you please read the first case?

Eric Furnas: Zoning Agenda Item #1. Dennis R. Hetzler, Record Owner, requests approval of the preliminary and final plat of the proposed one lot industrial

subdivision, River Valley Tank Subdivision, containing approximately 0.37 acres and is zoned I-2 Heavy Industrial District. This property is located in Bloomington Township, in the NE¼ of Sec. 11-T77N-R2W, West of Hwy. 38, containing approximately 33 acres and is zoned A-1 Agricultural District and I-2 Heavy Industrial District.

Tom Harper: Was there any correspondence?

Eric Furnas: No sir.

Tom Harper: Is the applicant here? Can you please step forward to the podium?

Denny Hetzler: I'm Denny Hetzler.

Tom Harper: Can you please give us some information on your application?

Denny Hetzler: Okay. I've owned this farm for quite a few years and I've decided to sell it and this is a piece of ground that I have zoned off before and have put on the large LP tank. The person buying the farm doesn't want anything to do with it because you have to maintain the property. You have to mow, you have to keep the weeds down and you have to keep the driveways pushed out during the winter. So he would rather not have anything to do with that so we just wanted to zone off 0.3 acres and I would keep that with my farm right next to it and he would have the rest of the farm ground.

Tom Harper: Eric, do you have anything to add?

Eric Furnas: It's fairly simple. I'm sure that you are all aware of where this location is, it's that bulk propane storage tank off of Hwy. 38. That portion was zoned I-2 Heavy Industrial District several years ago to accommodate that use, however it was still part of the contiguous farm ground. So as Mr. Hetzler described, this would simply allow him to split this off so that the future owner of the farm ground doesn't possess this portion where the tank is. The proposed subdivision lot would meet all the setbacks from the tank structure there itself. So we recommend approval.

Tom Harper: Okay, so you are leasing this to River Valley now, right?

Denny Hetzler: Correct.

Tom Harper: And it does now and it will maintain a shared driveway so there are no issues with the State of Iowa?

Denny Hetzler: Yes it has an extra-large driveway and it's made for semis.

Tom Harper: So either you or the purchaser of the farm ground will enter into a shared easement for the driveway?

Denny Hetzler: Yes there is an easement that will be involved in the purchase of the farm.

Carol Schlueter: What has been split off of this farm before?

Eric Furnas: There was a property to the south that was split, it was a previous homestead split off in the past and that's why he had to do the subdivision.

Denny Hetzler: Yeah, I didn't want to own another homestead so I had a young couple at that time buy the five acres with the house and buildings.

Tom Harper: Does anybody in the audience care to speak for or against this request? Does the board have any additional questions or comments?

Emily Geertz: No.

Tom Harper: I will entertain a motion.

Emily Geertz: I will make a motion that we recommend to the Board of Supervisors approval of this preliminary and final plat of the proposed one lot industrial subdivision, River Valley Tank Subdivision.

Tom Harper: Is there a second?

Carol Schlueter: I'll second it.

Tom Harper: A motion has been made and seconded to recommend to the Board of Supervisors approval of the preliminary and final plat of the proposed one lot industrial subdivision, River Valley Tank Subdivision. Any other discussion, questions or comments? Hearing none, all those in favor of the motion signify by saying Aye - 4; Opposed – 0; Absent – Virginia Cooper. The motion carried.

Denny Hetzler: Thank you.

MUSCATINE COUNTY ZONING COMMISSION
By Eric S. Furnas, Planning & Zoning Administrator

The Muscatine County Zoning Commission met in the Environmental Learning Center, Discovery Park, on Thursday, July 13, 2017 with Chairperson Tom Harper and board members Carol Schlueter, Emily Geertz, and Clyde Evans present, Virginia Cooper was absent. Eric S. Furnas, Planning & Zoning Administrator and Dixie Seitz, Office Administrator was also in attendance.

Others present for this hearing: John Eichelberger, Beth Nietzel, Jacquelyn Grage, Gary Grage, Nick Wheaton, and Debra Wheaton.

Tom Harper: Eric, can you please read the next request?

Eric Furnas: Zoning Agenda Item #2. Ronald L. & Ellen J. Oostendorp and Nicholas L. & Debra S. Wheaton, Applicants and Record Owners, request approval of the preliminary and final plat of the proposed replat of Lots 5 & 6 of Spring Valley Ranchettes into three residential lots (Lots 1-3). This proposed replatted subdivision is located in Bloomington Township, in the SE¼ of Sec. 12-T77N-R2W, Lots 5 & 6, Spring Valley Ranchettes, containing approximately 7.5 acres and is zoned R-1 Residential District.

Tom Harper: Okay and you are representing the applicants?

John Eichelberger: Yes, my name is John Eichelberger and I am the attorney for the Oostendorps and the Wheatons who are the owners of the two lots that are to be subdivided.

Tom Harper: And you heard that we are not a full board, we only have four members here today. Are you willing to proceed?

John Eichelberger: Yes we are willing to proceed. Thank you.

Tom Harper: Was there any correspondence?

Eric Furnas: No sir.

Tom Harper: Okay, if you would like to give us some background on this request?

John Eichelberger: Oostendorps and the Wheatons own two lots in the Spring Valley Ranchettes subdivision and there is a pond that is located sort of in the south third of the property and it's a building site that is technically available from the south side of the pond. What they would like to do is to subdivide those two lots into three so that they can sell that building site off that is south of the pond. Now the building site is within two miles of the city limits, so we are also going through the city subdivision process as well.

Tom Harper: Okay, are there any questions or comments from the board?

Carol Schlueter: This third lot that they are wanting to add, it would be part of both of the other two lots, right?

John Eichelberger: Correct.

Carol Schlueter: And so that's why they both have to apply.

John Eichelberger: That's correct. Yes, the line cuts north and south through the building side, so they both had to participate in the subdivision procedure.

Clyde Evans: The majority of the land belongs to lot five.

John Eichelberger: Yes, the majority belongs to the Wheatons, however there is a small portion that belongs to the Oostendorps. But it is south of the pond, so

therefore in order to get as much as you can south of the pond, the Oostendorps needed to participate in the subdivision.

Tom Harper: Eric, do you have any staff comments?

Eric Furnas: Just that we have been provided with minutes from the homeowner's association meeting where this proposal has been discussed and it has the approval of their association. The resultant lot would meet the lot area requirements for an R-1 Residential District, it is significant larger than the minimum requirements. Staff believes there is adequate space for residential development and a septic system, that type of thing, so we recommend approval.

Tom Harper: Alright, is there anyone here to speak for or against this application? Is there any more questions or comments from the board? Hearing none, I will entertain a motion.

Clyde Evans: I move that we approve this request for Lots 5 & 6 to be subdivided into three lots as requested.

Tom Harper: Is there a second?

Emily Geertz: Second.

Tom Harper: A motion has been made and seconded to recommend to the Board of Supervisors the approval of the preliminary and final plat of the proposed replat of Lots 5 & 6 of Spring Valley Ranchettes into three residential lots – Lots 1-3. Any other discussion or comments? Hearing none, all those in favor of the motion please say Aye – 4; Opposed – 0; Absent – Virginia Cooper. The motion carried.

John Eichelberger: Thank you very much.

MUSCATINE COUNTY ZONING COMMISSION
By Eric S. Furnas, Planning & Zoning Administrator

The Muscatine County Zoning Commission met in the Environmental Learning Center, Discovery Park, on Thursday, July 13, 2017 with Chairperson Tom Harper and board members Carol Schlueter, Emily Geertz, and Clyde Evans present, Virginia Cooper was absent. Eric S. Furnas, Planning & Zoning Administrator and Dixie Seitz, Office Administrator was also in attendance.

Others present for this hearing: Bob Dean, Terry Ziegenhorn, Frank Wagner, Greg Terry, Heather Whittemore, Jacob Lane, Joel Fuller, Robert Streets, Robert Wendlandt, Maliada Einfeldt, Bill Halling, Steve DeWinter, Jane Martin, John Sparks, Mike Schulte, Josh Allen, Joel Kraushaar, Austin Maas, Michele Rowell, Ken John Shoultz, Quinn Riess, Brian Lothridge, Liz Lothridge, Jesse Shield, Russ Van Acker, Marv Smith, Cleo Smith, Craig Nierman, Max Kauffman, John Flake, Kim Bartling, Dave Bakke, James McKillip, Kyle Reifert, Robert Danay, Tim Martin, Tyler Howerton, Matt Green, Don Briggs, Sarah Harrison, Alan Evans, James E. Petersen, Joseph Smith, Angie Brooke, Tomeka Petersen, Diane Farrar, William Krider, Herman Radke, Mark Petersen, Florence Fix, Phillip Raz, Faye Petersen, Jimmy Hoover, W. Hucker, R. Ruhlow, Robert Peck, Diane Fuller, Myrtle Fuller, Mark Elder, Ardyth Slight, Dennis Dick, Mark Westlake, Sarne Moore, Marvin Smith, Westley Drayfahl, Missy Phelps McCollan, Don Kennelly, William A. Phillips, Nancy Phillips, Roger Luft, Patrick Keefe, Lodden Axtell, Joe Rieke, John Pahl, Roger Strong, Terry McFadon, Jeff Jirak, Alissa Jirak, John O'Connell, Lon Morgan, Ed Fry, Chris Davis, Matt Weggen, Larry Hetzler, Lance Rowell, Paul Farrar, Christene Tomfeld, Scott Lucas, Shawn Lucas, Jim Harper, Kalli Shelangoski, Dirk Sneddon, Ann Sneddon, Wm. Shawn Carter, Jim Engler, Mac McCollam, Adam Axtell, Michale Gaeta, Richard Hines, Louie Broders, Nick Spurgeon, Hal Sackfield, Jolene Sackfield, Gary Carlson, Dorothy Phelps, Kenneth H. Irwin, Kenneth LeClere, John Buchele, Roberta Hodge, Tom Dalsing, Richard T. Edwards, Chuck Gingerich, Allan Oestmann, Raymond L. Dietrich, Rob Metzger, Deb Elliott, Daryl Eichelberger, Rick McGill, Chris Carl, Brian Scott, Troy Mitchell, Andrew Foster, Chris Lee, and Curt Weiss.

Note: I typed the questions and comments of the people that were standing at the podium or that I could recognize their voices. I did not type up remarks made in the crowd and back and forth talk.

Tom Harper: We are onto the third case. Eric, can you please read the request?

Eric Furnas: Zoning Agenda Item #3. Muscatine County, Administration Office – FEMA, Record Owner requests approval to permit an Outdoor Shooting Range on this property. The property is located in Pike Township, 1886 170th Street, West Liberty, Iowa, in the NE¼ of Sec. 9-T77N-R3W, Parcel B, containing approximately 25.52 acres and is zoned A-1 Agricultural District.

Tom Harper: Now this is not a zoning request. This is a review of the plan and project for the Zoning Commission and our recommendation for or against would get made to the Supervisors. We will start off with the applicant, which in this case would be Curt Weiss of the conservation board. He will give us an overview of the project and we will have our discussion. Then we will open this up for comments and questions from the audience. And due to the large group that we have here, there will be a three minute time limit on any comments. And I do not … and I will not tolerate any comments or questions going back and forth without going through the board first. So if you have any questions of the applicant address them to the board and we will go back to the applicant. We are not going to turn this into a free for all. Now Eric, was there any correspondence?

Eric Furnas: All the correspondence has been submitted to the commission and I request that it be made part of the official minutes for this meeting.

Tom Harper: Alright, and the applicant?

Curt Weiss: I would like to do a power point. So if I can have you guys get to the side so that you can see it and hopefully I can speak loud enough for everyone to hear. First of all I will start off with why we are proposing a shooting range. (Power Point presentation is attached) The Conservation Board has requested for many many years why we do not have a public shooting range, such as some of the other counties adjoining us. It really came to light about 15 years ago when we made it no target shooting on any public area, DNR area or County Conservation Board area, mainly due to safety concerns, liability concerns. People not putting up adequate back stops and there actually was an accident up in Jackson County that a mountain biker was hit by someone target shooting up there and that kind of put a stop to most target shooting just on public hunting areas. They need to go to a certified range. We've had trouble over the years trying to find an area in Muscatine County that was suitable. I know that there are probably a lot of areas out there but we are looking at a piece of area that the county already owns, because we don't have enough money to go out and buy the ground plus build a range. Several years ago the county acquired this piece of property located kind of in the center of the county. It's across the river from Saulsbury. It's off of Jasper and 170th Street. It was a FEMA buy out area, so it was given to the county. The federal government bought it and tore the house down because it flooded when the river went over the levy. So it was given to the county to manage. So we looked at several of these FEMA buy out areas as possibilities and got together with a group of individuals when we saw this one. Of course, our first concern was safety concerns … are we shooting in a safe direction? We've got it so the way the range is designed right now it is 2.8 miles to the nearest residence down range. Of course, we have concerns of the neighbors… we have one neighbor that is within 1,100 feet of it and noise concerns. So you will see in our proposal we are going to design this or have this ranged designed to NRA standards, which is eight foot side walls, twenty foot back stops, but we are recommending 10 foot side walls to help deflect more of that noise away, it will contain the noise in there so we will help out with the neighbors' concerns. Currently on two sides of it is a public hunting area, so there is already shooting going on down there, it isn't something new to the area. And of course, on a public hunting area you have no control over which way those people are shooting, hopefully they are using commonsense when they are hunting. So it is adjoining. The other thing that we liked about this piece of property, you know we've been asked to try to get a piece of property for a shooting range with the longest range possible. We would love to have a 300 yard range; this has a 200 yard maximum distance that we can put in, so we are proposing a 200 yard range. We had to work with FEMA, this was a FEMA buyout. It took us over two years to get this done. We had to… there's regulations, they just didn't give this to the county and say do whatever you want with it, there were a lot of strings attached. Some of that is, we cannot put any permanent buildings on there. You can put shelter type buildings, but no permanent side walls; no concrete could go on that, it has to all be permeable so that rain and all of that will go down into the soil. They don't want an area that's going to increase the flooding potential in that area. The berm material all has to be generated onsite, we can't haul dirt in to this site. We drew up a plan that would work for that and in May of 2014 we requested FEMA's approval for this. They came back in January of 2015 and wanted us to do an environmental stewardship enclosure plan, which I believe has been given to the zoning board. Essentially what that is, is if at any time… what FEMA's concern was, lead they said they consider not a contaminate at this unless the range was abandoned, then it's a contaminate and it needs to be cleaned up. So there is a closure plan if this would ever close, for whatever reason down the road, the county would be responsible for going in and reclaiming all of that lead to clean that site up. There are also plans in there that there is going to be ongoing plans to do that, depending upon how much lead is generated as its going. In May of 2016 we put in a new request after the plan was completed and in January of 2017 FEMA approved the county for being able to put a shooting range on this property.

May of 2017 we applied for the flood plain permits with the Army Corps of Engineers and DNR. We received permission from the Corp and DNR is running about three months behind, is what they are telling me, so we still have not received that. But I'm assuming if the Corp okayed it, that probably the DNR is going to okay that. We did get word that the concern from the DNR is that there are two state threatened species of turtles that are found in this part of the county, which we are very familiar with. We have those; we have one on the Saulsbury area, that's an ornate box turtle that lives in the water. I don't believe there's enough water on this site for ornate box turtles to survive. I mean, there is some adjoining land that they might be in. The ornate box turtle is a land turtle and for the most part we haven't found them on any of our sites that are this thick, they need more open sandy areas to move around. But during construction we would have to watch for those and make sure that we don't run into those. We can also do construction at periods of time that it wouldn't bother them. We also have a Phase 1A archaeology study done by the University of Iowa. They came back saying that there was no need for any more studies, they didn't think that there was any potential for being any sites on the area that we have. The planning process, we went to several ranges, well run ranges. The Linn County Conservation Board at their Matsell Bridge range, we looked at that, we talked to the staff. We also worked with Des Moines County Conservation Board down at their Big Hollow Range, and I do have Chris Lee here who is a director from Des Moines County Conservation Board that will be able to answer some questions how successful their range has been, how safe their range has been. It's been in operation for 20 years or more, Chris? (Yes) We had Martin & Whitacre design the range for us. Essentially we are looking at the 200 yard range; there would be berms in at 50 yards and at 100 yards. All shooting would have to be done into the berms. You couldn't go and set up a 75 yard target, you've got to shoot at 50 yards or 100 yards or 200 yards. And then …

Jesse Shield: Point where I live.

Curt Weiss: Pardon me?

Tom Harper: Please hold your comments until after the presentation, okay? Go ahead Curt.

Curt Weiss: It is designed to shoot to the east … well we could go back if you want to real quick and show you. This is the trajectory of the range going across and Jesse's house is over here.

Eric Furnas: Curt, please finish your presentation and then we'll have comments.

Curt Weiss: Okay, yeah that's DNR property to the side of it. Okay, so we are looking at the 25 yard range, we would be running this, as I mentioned earlier, we are looking at 10 foot side high berms and 20 foot backstop berms on both of those. The people would be required to shoot from the shooting platforms on the 200 yard range. They could be, depending upon who comes in first, they could go in and do closer walk up shooting on the 25 yard line, which Chris could probably talk to you about how that works in Des Moines County. All people going onto this would be certified, go through a safety training, we're just not going to have an open free for all shooting range. You would need to get a membership, just as they do in Des Moines County and Linn County in order to go onto that. Who will use the range? It will be open to the general public, target shooters and people just wanting to sight their guns in for hunting season, hopefully, you know, a lot of youth, people that live in town don't have a place to go and shoot. We don't have it on any public property right now, you can't go out and target shoot on it. Youth shooting sports, we're seeing a big increase in that, I believe Wilton just opened a new trap shooting league and there's a target shooting group over in Illinois. We'll

also use it for our hunter education program. We used to use the one in West Liberty but they … West Liberty had a fire a few years ago and so we have not been able to take our hunter education classes up there anymore so we are looking for a new place. So kids would not only get classroom work, they would also be able to go out and fire a gun. Muscatine County Sheriff's Office is currently using a private range there is no public range for them. So ownership could change on that and they could lose that. So we are looking at having a permanent range for the Sheriff's Office and of course other law enforcement agencies. Chris could probably attest to how much their range is used by other law enforcement agencies, state troopers, conservation officers, county conservation officers. They hold district meetings and then they do training at those local ranges. Rules and regulations, of course, none of that has been set up yet until we move forward. But we are looking at modeling it after the Des Moines County and the Linn County ranges. The area will be fenced and signed and again, only certified shooters would be allowed to go in and you would have to sign in and sign out. Maintenance and enforcement … the county conservation board would be responsible for maintaining the area. There is going to be a small yearly user fee that should cover most of our costs for backstops, we would furnish all the backstops and all of that. The targets, you know, individual targets could be put on that. You know, gravel for the roads, portable toilet rental, you know as I mentioned earlier, we can't have any permanent structure, we can't build a permanent structure. The enforcement would be by officers with our conservation board as well as the sheriff's office would be patrolling that area. Cost, right now the estimated is about 21,000 cubic yards of soil needs to be moved. We will be creating three new wetlands on the area when we move that soil. There will be six culverts placed in the side berms so if… when that ground ever floods again, if it goes over the top of the levy, the water can flow in and out and it's not a stoppage. Also two shelters over the shooting stations and improve the roadway on the range, cost estimates about $150,000 for the dirt work, we hope that we can get it done for less than that and we also to hope to build the shelters with staff and volunteers. We've done that on a lot of our other areas, there are a lot of people that come and help us when we need help. That's all I have at this time.

Tom Harper: Okay, Eric do you have any comments?

Eric Furnas: You have been provided with the ordinance that lists the criteria for an outdoor shooting range. Outdoor Shooting Ranges are now listed as a Special Use Permit under A-1 Agricultural District. The state law requires that the Zoning Commission review Outdoor Shooting Ranges and that's why this request is in front of you. According to the Muscatine County zoning regulations, shooting ranges must be a minimum of separation distance 750 from the nearest residential structure and must be designed by a licensed professional engineer in the State of Iowa and establish guidelines for range design. In addition they need to have safety procedures, rules and regulations permitted and permitted days and hours of operation are some of things that area required on submitted documents. All of those have been submitted.

Tom Harper: Okay, does the board have any comments or questions?

Clyde Evans: I appreciate all of you taking the time to visit with me on this. One of the things that always comes up is communication and involvement. (he said something else that the tape didn't pick up)

Curt Weiss: Well I guess that's what this meeting here is for, to receive their input.

Tom Harper: Okay, any other questions by the board?

Emily Geertz: I have questions about the usage. Right now what I understand is that it will be 365 days a year?

Curt Weiss: That's what's in there, yeah.

Emily Geertz: I mean, I think that's kind of extreme.

Curt Weiss: Yeah, what do you guys do Chris?

Chris Lee: Ours is open year round.

Curt Weiss: Yeah, Linn County closes theirs for a few months in the wintertime. Des Moines County keeps theirs open year round.

Tom Harper: So the hours they are opened are still to be determined?

Curt Weiss: Yes. I think we have in the proposal is what they have in theirs but I guess we are open. You know, I think those are things that the Conservation Board would be open to ideas that… you know, is it open at 7 in the morning, do we open at 8 in the morning, you know?

Emily Geertz: I'm just questioning the demand for year round. I was just questioning being open 365 days a year.

Carol Schlueter: But then open from what hours are you planning? So are you saying seven in the morning until dark?

Curt Weiss: So it's a half an hour before sunset.

Carol Schlueter: But are there going to be lights there?

Curt Weiss: No, there is no electricity on site.

Carol Schlueter: Okay, no electricity on site either?

Curt Weiss: No, not at this time.

Carol Schlueter: And the cost, I guess you said it is $150,000 to move the dirt?

Curt Weiss: That's the estimate from the engineer.

Carol Schlueter: Okay, and that is coming from your budget?

Curt Weiss: It will… we have a gun club that is willing to put some money into it at this time and then the rest is to be determine from reserve funds that the county conservation board has. It might be then, you know, it might be that we are going to have to go out and raise some money if we can't do it. I mean, it might have to be put on hold for six months. But we're not going to raise the money until we know that we can move forward with the project.

Carol Schlueter: So right now you really don't have the money to do it?

Curt Weiss: If it comes in at $150,000 we would be stretching it. But that we don't know until we get bids from contractors.

Carol Schlueter: Okay.

Tom Harper: Does the board have any more questions before I open this up?

Carol Schlueter: Yeah, so you said the $150,000 is for moving the dirt but you said that you want volunteers to do other things. So what happens if you don't get volunteers to help? How much is that going to cost?

Curt Weiss: We do not have to build those shelters right away. There's a range over in Washington County that just has their shooting platforms without a roof over the top of them. So it is not something that has to be built before it can open. We can add that to it later.

Carol Schlueter: But isn't there going to be a fence around it?

Curt Weiss: The fence would all be done. There is already currently a fence around it, a barbed wire fence.

Carol Schlueter: But I thought it was going to be an enclosed big fence around this? Am I wrong on that?

Curt Weiss: Yeah, no we would just be looking …. Des Moines County has, what do you guys have around yours?

Chris Lee: Ours is just barbed wire.

Curt Weiss: Right, barbed wire with signage.

Carol Schlueter: So there's not going to be any fence around just where the shooting range is?

Curt Weiss: No, you know, if people want to get over they are going to climb over a six foot high or a five foot high fence, you know? The main thing is signage and enforcement. Are you talking about the berm or the fence?

Carol Schlueter: I'm talking around the shooting range where the berm is. That's not going to be fenced in?

Curt Weiss: The property that the county owns will all be fenced. No, no the berms… there are no fences on top of the berms. The berms are around the 25 acre piece of property. Inside that we will build the berms 20 foot high back stops 10 foot sidewalls. So you'd be looking down them. I don't know if I can go backwards on this power point to give you an idea.

Carol Schlueter: So the only fence will be around the whole property?

Curt Weiss: That's correct. Nobody will be allowed on that property unless they are certified to go there to shoot.

Carol Schlueter: So who is going to be there to supervise that every day?

Curt Weiss: There will not be anybody there every day to supervise it, no.

Carol Schlueter: So then some people can come in that maybe should not?

Curt Weiss: But if they are caught they will be charged with that then.

Carol Schlueter: But who's going to be caught with that then?

Emily Geertz: But who would catch them?

Curt Weiss: We patrol our areas now, such as like the beach down at Deep Lakes, they have to stay inside that beach area. We patrol that. Anybody caught outside gets tickets for it. We have three full time officers with the county conservation board and then the county sheriff's department would be going by that also. We would also ask that the people that are … and I'm sure that Des Moines County does the same thing, that the people that are members are going to be our eyes and ears as well. If they are in there and see that somebody is in there and they haven't signed in they will have our phone

numbers to call so that we can come and take care of it. This is the way that these other ranges have been running and … do you have problems with that?

Chris Lee: No.

Emily Geertz: I have a question Curt. You have these berms which seem to be for ammunition or bullets but what about sound? How does that work with the sound? I think that would be another concern that they may have.

Curt Weiss: Can you answer any of that Chris, do you know? See that's why we are designing them higher to hold that sound in and to deflect the sound off to the side.

Emily Geertz: I'm just curious, I don't know how that works.

Curt Weiss: The back berm is 20 foot high, side berms are 10 foot high.

Carol Schlueter: But there's nothing on the top?

Curt Weiss: Nothing on the top, no.

Carol Schlueter: Well can't a bullet go up there?

Curt Weiss: Well if people aim that way. But right now in the public hunting area they could do that too. You know, hopefully they will be trained people that know which way to shoot and to make sure that they are shooting into the berms so that the bullet doesn't have the wings. These were designed and that's the way the engineer designed them so that all bullets and projectiles stay inside that range. They are designed so that nothing will go outside.

Clyde Evans: Curt, the range is facing mostly east and I know that the morning sun comes up in the east, at least it used to and there was some thought about maybe sloping it a little to the southeast. You would have a wider extension down to the Cedar River, a lot more trees in that area. Have you thought about that at all? It also would lessen the sounds I think.

Curt Weiss: That's a possibility. I guess, I'm not an engineer. You would have to have the engineers look at that. The only thing that I did look at … I think then that there could be a house within two miles down range instead of 2.8 miles down range.

Emily Geertz: So another question that I have is, aside from the initial cost of moving the dirt, does that also include building a road and grading?

Curt Weiss: Yeah, that wouldn't be that much cost. There is already a lane going back in there. So it just would be the improvement of that lane.

Emily Geertz: And then what would be the projected or estimated cost of the maintenance every year? There would have to be mowing and…

Curt Weiss: Well it would just be within the budget that I already have. I mean, I already have staff that can do that. So I mean as far as… we are hoping that the user fee will cover it. The main thing that is going to increase cost is backboards and those kinds of things. And with the user fee, that should cover that. Maybe the first few years as the membership goes up, but I don't know. How many members do you guys have currently?

Chris Lee: We have over 800 members.

Curt Weiss: So it would be 800 members at $20.

Emily Geertz: And which county is that?

Curt Weiss: That's Des Moines County. It's about the same population.

Carol Schlueter: So you are not looking at anybody else to help with this?

Curt Weiss: No, other than if there is enough money brought in, we could look at some type of part-time caretaker that could maybe come in on a daily basis to help do some cleanup so county staff wouldn't have to drive over there as much. But there might be some shooter that's planning on being there anyway and he would be willing to do some cleanup while he's there. We have a lot of retired people that want things to do.

Emily Geertz: This is all kind of new to me so from my understanding there is no limitation on the type of guns that you could use there? I mean, it's not like just pistols and rifles or what it is?

Curt Weiss: At this time those rules haven't been decided and that's why we are leaving some open to hear from people. It would be anything that is legal for people to own, you know, hunting rifle calibers, pistols, shot guns. It would be all target shooting.

Carol Schlueter: So it would be automatics?

Curt Weiss: Well I don't think it's legal for them to own that, it could be semi-automatic.

Carol Schlueter: I see, okay.

Curt Weiss: Yeah, it would be for things that are legal for people to own. No, there wouldn't be fully automatic weapons there, other than if it's for law enforcement but it is not legal for the average person to own one. We are looking at same calibers of rifles that can be out on that public hunting area today. There is no restriction on that DNR area on what caliber rifle can be used in that area. You can hunt coyotes with rifles.

Tom Harper: Okay, if there is nothing else from the board I will open this up for public comment and questions. Come to the podium if you have any questions or comments, please state your name for the record and there will be a three minute time limit on your comments.

Jesse Shield: Can I get more than three minutes since I'll be getting shot at? I mean, why would I waste my time with only three minutes? I live down range…

Eric Furnas: Please state your name and address.

Jesse Shield: Jesse Shield, 1922 170th Street. I brought my checkbook today, I am willing to buy the ground so that you can take that money and find a better spot. I am a NRA member, a gun collector and I hunt, I have a right to carry, I mean I'm not against guns by any means. I just don't want it pointed at my house. It needs to be safe. I honestly don't want it at all because I live there. But Curt said two miles… so all bullets fly perfectly straight so 1,600 foot, my house is over there. We don't sit in the house daily. If you look at that map, my property goes clear down to the corner. You take that T and measure, you are going to find out that's it real close. I have a 10 year old boy and I've had a lot of trouble in my life already, I don't need any problems. I mean, I want it to be safe. I mean a 30-06 will go 1,600 yards, it's full kill power. You know, I'm just saying. And there's cows, I lease that out. Like I said, I am willing to buy … I mean, he's the FEMA Administrator he can make it happen. Find a good spot or I'll do it myself. Move it so it doesn't get aimed towards me, like

Clyde said, if you could get it going a different direction… I mean it's already going to the public hunting area, let's whatever… The lead… I have a drilled well but I know some of my neighbors have sand points and they are pretty close and there could be lead in their water. It's aimed right at the DNR parking lot where you walk in, I mean that's where you park your vehicle, put your gear on and go, that's what it's aimed at. My tax dollars are fighting against me, I have to help pay for a lawyer to try to at least make it right. It's 30 minutes… cell phones don't work down there, it's 30 minutes away for… I talked to Kenny Morrison today it's going to take 30 minutes to get an ambulance there by the times these guys get to their place. Fencing… I mean, I don't know if you guys have ever been out in the flood plain but if you put a fence in, it's gone. The whole wire is gone. It flooded last year so the culverts that let water into the berm will go under the ____?___. No matter who told you any different, that's how it is. My property value is going to go down. And the Board of Supervisors are all for it and I see some of you here today. I mean, like I say I am not against guns, I just don't want it aimed at me.

Tom Harper: Next, please state your name and address.

Dorothy Phelps: I think I can turn and talk this way. Hi, wow what an audience we have here. I'm Dorothy Phelps and I live at 1004 N. Miller Street in West Liberty.

Eric Furnas: Ma'am … ma'am you need to turn and face and talk to the Zoning Commission.

Tom Harper: You need to address the Zoning Commission.

Dorothy Phelps: Oh okay. I'm Dorothy Phelps and I live at 1004 N. Miller Street in West Liberty. My family and I own 125 acres just to the west of this shooting range proposal and in fact I think that part of our property would almost border it. We have as I said, 125 acres of wooded land and open area. At one time we use to farm the open area. Now our farm or our acreage is in a government easement program so all we have to get out of this ground is our enjoyment but we still pay taxes on it so we have really promoted wildlife conservation. Some of our family members like to hunt deer, wild turkeys and pheasants and they can do that down there but we cannot put any kind of a building on this ground or have any kind of a source of income off of it. So anyway I'm concerned and I'm not for the shooting range at all because I do like the wildlife. My heart breaks for my neighbors, Bill Phillips, they have property right next to the driveway of this shooting range and they have the most beautiful waterway right off of that driveway and they keep their land very beautiful by mowing acres and acres of ground. They have wild geese on this waterway most of the time. But anyway that's one thing that I always like to do is to go down to their property and sit along this roadway and watch the wild geese. I just can't imagine putting it close to that property. Thank you.

Wes Drayfahl: Wes Drayfahl, I live at 1868 170th Street, I am just down the street from Bill. He offered FEMA… he called them and said hey let me buy the ground and it would have went back into the tax roll, which people in government get a little giddy when you say taxes. But they said, oh no, the county said we can't touch it we can't do nothing with it. So now they are going to make a gun range. There are gun ranges all the way around Muscatine County, maybe not professional ones. But if you want to be safe and you are tight with the DNR, put it there. DNR bought 900 acres down there along the river, put it right down there in the middle, the trees will protect everybody, it will take care of the noise. So I don't want the noise. And if one stray bullet hits my place, I'm shooting back. The constitution says that if I'm threatened, I can shoot back.

Eric Furnas: I'm privileged that you think that I have the ability to sell property, but I am not the Muscatine County Board of Supervisors nor is this the board…

Wes Drayfahl: Than who is the liar that put in the paper, oh there's not a house or residence within two miles and yet Bill can hop over the fence and he's right there? It's just a bunch of bull. Like I said, if he's tight with the DNR and he's got to have it, put it down there in the woods.

Eric Furnas: This is the board that you need to address. They are making the decision, not me.

Wes Drayfahl: Okay, and another way to put it would be we're neighbors right around this, we've got to put up with it. Why not put a sign in every one of your yards saying gun range in the back of my back yard come shoot all you want. That's just saying the same thing. That's what you are telling us. Well you can just put up with it. And how many years and digging holes for the dirt, I mean, we have enough mosquitos out there.

Tom Harper: No one wants ____?_____ by where they live. Whether it be guns, traffic, neighbors…. Please, spare us.

Wes Drayfahl: Spare you? In other words, you are going to pass it anyway?

Tom Harper: No, I didn't say that. Okay, next?

Bill Phillips: Bill Phillips, 1870 170th Street. I'm the one that lives 1,250 feet from them. I worked a seven day swing shift for 30 years and my house set up next to the road and the gravel and all the traffic made such noise that I built back where it was quiet and now they are contemplating putting a shooting gallery back there? I'm not against guns myself either, I spent seven years in the military so I know what guns are, big and little. I just don't want all that confusion on here. You know, I'm right next to it. As a matter of fact, it was just a year ago that somebody went back there and was driving around at night and they went right through the fence and lacked ten feet of going into my pond. And if they had of, they would still be there. That's all I got to say, I'm against it.

Faye Petersen: First I want to say, my name is Faye Petersen from 501 N. Clay Street in West Liberty. Is my time here, my three minutes, am I not allowed to ask a question after that?

Tom Harper: If you have a question you need to direct it to us.

Faye Petersen: After I have finished and I have sat down? Dorothy is my mom, there are five of us. Dorothy and three sisters… well lots of kids besides. She said a lot of what I intended to say so I'm going to fast forward here on my land. The property… land is one of today's most value assets. We can't manufacture or grow more land. These families, these ones that are close by here and in some cases multiple generations have worked hard to get their property to this point. They have invested blood, sweat, tears and money. If you guys have your survey sheet in front of you, in reference to the Special Use Permit Questionnaire, question #9 on this sheet, will the proposed use unreasonable diminish or impair established property values. Curt's answer was no. We have visited with multiple real estate agents and they all agree, yes it will. It takes a special real estate market to find a buyer interested in land next to a shooting range. There aren't that many home buyers who want a house that is within feet of a shooting range. There are safety hazards and noise nuisance and concerns of public health as in lead contamination. These issues are covered in numbers 10 and 7. To the noise issue, Curt answered, some noise… some noise created by firearms. To the public health

question his answer was no, no concerns to lead contamination or safety. Our property is primarily marketable as prime hunting property. But of course, who is going to buy it when there is no game? There won't be game there because of the shots fired and the noise and possible lead contamination. So when we want to sell our property will there be very many buyers? There might be one, and it's sitting probably right here in this room and that would be the Muscatine County Conservation Commission and it's not for sale. To those whose votes will decide this decision I urge you to vote as if your house … your house is as close to the shooting range as Bill Phillips, Wes Drayfahl or Jesse Shield. I too brought my checkbook; you can sell it to me.

Tom Harper: Times up. Okay, next?

Marvin Smith: Marvin Smith, 1621 Kelly Avenue. I oppose this. DNR was saying that we've already hunting down there. Yeah, you hear a few shots couple months a year, not shooting everyday seven days a week, you know, that's not acceptable. I own and have got property on the other end of it and we live a little farther away there's two ponds down there where we take the camper down there and camp and stuff. I really don't want to hear that noise all the time. Okay, thanks.

Tom Daising: My name is Tom Daising, 1854 160th Street. I was given a letter here that was written by Wayne Corriell last evening and unfortunately he is in the hospital as of this morning. This was just handed to me this evening here and they asked me to read this. Per Wayne: First of all I would like the correct information given out by the conservation board there are over 30 homes in a two mile radius of the proposed shooting range. If the county and the board have misread the maps I am concerned about other fake facts that they are … in their environmental studies. Here are questions asked by our neighbors as I have visited with them. We deserve answers here and now tonight. This is a list, again per Wayne: Do the supervisors have too much money? Does the conservation board have too much land? Is there outside pressure on the supervisors from local boards and individuals? Who will pay the ongoing cost for the range and any affiliated legal fees to pollution and injuries? Let's have the truth on why this is being proposed at this time and in this secretive manner and in this location. Where's the leadership from the supervisors? Who is our representative on the board and what is his opinion? He should have been in the neighborhood explaining this proposal over the course of the past three years. There is something, however, I found that the county boards involvement in this proposal that we have in common, we both need better backbones. The DNR is noted for starting grass fires in this proposed area and then leaving the areas unattended. What is your policy towards fires and then tending to them? It's been left to the local departments, West Liberty, Atalissa, and Nichols to extinguish the fires and to absorb the cost. They have not been paid the majority of the times they have been called and why not? If the agency cannot handle the responsibility to the land that they currently have why should they be entrusted with more? Looking over this proposal I am reminded of a phrase a county employee, Eric Furnas, he used when inspecting our septic system last year said to me, "What a bunch of crap". We wait for your response to our questions. That's per Wayne. Again my name is Tom Daising and I live at 1854 160th Street speaking on my behalf. I live as a crow flies less than a mile to the north of your proposed gun range. You are going to have obviously a very much unsupervised area, unpatrolled, unfenced, unsafe area for people in there. Someone turns around and fires a gun… I've got show horses and show cattle on my property, who do I sue when something gets shot? I'm just asking. Not so much for an animal … what about a child… there's kids, there's people, passerby's? If you cannot patrol an area, you don't have it regulated, you cannot keep it right. If you were to visit the City of Cedar Rapids … and in my occupation I've worked with the City of Cedar Rapids on their current

gun range that they have been in the process of building for their law enforcement officials, for the county and other organizations can rent the facility at a very reduced rate to use for training or any gun exercise… Lead pollution is huge. You have to use steel shot when hunting around water for ducks and game. But you can shoot lead into this pile of dirt all day long? The City of Cedar Rapids, obviously the engineers, architects whoever they have involved trying to design this have not looked into any kind of lead meditation for the soil. This project would cost two million minimum to be built correctly to protect the people and protect the environment from what you are trying to propose here. You are opening up a can of worms and a barbed wire fence isn't going to keep anybody out for trying to go in there and shoot up things. Thank you.

Chuck Gingerich: Hey this is Chuck Gingerich, 1666 Iron City Avenue. I also own property along 170th, my farm borders 170th. As the crow flies I also live about a mile away, maybe less than a mile away from this proposed shooting range. I have spent 25 years of my live doing conservation programs that I can do, tree plantings to enhance the wildlife environment. I think that this is going to be detrimental to wildlife. I like deer, I like to hunt, I have guns. I think this is going to be detrimental to having any more deer down there because of the noise. If you've ever been deer hunting and if you've ever watched deer, and I've watched deer before when somebody else is shooting in the background they bolt, they run and they are gone. I think it is total disrespect to Bill and Nancy Phillips, Jesse Shield and Wes Drayfahl to try and even consider this. I am totally against it. I bought this farm because I like peace and quiet and I would still like to maintain that. Thank you.

Louie Broders: Louie Broders, 1840 Iron City Avenue. I imagine I am about a mile and a half from where this proposed site it. I had forgotten about the fires that Wayne had brought up from the DNR because I was helping the fireman find their way around the fences to get in so that they could put the fires out. Anyway… I have a levy that goes through the DNR ground which is within … I would say probably 1,000 feet from this proposed site. We mow this thing three times a year through the DNR ground. Okay, you are going to have all kinds of cliental out there… anybody can go down and get a permit, okay? You have … you go through a course, you can have anybody from a Latin King to some fellow that shouldn't even … that shouldn't even own a gun. So they try to go out to this shooting range and they do not have a permit to get into it, okay? What … they drive out to get to the shooting range without knowing that they need a permit, they show up there… what … yeah with no supervision of course, what are they going to do, okay? They are going to set in the parking lot, maybe throw stuff out on the parking lot and shoot it. They went to shoot the dang gum gun and they are going to do it whether they can get into this gun range or not, be it pistol, rifle or whatever. Say I'm mowing that levy at this certain time with my tractor and I'm 1,000 yards out say somebody says maybe I can touch that tractor, nobody will know. There's no video surveillance on who's at this gun range. There's nobody… the road that we are on… there's much better roads than this… or areas that this could be on. It's a dead-end gravel road off of another gravel road that has no traffic… I mean it has minimum traffic on it. The dead-end road has absolutely none until it comes to be deer season. So you are going to have people down there hiding and shooting stuff up left and right. To me I think it's a safety issue for other people around. They say you can't shoot over top of the berms, misfires… accidental shots, somebody hitting the trigger, somebody getting out of their vehicle and the gun goes off of the wrong direction towards one of these guys houses? I am a mile and a half, I mean, if you are shooting a 30-06 up in the area, you know accidentally, it could land on my house. We have kids… I mean, you never know. I mean, you get the trajectory right anything could happen. How did the guy who was in the… that got shot at a gun range he was on a bicycle, how did he get shot? He wasn't on the gun range but he got hit. How did that happen if the bullets

weren't supposed to be… a mountain biker? Okay, I just don't see it to be safe. There could be better places for this thing that's better policed. I mean it is hidden down in there. I mean, so that's why its hunting ground is because it is hidden down away. As far as it being in the center of the county, I don't know where that came from because it's really not the center of the county when I get in my truck and go to the other side it takes 40 minutes. So I don't know I just really believe it's really going to be a bad deal for everybody, the noise… I live there, I will hear it. I listen to the West Liberty Raceway every Saturday night and I live six miles away from it. We do have gun fire out there, it happens a lot. We have neighbors and sometimes their son goes down there and he has rifles, repeating arms and he will go down and shoot up things. But it happens once every three months, four months. You are not inviting these people out here to shoot whenever they want. I just don't see the safety in it.

Wes Drayfahl: I didn't get my full three. Well I've got to go with what Louie said, I live on that gravel road and there are days when there is no wind and say a truck goes by or even two pickups and you've got to slow down. You don't dare stop because somebody is going to ass end you. But the dust is terrible. And our city hunters or shooters, excuse me, they are going to come out on a Saturday and Sunday … they are going to raise a dust storm like you wouldn't believe and somebody is going to get into a crash, let's put it that way. So for the safety ain't just for the gun deal it's for getting out there. And the dust is terrible.

Tom Harper: Next?

Tomeka Petersen: Tomeka Petersen, 916 N. Columbus Street, West Liberty. I have three questions for Curt Weiss. First one, what was the date you said you met with the residents of Pike Township? Number two, you mentioned no roof over the top of this building… not a berm but a shelter, I thought that was a safety device that was supposed to be like… an overhead safety baffles? Number three, is an AK 47 legal? So we are talking about possibly AK 47's being shot down there. Alright first of all I would like to say thank you to the Zoning Commission for this opportunity to voice my opinion. My grandmother is Dorothy Phelps that you learned earlier has 100 plus acres of land to the west. On July 4th I learned about this public hearing and your decision weighs heavily on my future enjoyment of country life. What a shock to learn that the peace and tranquility of nature can be snatched away in an instant by outside forces with no emotional connection to the land. How did we get to this point? How is it possible that the people in the affected community, Pike Township, were clueless that Curt Weiss and the Board of Supervisors had been not only interested but planning and coordinating this Outdoor Shooting Range for years? For the past nine days a grassroots coalition has formed to find what is going on. We've emailed government employees, talked to public employees, talked to various board members, gone door to door talking to neighbors, read many forms and letters by the project champions which appear to be Curt, Eric Furnas and the Board of Supervisors. We've monitored facebook and email distribution lists and yet interestingly all this information and planning occurs without anyone, not Curt, not Eric, not the Board of Supervisors talked or involved the residents or neighbors of Pike Township and surrounding areas. How is it possible that there has been much interest for many years but no one in the Pike Township Community was aware that their property in their neighborhood was the bullseye? Possibilities for this: A. No one in Pike Township is a member of the conservation board or the Board of Supervisors. B. No one in Pike Township is interested in an Outdoor Shooting Range let alone having one move into their neighborhood so that they are not members with the group in the know. C. There is interest and knowledge about this project but those individuals are keeping it quiet. D. Possibly even commission members and supporters for the range were in the know but were under the impression that

they were not allowed to talk publically about it yet. E. The project champions, Eric, Curt and the Board of Supervisors successfully buried the under workings of the project from all but a select few until it was the right time to resurface it. Why I say that is I'm aware of DNR officials that told us, he was not aware of the meeting and he hasn't heard about the range for the past year. He thought it was dead. I even had a commission member, somebody in this room but I'm not going to say who it was, said that they too thought it had died because they haven't heard about it in quite some time. So why would the public be left in the dark? Well possibly Eric, Curt and the Board of Supervisors wanted to make sure that they had their ducks in a row before anyone could raise opposition about the idea. In July, 2016 Curt Weiss and the conservation commission and Jeff Sorensen, Chair of the Board of Supervisors, signed a letter stating that Muscatine County is seeking permission for the Muscatine County Conservation Board to construct the public shooting range at this location. One big problem, there was no provision in the county zonal code to allow the operation of an outdoor public shooting range. For several months several boards worked quietly to amend the Zoning Ordinance to define Outdoor Shooting Ranges and establish a process for their development. All the while they have been informing conservation members, FEMA, Iowa Homeland Security and Emergency Management Department and the DNR Floodplain Management Department that they will build an Outdoor Shooting Range. So once the permits, surveys, evaluations and the Zoning Ordinance is replaced, surprise Pike Township here's your notice, there's going to be a public hearing in three weeks, for Curt, Eric and your elected officials, the Board of Supervisors, to build an Outdoor Shooting Range in your unsuspecting neighborhood.

Tom Harper: I'm going to stop you right there your three minutes are up. (people talking at the same time)

Tomeka Petersen: I'm going to read her part for the next three minutes. As I mentioned…

Tom Harper: You are making a lot of wild accusations here and you don't understand what… (people talking at once)

Tomeka Petersen: You want to see letters? I've got lots of letters.

Tom Harper: First of all, Eric is not… Eric is only involved in this because he is the Zoning Administrator. He does not have any plan making with this, okay? He administers with the zoning operation of the state, of the county, alright?

Tomeka Petersen: Isn't he with FEMA?

Tom Harper: No, he is not with FEMA. He is a county employee. The ordinance that was changed, the ordinance is a growing and living document. It's changed as needed for various different reasons throughout…

Tomeka Petersen: No, I agree. I understand what you are saying but it just seems that…

Tom Harper: And we also try to align our ordinance with other counties and with state laws so there is nothing subversive about this, okay?

Tomeka Petersen: Okay, so I get my sisters three minutes.

Tom Harper: You get your sisters three minutes.

Tomeka Petersen: And I'll get my dad's too. So what I want to say is Eric, it's not in your backyard, it's not in Curt's nor is in the backyard of the Board of Supervisors. So why should you be overly concerned about something you

described to me Eric, as a particular beast with higher potential for nuisance complaints and safety. Is this a public project or is it a project on public land being ramrodded through by the Board of Supervisors and completely ignoring the neighbors of the community that will be affected the most? So to the commission, imagine you live where Jesse lives, where the Phillips live, and the Drayfahls, how would you want the commission to vote? Would you want to factor the quality of your country life into the equation? Do the wants of others surpass those who oppose it when other options are available? I urge each of you after hearing the emotions of all these neighbors who have spoke to you tonight or called you asking to take this back to the drawing board and find an alternative location, one that does not infringe on anyone's quality of life. No one has the right to do that to another nor should anyone petition an agency to do that for them. Thank you.

Tom Harper: Anybody else wish to speak?

Craig Nierman: I'm Craig Nierman with the Phelan Tucker Law Firm and I have been privately retained by several of the property owners in the area. A lot of the policy reasons why this should not be approved have already been articulated. I'm going to focus on the law here. As Petersen mentioned the ordinance as did the sheriff referring to the Zoning Ordinance Article III, Section 3.29, Sub 3 says that when applying for a Special Use Permit the application shall provide in addition to what is otherwise required for Special Use Permitting, the following information… you look at Sub B…

Tom Harper: I need to stop you right there. Special Use Permits are heard and granted by the Board of Adjustment, this is the Zoning Commission.

Craig Nierman: I understand. There has been no submission of noise abatement methods and procedures. Now the county talks about noise abatement but the purpose of the berms is to attempt to limit stray bullets, not that a 10 foot berm is going to do much. But there is no berm to the west of the range, or the proposed range. Actually it is to the west and a little bit to the north where the closest house is. There's no berm proposed to the left or the right of where people are going to be shooting. So on three sides there's not even a berm. Also as a means of restricting… there's a requirement in the ordinance that there shall be a means of restricting unauthorized access onto the range by perimeter fencing, gates, etc. That is required to be addressed in the plan and it is not. Similarly in Sub 3 Sub B Sub 2 it requires disclosure of the calibers of weapons and ammunition, that's not in the plan. And finally Sub 3 Sub B Sub 6 methods used for range cleanup and maintenance including lead abatement and disposal are not addressed. This is significant because the county's claiming that the only lead abatement that's necessary is in the closure plan. I have here the federal government's publication – Best Management Practices of Lead at Outdoor Shooting Ranges. And it was created with the support of the National Rifle Association, the National Shooting Sports Foundation, and Mr. Dick Paracord who wrote the closure plan. A couple… I will just highlight a couple of things here, one… lead. Lead kills children. Lead destroys brains. Lead causes reproductive problems in adults as well. This, which I would like to make a copy of the minutes, also includes the perils that lead bullets can cause when they are mixed with rain water runoff. Of course, this area is prone to flooding and it also details how even rain water can distribute lead into the soil and into the drinking water. Approve this project is tantamount to releasing lead into the Cedar River Valley, and of course that is going to cause huge problems, health problems for children as well as adults. This plan is unwise and it's unlegal … illegal and deadly to future generations and accordingly it should be opposed. Here is a copy for the minutes.

Tom Harper: Next?

Scott Lucas: Scott Lucas, 1961 280th Street, Letts. We own property directly across the river from in the direction that the shooting range will be pointing and I am for the shooting range. The reasons why I am for the shooting range, right now … we have owned that property for seven years and there are people that shoot year round down there now. I believe having a shooting range will make things safer actually because there's people shooting every direction down there now year round. And speaking of lead contaminate, I think it will be a controlled lead contaminate instead of having lead spread all over the whole bottom in an uncontrolled manner. Like I said we are down there quite often, I don't have a house down there like you folks do, I don't live down there but I am down there quite a bit. I hunt down there. We fish down there. We're down there a lot. I don't have any concern for safety if there's a berm constructed and the people go through the process of getting certified to be there and knowing the rules, play by the rules. And I don't have a problem with it and like I say, we are the direct path as a crow flies when bullets come flying and there will be berms protecting that so I don't see a problem with it.

Daryl Eichelberger: My name is Daryl Eichelberger and I live at 2180 Independence Avenue. I do sympathize with people that have property surrounding this area, especially their safety concerns, however, I have shoot at ranges like this in other counties and other states and I believe that there are probably hundreds if not thousands of these public shooting ranges across the country and I think if safety and liability were a big concern with these as much as it seems in the society that we have… people wanting to sue for everything, that if it was a problem I don't think our county would be wanting to put itself in that kind of a position where there would be lawsuits. I believe that these things are probably pretty safe, at least you are controlling the direction of fire. I think another big bonus to having this is just the promotion of education and safety. Like I said, we'll have safety programs out there. I think more people owning firearms now the more chance they get to shoot them and use them, the safer they become. If we have a place like this where they can go and safely use them with some safety training programs, it's just makes the world a safer place for all of us and our firearms. Thank you.

Sarne Moore: My name is Sarne Moore and I'm at 310 W. 5th Street in Wilton. I am a… I used to be a member of the Oakhills Gun Club. I target shoot at the Johnson County DNR site regularly. The Oakhills Gun Club is surrounded by homes and it's as safe as you can be with the members and the training that you receive. Again, there is no right or wrong … I've lived in Muscatine now 15 years, I would like a place to shoot within my county so I'm not driving an hour or two just to get somewhere. I would purchase anyone of your lands as soon as you want to give them up.

Jim Petersen: Jim Petersen, 501 N. Clay in West Liberty. I visited with one of the members of the board here, I think it was Wednesday and I believe that he 100% assured me that there would not be any police officers shooting in this range. So I'm not sure all the law officials, sheriff's and everything… either somebody's put that in there since we talked to him or maybe he didn't know what he was talking about, I'm not sure. Would you like to answer that Clyde? Anyway I'm highly against this. I am married to a family member that owns the ground on the other side of the west fence. And when it floods… there's gravel underneath the shooting thing, it's going to be probably over in the Phelps property and whatever other junk that's lying around there, maybe… possibly. I know in 2008 I believe there was probably six foot of water over the top of this range and nobody could get down there for two months maybe. And in September of last year the river levee broke down by 22 and it backed up in there. So that would be another month or two that you aren't going to get in there. And I just don't think it's very good and I have several pictures of ___?____ turtles on the other side of the fence where this is going to be at. I think they are protected in Iowa, if I'm not right. I think so. So thank you.

Cleo Smith: My name is Cleo Smith, 1621 Kelly Avenue. I would just like to ask why should we start this project when they don't even have enough money to do it? Think about that. It's going to sit down there and who knows when you are going to have the money to finish this project. And another thing you guys need to go and look at where it's going to be. Have you? Have any of you guys? You have and you have? So consider that. Look where the houses are. Bill Phillips and all of these guys live there. You wouldn't want that gun range there. You've got to consider that. With all the shooting and all the noise… and what are you going to do about the gravel road? We are tired of the dust! And how many people is going to be able to shoot in there at once? How many people? Is there an answer? Is there an answer! How many people can go at one time to shoot? Answer that! Is there going to be 10, 20 people shooting in there at the same time or what?

Curt Weiss: Do you want me to answer that?

Tom Harper: Sure.

Curt Weiss: There will eight stations at the 200 hundred yard range and there could be up to eight stations on the 20 yard range.

Cleo Smith: So who is going to be there to see if that's just enough people there but not too many? Are you going to stand there every day from 7 until dark time to see if it's right or not? Okay, who's going to do that? Who's going to do that? You're going to do that? You can stay there and do that. I don't care who's all here. You guys don't live there. You don't live there! You have no consideration for us that live there. Go to West Liberty, they can rebuild that. They can rebuild it – you guys go to West Liberty! When you consider all the traffic, everything… who's going to consider that? Not these guys back here – they're not going to! They are going to come and just shoot all they want! Take that under consideration. That's all I have to say.

Bryan Scott: My name is Bryan Scott, I live at 3102 Peartree Lane here in Muscatine. First things first, consider an archery range along with the gun range because there are a lot of shooting sports guys that are out there. Second, to go to another county like Des Moines, Linn, also the state range at Princeton… they all are having to deal with the lead issue. The DNR site at Princeton is right next to the river. If it wasn't allowed or if there was a lead issue, they wouldn't put it in a marsh area, it wouldn't be there. So why would they put a state range that is less than a mile from the river and it's on a marsh? I mean, that's just part of it. But I am for the range because I want a place that I can shoot locally where I don't have to go out and spend my money in another county. (people interrupting) I want to be in my county where I can spend my money and where I can support the organizations that are here. There's plenty of organizations in the county, whether it be 4-H, scouting, hunter education program that is here to support this. There's plenty of volunteers that will step up and build the buildings that they need, if they need them, like if they want to build some type of a temporary structure, there's somebody that is going to step up and volunteer, whether it be materials, time in labor, everybody is going to want this to go. I am favor of it.

Tom Harper: Anyone else?

Wes Drayfahl: (everyone talking at once) What about the fireworks that the state just got done?

Tom Harper: This has nothing to do with fireworks. It has nothing to do with this project, so move on to something else.

Wes Drayfahl: The noise… all the city people all over the state now they are trying to make it illegal again and have all kinds of restrictions because of the noise. But if they come … if the city people want to come out and make the same noise in our backyard, that's okay… and the dust.

Adam Axtell: Adam Axtell, 2759 150th Street. I do sympathize with you land owners and I understand where you guys are coming from. Currently I coach on the Wilton team we have about 13 youth right now. I have a lot more interested … currently we are taking a group of kids about 45 minutes to bi-state… that's the only facility that we have now available that I know of that has a youth organization with somebody putting something on where the kids can actually shoot pistols and rifles and do it, you know, for a score and do it through an authorized coarse where the safety and everything is ready to go. So I am for the gun range. I think that as this grows there's about 4,000 kids that shoot at the state meet and there's about 30,000 shooting at the national level with both pistols and handguns. These kids couldn't be any safer and they are doing an excellent job. The DNR is in charge of the Iowa region of that and they have done a phenomenal job of making it safe, going above and beyond what a safe range could be. So that's one of the major reasons that I am for it. Second off, my family owns a property next to some public ground that's owned by Iowa, it's the Weise Slough area. There's two or three parking lots down there that there are random people at every day. They shoot, and they shoot, and they shoot. And there's no way that I can do anything, other than calling the DNR and doing whatever, I understand that. But I think with this range if we had that there, these people would come and they would shoot downrange and they would be shooting at a bunker, somewhere safe. I don't know that… I guess I feel like with the range would be a lot safer to do that. That's all I had.

Ken LeClere: Hi, my name is Ken LeClere, 401½ Cedar Street in Wilton. I am a member of the Izk's (sp?) club. We go through and have individuals out there that are currently donating their time and stuff to go through and police the area once the firing is done. We go through and keep it pretty well safe. We are coached in safety and stuff. I'm pretty sure that they're going to go through and have a safety course and stuff. You are going to have to be qualified to go onto this range. I admit there is probably going to be people out there that are going to go through and go out when they are not kind. But that is a fact of life with anything. But like I said, we volunteer our time to go through and make sure that there's a pleasurable shooting experience out there and we enjoy it when people come out and have fun. Thank you.

Tom Harper: Anybody else?

Bob Streets: I'm Bob Streets, 205 S. Oak, Letts. I wanted to address the noise issue. I am quite familiarly with the West Liberty Gun Club Range. That property is actually owned by West Liberty City. They apparently aren't having a problem with it or they wouldn't let the club rebuild. The surrounding neighbors … oh I would say about 300 yards maybe … or probably even 200 yards away might be the closest house and they are building closer and this is all behind the firing line. What has been proposed and the extreme distance is beyond the berm, the backstop. So when you are living 500 feet from the property that doesn't mean that you are 500 feet from the firing line behind the berm. I mean, if they are shooting west you are going to have a hard time (changed tapes) getting hit east of it, you know, if you aren't living behind the berm in the direction that they are firing. The noise issue I think is mute. It's a boom and you can hear it downtown West Liberty on the right days, but it's obviously not too disruptive, you know, they're not having an issue there in the city and they are building closer. Thank you.

Jim Petersen: Jim Petersen, 501 N. Clay, which is about less than a half of a mile from the gun range in West Liberty, Iowa. And I know one of your members lives probably as close or little a little closer or maybe a little farther away, I don't know. And you can't guarantee me that you can't hear every shot. We even hear them when they shoot and then hit the target. I don't know what they've got behind the target but it sounds like a piece of metal. Is it metal behind there, can I ask you that or you don't know?

Bob Streets: They do have steel plates. I won't say that you can't hear it but I'm certainly saying that it's not very disruptive,

Jim Petersen: It is disruptive when you live in the house that we live in. The church that we go to is on the northeast side of town and we're sitting in church Sunday and we can hear them shooting. So don't tell me you can't and that's not disruptive. Anyway one time there was a lady on Elm Street which is probably … I don't know how far that is… Emily how far is that? Well it's not very far. She was sitting there and pretty soon a bullet went through her room and lodged in a book… well … from the West Liberty Gun Club. And they said that it was a ricochet, well it was hushed up really. But the investigators figured out that somebody probably took a gun out of their trunk and they figured that it came in like that that it was not a ricochet because they had the bullet. If you hit the backstop or the target, it probably would flatten out the bullet a little bit before it ricocheted off for almost a half of a mile and it went through somebody's window and lodged in their book. Thank you.

Tom Harper: Anybody else?

Roger Strong: Roger Strong, 2120 Bidwell here in Muscatine. I served in the United States Airforce and I enjoyed shooting all the time. Since I got out, there has not been a spot… I'm going to be the first one to admit I go out along the road and I have shot. I put targets out in fields and that… probably in some of these people's fields. I'm sorry if I did, I'm sorry for your houses, but I've got to have someplace to shoot. (people interrupting) I'm just saying that I think this is a great idea it's been in the works forever. I remember when Curt first brought it up, it was in the paper and it hasn't been hush hush like people have been saying. (people interrupting) Not it has not been, it has been in the planning for years.

Tom Harper: No arguing going back and forth.

Roger Strong: Well she's going to start it and I'm going to finish it. It's been in the planning for years. I'm 100% behind the conservation board, DNR, etc. We need a place where it is safe and we can shoot. Where do you go in and sight your shotgun for deer season? You go to somebody's field and that is illegal. At least this is legal. I'm going to paying $20 or $25 a year so that I can go out there and do it. I'm going to be a volunteer to help work and clean up trash, cut grass, whatever. We need this gun range. I'm sorry but I've heard this bull crap so much … not in my backyard. (people interrupting) I'm sorry but the city would not allow it. As I've heard from three or four people, I have my checkbook and let me know the price folks.

Tom Harper: Is there anybody else?

Don Briggs: Don Briggs from Fruitland, Iowa. The Muscatine County … if I have to go shoot I either go to a private person in Louisa County or I belong to Shooting Stars in Muscatine. There is no… you are limited to what you can shoot at Shooting Stars, there's no outside for rifles and everything to shoot, except for some private people that you can go to. You've got the Ike's out there off of Mulberry … but other than that Muscatine County there is hardly

anything unless you know private person and go onto their property to shoot. The general public needs to have something to go and shoot. Thank you.

Don Kennelly: I'm Don Kennelly, 2399 Melon. I spent 20 years in the military and we have nothing but open ranges, well I couldn't say that… we have many open ranges. Most of them are surrounded by bases. Most of them are surrounded by housing developments because the public encroaches on them, okay? The berms that they are proposing are much higher than what we had on the bases. And just like a highway berm, it arrests a lot of the noise that is produced as firearms. Most of the noise that is going to come off of the firing range is in the direction of where the firearm is going to be shot. In the case of what was told us here tonight, the 2.8 miles where the firearms are going to be directed towards, most of that noise is going to be arrested by those berms. I've got no dogs in this fight because I live down by the airport. But I will say that my neighbor and I both shoot and we shoot out our backdoors basically. He's less than a quarter of a mile from me and most of the time we don't hear each other. I mean we can if we are shooting a bigger rifle, but we don't normally hear each other and it's a straight shot from my house to theirs. As far as going over fences and stuff, Mr. Mushroom hunter, the fences… you can't… it's like having a speed limit, you know? Everybody is going to go past the speed limit and they are either going to have it, or abide by it or they're not. If you are not going to abide by it you get a ticket. In this case, if you're not going to abide by it and they are enforced you are going to get a ticket. You shouldn't be in that area, that's what a fence and signage is for, right? You don't go hunting when you aren't supposed to, right? I think it's commonsense, it sounds like a good idea. The nice thing about it is that again you are looking at rules and regulations. You know, how are these going to be enforced? We are going to be certified to go on the range, that's a great deal. At least it's showing education potential. That's all I got.

Tom Harper: Anybody else?

Missy McCollam: My name is Missy McCollam and I live at 215 E. 6th Street, West Liberty. I am reading this from Pat Corriell, she couldn't be here tonight. So I was given this tonight. Plans have been kept secret, fake facts have been widely distributed by county officials. In one deceitful swoop you've managed to solidify opposition to this non-plan from both sides of almost every divergent group involved. Young and old see its pitfalls. Male and females worry about its safety. Ranchers worry about their livestock and farmers worry about liability. Hunters in the public shooting area worry about that one stray shot from the range striking them. The second amendment advocates ___?____ and will residents fear for their safety and that of their family? Members of all of these groups have united to criticize using ___?___ for an outdoor gun range. But you with your blinders in place refuse to acknowledge legitimate concerns of those of us who are most intimately affected by the fallout of this ill __?___ venture. This county really needs this facility, you say, but not in your backyard we noticed. By reducing noise, traffic and activity in an established ___?___ you are willingly creating a noise, traffic and activity problem in another area, ridding your neighbor of the problem of ___?____ or so to speak. You are about to blinding approve seven days a week 7 a.m. to sundown ___?___ from long rifles without restrictions from anyone who pays a small fee and takes a safety course. Have you not noticed the incredible public outrage about the noise factor affiliated with fireworks? Local Iowa governments have responded to the outcry to the constitutes acknowledging that no one has the right to encroach upon the serenity and sanctity of another's home. Where is your ___?____?

Tom Harper: Anybody else?

Andrew Foster: Andrew Foster, 612 Jackson. Sheriff Ryan is here, where do you currently shoot with your team on a private farm, is that correct?

C.J. Ryan: We shoot on private property either in Muscatine County or Louisa County.

Andrew Foster: Correct, so our Muscatine County Sheriff's Department is relying on a private individual to allow them to come onto his property. If tomorrow he chooses not to allow them, Muscatine County Sheriff's Department does not have a range. Is that range up to code or is that range what this range is going to be - absolutely not. It's maybe considered a luxury or a score for a sport hunter to have this range, it is not a luxury for the Muscatine County Sheriff's Department to have a range. The fact that they don't have their own range is.. I mean that is actually mindboggling. You don't become a marksman or an expert shooter just because you graduate basic training from the military or because you graduated from the Sheriff's Academy. It takes months and years of continuous practice … just like anything else to maintain that level of marksmanship. If they only get a chance to go once or twice a year… and then that one time heaven forbid that they are in that situation where they have to use their weapon they will not be prepared. They need a shooting range where they can go at any time at their convenience and not rely on a private individual to give his land, which is still mindboggling by the way, where they are at his convenience or at his schedule. They need to have their own schedule that they can control and they can have their own range.

Tom Daising: Tom Daising, 1854 160th Street. I'm just curious, the… and I'm all in favor of the law enforcement, you all need way better than shooting down a gravel road, you need a range. Have any of you all been up to Cedar Rapids to see their range up there in the city? It's beautiful. They aren't done yet, it's about halfway finished. Maybe you've been there Sheriff, I don't know.

C.J. Ryan: I have not been there.

Tom Daising: It's amazing. What have you all been doing the last 10, 15 years shooting, besides shooting out at somebody's field? Anything?

C.J. Ryan: Well we have some separate ranges that we use, but both of them have been constructed by private individuals on private property. So it's better than shooting down a gravel road, right?

Tom Daising: Because that's what you all got coming up here.

C.J. Ryan: …. well if somebody were to pass away and the family didn't want us to shoot there anymore or if the landowner decides he doesn't want us there anymore then we are left to go and find something else.

Tom Daising: Right, I was just curious on that and then again keep in mind… I keep bringing back Cedar Rapids, they have done a… it's crazy what they have done up there. It's a beautiful facility and it's open to the public as well and can be rented. By the way, how many acres is this facility that we are sitting on right now, Curt? How many acres is Discovery Park?

Curt Weiss: Discovery Park?

Tom Daising: Yes.

Curt Weiss: Seventy five acres.

Tom Daising: Do you think you could find 25 acres here to put a shooting park on?

Curt Weiss: This is inside the city limits.

Tom Harper: Okay, anybody else?

Carol Schlueter: Are you with the Muscatine County Sheriff's Department? I don't know you sir.

C.J. Ryan: Yes. (everyone talking and laughing)

Carol Schlueter: I have a question, do you know about Cedar County or Scott County their departments, do they have shooting ranges to go to or do you know what they do for practice?

C.J. Ryan: I believe Scott County goes out by Mt. Joy and I'm not sure where Cedar County goes.

Carol Schlueter: But is that a private one that they go to in Mt. Joy or is that a Scott County owned one?

Somebody: That is a city owned gun range out by the Davenport airport in Mt. Joy. That's where they shoot out there.

Carol Schlueter: Is it just for the sheriff's department or is it public?

Somebody: No, no that's not public, it's just for law enforcement and county conservation. They utilize that out there.

C.J. Ryan: It's used by state patrol as well.

Carol Schlueter: And you don't know about Cedar County?

C.J. Ryan: I don't know about Cedar County.

Carol Schlueter: Thank you sir.

James Hoover: James Hoover, 720 W. Fulliam, Muscatine. Just out of curiosity are you the gentleman that runs the Big Hollow Range down there?

Chris Lee: Yes.

James Hoover: Could you maybe explain to all of us how it's set up? You have triple berms down each side and what goes on down there and if you've had any injuries, issues that you've had to address and how you fixed it? Is there any way that you can explain to all of us?

Chris Lee: I would refer to you.

James Hoover: Because I'm curious.

Tom Harper: You can go to the podium.

Chris Lee: I am Chris Lee. I am the director down in Des Moines County. So I run the Big Hollow Shooting Range. Down there we have a 25 yard, 50 yard, a 100 yard, and the 300 meter range all of which are built to basically this same design that Muscatine County is proposing. There are two side berms, our side berms are a minimum of eight foot and then a termination berm at the end of direction of fire, which is a minimum of 20 feet. The ranges down there have been operational for more than 20 years, it predates me, obviously I'm a pretty young guy. To some degree they have been expanded a couple of different times over the years to where they are today. The configuration that they are today has been there since the early 2000's, which also predates my time with the department. In that time we've been logging about 3,000 to 4,000 visitors a year to that range, and that does not count law enforcement agencies coming in to reserve the ranges and using them for training facilities. This is just public access, we have a little over 800 certified range users, you

have to be certified to use this range, you have to take a small safety course so that you understand the range rules and how it gets used. We have over 800 members. It's like I said, we had 3,000 to 4,000 visits a year. The ranges are very safe. We have very little problems there. In my entire tenure with the department and dating back…well in the entire 20 plus year history there's never been an injury on the range. We've had… we believe in self-policing, it is not a staffed range. It's on our Big Hollow Park which is an 800 acre wildlife area and recreation park. It has a 178 acre lake with a beach and a boat ramp, it's a semi-highly developed park. It is open to public hunting, all of the land surrounding this range is open to public hunting. We estimate we get over 50,000 visitors a year to the park itself. The range is surrounded by just a five strand barbed wire fence and signage ever 100 or 200 feet or so there is a sign that says shooting range no trespassing. You know, don't step over this sign because if you are inside this fence you're inside of a shooting range. We get no issues with that. The big issues that we have on the range is when a range member calls us and says that somebody is using the range that is not certified to use it. We have found that our range members self-police very well. What we have noticed is that the shooting community … the whole reason our range was first built because the shooting community wanted it. We have wildlife area where people take tv's, refrigerators and they just go and shoot the hell out of them. So the shooting community, the wildlife community, the conservation board, the community got together and said lets establish a place where we can have designated shooting lanes and so they built this. We don't get tv's or refrigerators out there now. The folks that use this range are adamant that you do follow the rules because we understand the political situation of firearms politically now and I don't reckon in talking to our members that there is a gun owner out there that's going to tolerate somebody doing something unsafe with a gun if they can prevent it. That's what we found at this range is that the user, the members of this range very much self-police it. So we don't really have any issues. Curt came down and looked at our range and their design was built much like ours. We are again following NRA range specifications to build it. We love it a lot. We get a lot of people out there and the range uses take… I've got to give the citizens and honestly we have over… we had 100 emails in our database from zip codes within the Muscatine County area. So we've gotten quite a few from up in this direction. The community takes darn good care of it, I've got to give them a lot of credit for that. I don't know, did that answer your question?

James Hoover: Do you have a lot of camping down there?

Chris Lee: Yes we have a 32 site campground.

James Hoover: And I've fished the lake before, so you've got family members and people camping, people visiting, kids out playing, you know kids on the beach? You are surrounded by people and you are pretty well capable of containing and controlling most situations and you say that you haven't had any serious issues?

Chris Lee: No. We've had… in my tenure with the department we've had one issue where a round got out we investigated it and determined that somebody either had an accidental discharge and it went downrange seven-eights of a mile. We don't … unlike what Curt is proposing we don't have a full two miles downrange. The nearest house downrange from us is just inside of a mile and they found a bullet hole in their house. Since then we actually redesigned the range and oriented them in a different direction and we have not had any issues. What the investigation determined was that it was likely an accidental discharge and it cleared the berm. We actually raised the berms after that, this was a number of years ago to get them up. The original design of the range didn't meet that whole 20 foot, so we got them up to a 20 foot height now and since then we have not had any issues.

Someone: Can I ask a question? How about the noise? Have you heard anything from the neighbors within two or three miles asking about the noise? Do you know Andy Robbins? Do you know where he lives?

Chris Lee: Yes.

Someone: I talked with him on the phone because he got one of these letters and he was supposed to be here but he never got the letter because it's still in Des Moines. He's over all of the Cedar bottoms and Red Cedar and all of that. So this Andy Robbins works for the DNR. Anyway I talked with him for quite a while on the phone, I don't know maybe he is here but I don't know him. But he said he can hear this… your range most every day except if the wind is blowing whatever direction… I don't know where he lives. He said he lives over about three and a half miles … is that true?

Chris Lee: I don't know what the distance is, but yeah he is north and east of the range. Yeah, I'm not saying that people don't hear noise. I'm saying that we don't get complaints about it. (everyone talking at once)

Carol Schlueter: Okay, what county is this?

Chris Lee: Des Moines County. We are a rural area.

Carol Schlueter: What are the closest houses to this shooting range?

Chris Lee: We have … well I would have to go back and look at the map … we have probably a dozen homes within a couple of miles radius in different directions, like if you were to draw a circle around the range, maybe more.

Carol Schlueter: Okay, then you also said you have campers and children there?

Chris Lee: Within the park itself.

Carol Schlueter: Is that anywhere close to the shooting range?

Chris Lee: The campgrounds are probably about a quarter of a mile away from the range.

Carol Schlueter: Thank you.

Emily Geertz: How many acres is your shooting range?

Chris Lee: I'm guessing 10? I don't know, I would have to measure it, it's kind of like an "L" shape.

Tom Harper: Okay, anybody care to speak? Anybody? Okay, not hearing anyone does the board have any questions or comments?

Carol Schlueter: Okay, I think … this is all new to me. I appreciate everyone coming tonight and all of your comments. I really do appreciate it. I don't like guns either, but I think there is a need for this, for the kids and everything like that. To me, the illustration of what you want to build is okay, I think. I would like to go see one before I would make my final decision, I think to see what it's really like so that I can know that. Have you looked at other locations? I have a problem with the location. Have you looked at any other locations within the county where it possibly could go that would not be close to any residence at all?

Curt Weiss: That's what we have been doing for 15 years is looking for a location.

Carol Schlueter: And you didn't find anything else in the county?

Curt Weiss: Not that is currently county owned.

Carol Schlueter: Oh.

Curt Weiss: Because the fact of it is, you know, we are saying that $150,000 is going to be a lot to come up with to build it and then if we have to pay another two hundred, three hundred or four hundred thousand to buy it… But we looked at all current county owned properties and none of them were suitable for… (people interrupting) Can I answer that?

Tom Harper: Yes please.

Curt Weiss: The DNR ground that is bordering this property was in WRP and cannot have any structures whatsoever built on that. That is just like what the Petersen's had, I believe. Is yours in CRP or WRP?

Petersen's: WRP.

Curt Weiss: So the government essentially has bought it out, paid the landowner but they get to keep it but it is restricted. They cannot have anything on it. We did talk to Andy Robbins about that and the DNR cannot allow us to put a shooting range on that property because it has federal restrictions from being bought out.

Jesse Shield: How about Bill Ohde? Bill Ohde, do you know him? I think he would work with you to trade this.

Curt Weiss: The DNR cannot allow us to put a shooting range on that property. Bill Ohde no longer works for the DNR.

Louie Broders: So the 25 acre tract that was bought up by FEMA and then donated to the DNR or to Muscatine County that has no restrictions on it? But the DNR ground next to it and Petersen's ground that's touching it, both of those are restricted but this one isn't?

Curt Weiss: Because they were paid by the federal government not to farm it anymore.

Louie Broders: Didn't they do that to Bill ___?___ too?

Curt Weiss: They did that on his farm ground but not his homestead. They only buy farm ground.

Carol Schlueter: And there's no way that that can be reversed?

Curt Weiss: No.

Somebody who didn't give his name: What about the Wiese Slough?

Curt Weiss: That's a DNR area we did not look at DNR areas we looked at county conservation areas.

Tom Harper: Did you have a comment or question?

Denny Dick: I'm Denny Dick, 2262 N. Hilltop Court. I have a question for the DNR guy. You stated that there is going to be certified shooters at this range. How are you going to mitigate who enters this range? I'm for the range by the way, I'm all for it. I've been a shooter for 60 years.

Curt Weiss: How are we going to do what? I guess I don't quite understand?

Denny Dick: How are you going to keep… how do you know that this gentleman right here is a certified shooter when he walks in the range?

Curt Weiss: He would have… and I guess that Chris could answer that because he does that. Do you want to answer that Chris?

Chris Lee: Yeah, so at our range in Des Moines County the members that use that range know that they have to be certified to use it. So they self-police it. If they see somebody on there that they don't think is certified, they are allowed to ask for their certification and the members are required to show it. If they don't want to approach the person, our phone number is posted everywhere which will go direct to a park ranger's cell phone. Where ours is at we do not have electricity – so no lock or code. (several people talking)

Louie Broders: So if you have gone through the course and have a permit, you can't take a buddy in with you or a couple of buddy's in with you? That is not permitted?

Chris Lee: You can take one guest.

Tom Harper: Okay, anybody else?

Somebody who didn't give his name: Chris, I believe… you're shooting range is in a 800 give or take acre area, public use… there's a lake, there's a camping area, the whole nine yards… you've got constant… well I can't say constant traffic flow, but there is movement, there's park rangers, there's eyes on the range, okay?

Chris Lee: Yeah.

Somebody who didn't give his name: Okay, that's what I thought. This is a dead-end gravel road in the middle of nowhere, okay?

Carol Schlueter: So at the end of the day when it's time to quit shooting does it get locked up? Who's going to lock it up or can anybody go in there at night?

Curt Weiss: We would have a gate there that we would be proposing to put a lock on the gate so as the people go in they shut the gate behind them, kind of like they do up at the gun range by Blue Grass, it's Oak Hills. You've got a combination to the lock or a key to their lock after you get the certification. You open that up, you go in, you close it behind you, lock it behind you. You go in and use the range… another guy comes in, he has to open it up, he drives in, he locks it behind him. So it isn't open just for people to go in and out. So when the people leave at night, that gate is locked.

Carol Schlueter: The gate where they drive in, the driveway?

Curt Weiss: Yes, the gate going in. There is no gate up by the shooting range, it's to get in so that you can drive your vehicle into it.

Carol Schlueter: So anybody can jump the fence?

Curt Weiss: Yeah and that's no matter how high the fence is, if they want to do that.

Tom Harper: So the gate would be where the property starts?

Curt Weiss: That's correct at the end of Jasper there would be a gate. And that would be all signage, just like all the rest, saying that they can't go in unless they are certified shooters and have the card.

Somebody who didn't give his name: This fence deal, there is three property owners, there's four sides but there's three property owners besides the county that owns the road. There's nothing… there's a fence this high on the west side that the Phelps family owns, there's nothing keeping anybody from parking their car…

Curt Weiss: A fence would be built all the way around it a four or five strand barbed wire fence.

Somebody who didn't give his name: We don't want a barbed wire fence on the side of our half.

Curt Weiss: It would be whatever county code requires. There is a fencing code in the county, so it's whatever the county code requires and each land owner would be responsible for half of that fence.

Somebody who didn't give his name: So everybody's got to build a new fence around their property because of county code? I don't understand that.

Curt Weiss: That's a fencing code for the county.

Louie Broders: So the DNR will build one on their half too?

Curt Weiss: That's correct they would be responsible for half of the fence.

Louie Broders: Is that included in the $150,000 or is that on top of it, with the dirt moving and all of that… is the fence going on top of that?

Curt Weiss: Well yeah it would be on top of that.

Tom Harper: Okay, is there anyone else who would care to speak?

Somebody who didn't give his name: I rebuilt a lot of fence in '08 and I want you to know the tax dollars to go to build a fence.

Somebody who didn't give his name: Okay, you say that they have to take that safety course and all of that… let's say a guy loses his… or gets kicked out or something but he's already got the combination to get into it, so how do they do that? Now he was talking about a gate that locks, if you already got the combination… you can't change everyone's combination.

Chris Lee: Our range is actually not gated.

Somebody who didn't give his name: Oh, okay, like I say he was talking about a gate a lock and if this guy is not allowed in no more, you can't change the lock.

Curt Weiss: Well he would be in violation because it says certified shooters, so he would be in violation if he came on.

Tom Harper: Anyone else have any questions or comments?

Wayne Phillips: Wayne Phillips, 1870 170th Street. Speaking of jumping the fence and that there, they don't do that they just drive right through them. I've got proof of that. And on the other hand, I have a lot of deer out there, well I don't have them… they come on their own. But I have anywhere from 10 to 14 deer every night and a couple in the morning, they feel pretty safe out there right now. But if you go out and have a lot of traffic out there, they're not going to be safe anymore. I have been feeding them for the last five years and there hasn't been one deer killed on the road out there since, not one. But they come right up there in the morning and they lay right down in the

yard and wait for me to go out there and feed them. I've been feeding them for the last five years. They are going to leave if you have shooting out there from sun up to sun down they're not going to come back. So I am opposed to it. I try to keep that mowed up like a park anyway. I wanted a place to hunt when I was younger, so I bought it. I don't hunt anymore, I just watch. If everybody else hunts it doesn't bother me a bit. I'm not against guns either… I probably got a garage full of them. But I just don't want a lot of traffic and there will be no more peace and quiet. That's it.

Cleo Smith: I've just got one thing to say, how come if it does pass why isn't it for a shorter time? Does it have to be all day long? What's your answer? Why does it have to be from seven to sunset? Why does it have to be that every day? Because you're not working there… you're not shooting there are you? And you ain't there living there by the noise or anything else… the traffic. So what's the answer?

Curt Weiss: Those are all things that we can consider.

Cleo Smith: Yeah, I understand everybody. But why does it have to be such a long time? (people talking) It doesn't matter about you guys I'm saying what I have to say. So anyway let's consider the times of what they have every day seven days a week. We live there.

Tom Harper: Anybody else? Any other comments, questions or discussion? Okay the time has come for the board input.

Emily Geertz: Well I will comment that I have concerns because I feel like it's not really a… I just feel like we don't have a lot of details and I would like to nail down the hours, the monitoring… I also am not sold on that location. I just think it's kind of silly to build something on a place that's going to flood.

Curt Weiss: Well I am confused on that… it's protected by a levy. (everyone talking) We are building a shooting range with no buildings. So the area is designed so that it can flood. The water comes up and the water goes back down, there's a little bit of cleanup. My guys do it at Saulsbury all the time.

Emily Geertz: I know … I'm just voicing some of my concerns. I also, if it were to be built, I wouldn't want anything started until there was a shelter up instead of having everything started and then gradually adding to it. I think we need it. This is the first, as far as I'm concerned, public forum and I think that there is a lot more that we need to kind of hash out here before we go ahead with this. This is just what I am thinking. I would like to see a higher fence and a barbed wire fence. My concern is with road travel. And I'm concerned with the hours. What did you say yours is open for?

Chris Lee: It's sunrise to one half hour before sunset.

Emily Geertz: I just think that's another thing that we need to discuss.

Carol Schlueter: I agree. I need more information too. I just don't like all the ifs. Like you say, with the hours…

Curt Weiss: Well we proposed what hours we had … but I said that that is something that we can talk about.

Carol Schlueter: Yeah and the location.

Tom Harper: So how do we proceed on this? What are we looking for?

Eric Furnas: Well you have the opportunity for someone to make a motion, to not make a motion, the applicant at this point can request it to be tabled and to

bring you more information that you are specifically requesting or bring back a modified proposal based on this hearing. Those are basically your options you can vote tonight or table it tonight.

Tom Harper: I grew up in that area only on the other side of the river on top of the bluff and there's a lot of stuff that has gone on back there. You know, I know what you people are going through … I've lived on a gravel road for 50 years. And hunting… road hunters… don't get me started on that. But this is bottom land you can't do much with bottom land… (changed tapes) It's a natural area. I think that this is a good place, you know, for the shooting range. You know, there are wetlands within there and you can't make a park there because you already have Saulsbury and it's really an anomaly, but it's taken care of year after year and it's still a great place. I am in favor of it but I do think that we need to get a little bit more nailed down on the plan.

Curt Weiss: I guess if I had clear direction… I … you know. I don't have a problem coming back with a clearer… but the plan, I think, is … it's an engineered plan… the shelters are not needed. Like I said, there are shooting ranges that do not have shelters over the top of the shooting ___?___. But we could look at that.

Tom Harper: I just think that we need… a little bit more.

Curt Weiss: I understand that but I guess I would just like some direction then, if I could, to know exactly what you are wanting.

Clyde Evans: Well I first would like to thank all the people that came out both pros and cons… _____?__, thank you very much. I would like to make a motion with come caveats. I will make a motion to approve the range but with the issues identified… the direction of the range with the issue of the sun shining in your face; also the dust issue, they can do something with that; and I think the plan the range is open, maybe looking at some days to give some peace out there, we need some hours. I know you talked about after sunrise or before sunset, so that is something to look at there. And also for the benefit of the owners with land or houses there around or across the road or on the same side of the road, I think there might be some consideration to provide a free membership to the families. There are people in this room right here that that would be a great benefit that they would have a place to go across the road or down the road a little ways.

Tom Harper: Okay, there has been a motion. Is there a second? No second? Does anybody care to second?

Carol Schlueter: Can I speak my opinion?

Tom Harper: Sure.

Carol Schlueter: I would rather… I know you placed some conditions in your motion but I would rather table this request and let him come back with more info for us. I would like to go tour the one… I'm going out to state fair, if I could come out and see your facility I would like to do that before I make my final decision. Like I said, I still have a big problem with the location that is my biggest problem.

Somebody who didn't give his name: Des Moines County is south of us, so it's not near the state fair.

Carol Schlueter: Oh, okay.

Clyde Evans: I will withdraw my motion (people talking) and make a motion to table this so that we have a second meeting concerning this.

Eric Furnas: If the board decides to table, you certainly can do that. We need to publish the date and time and location. So that time and date is to be determined. The publication will be made just the same as this public hearing was done.

Clyde Evans: We need a second on that?

Eric Furnas: Yes.

Carol Schlueter: I will second that motion.

Tom Harper: Okay, a motion has been made and seconded to table this request to a later date and it will be published, so on and so forth, for further investigation. Any discussion? Hearing none, all those in favor of the motion to table this request please say Aye (4) Opposed (0) Absent (Cooper). The motion carried. I thank everyone for coming and we are adjourned.

MUSCATINE COUNTY ZONING COMMISSION
By Eric S. Furnas, Planning & Zoning Administrator

Add as part of the record:
Correspondence received by July 13, 2017
Curt Weiss's power point presentation
EPA – Best Management Practices for Lead – received from Craig Nierman
Conceptual Closure Plan
Proposed Plan – Engineered by Martin & Whitacre Surveyors & Engineers, Inc.

July 10, 2017

Dear Tom,

I am writing to inform you that I oppose the proposal to turn property at 1886 170th Street, West Liberty, Iowa into an outdoor shooting range. I am regularly on my grandmother's (Dorothy Phelps) property to relax and enjoy the peace and tranquility of nature. That's what country life is about...hearing the wind through rustling prairie grasses, the sound of crickets, toads, and many species of birds or the raccoon washing in the small pond. This Pike Township neighborhood has been living in harmony with nature for many, many years.

A shooting range does not improve the environmental integrity of the land and there are too many homes and livestock within very close proximity. An outdoor shooting range will be an unwelcome neighbor because the peaceful sound of nature will disappear, property values will plummet, traffic and dust will increase, and the fear of an errant bullet coming onto the property will be my #1 concern.

Please find other land to develop the outdoor shooting range.

Sincerely,

Tomeka Petersen

Tomeka Petersen

West Liberty

Also, West Liberty already has an outdoor shooting range - we do NOT need two.

There are far better ways to utilize the land. NATURE is becoming more and more difficult to find and experience. Please leave this piece of natural habitat as it is.

Thank you for your consideration.

Tomeka

July 8, 2017
West Liberty, Ia

Dear Mr Tom Harper,
from Dorothy Phelps, Pike Township

I am a property owner close to the proposed shooting range in Pike Township. It is to be considered by your Zoning & adjustment boards on Thursday P.m. & Friday a.m.

My family is very much against the shooting range? Our wooded & open area is in the state easement program. We promote wild life, flowers & grasses. Family members like to hunt pheasant, Turkeys & Deere — why would we be in favor as a shooting range?

The Area being considered is now hoped ass as a Public Area & Hunting ground. How can decisions be changed to Post the opposite?

Have you visited the area for the shooting range? It's on a quiet graveled road that we love. Neighbors are against the shooting, the noise, clutter, & Traffic that will accompany a shooting range.

Please consider the phelps family's & other neighbors oppositions when you make your decisions.

Thank you!

Sincerely,
Dorothy phelps

West Liberty, Ia
July 10, 2017

Carol Schlueter - Boards Adjustment

~~Secretary Supervisor~~, I know you will be Attending the Board of Adjustment's meeting on Friday July 14th.

As property owners, my family & I own one hundred & Twenty five Acres of wooded & open Area just to the west of the proposed shooting range in Pike township — we are very much against the shooting range!

For years we have promoted the restoration of wild life, hoping for better hunting of deer, wild turkeys, & pheasants.

Can you see how to disturb wild life in an area more so, than a Shooting range?

Please give consideration to my request — and vote no against the shooting range proposal on Friday, July 14!

Sincerely
Dorothy Phelps

Proposed Shooting Range in Muscatine County

Curt Weiss
Director
Muscatine County Conservation Bd.

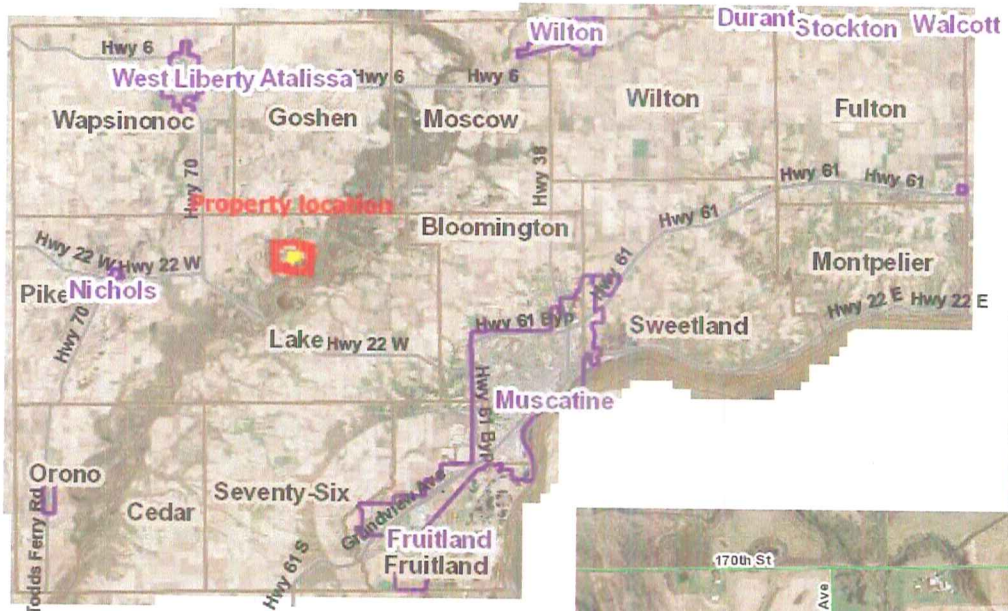
WHY?

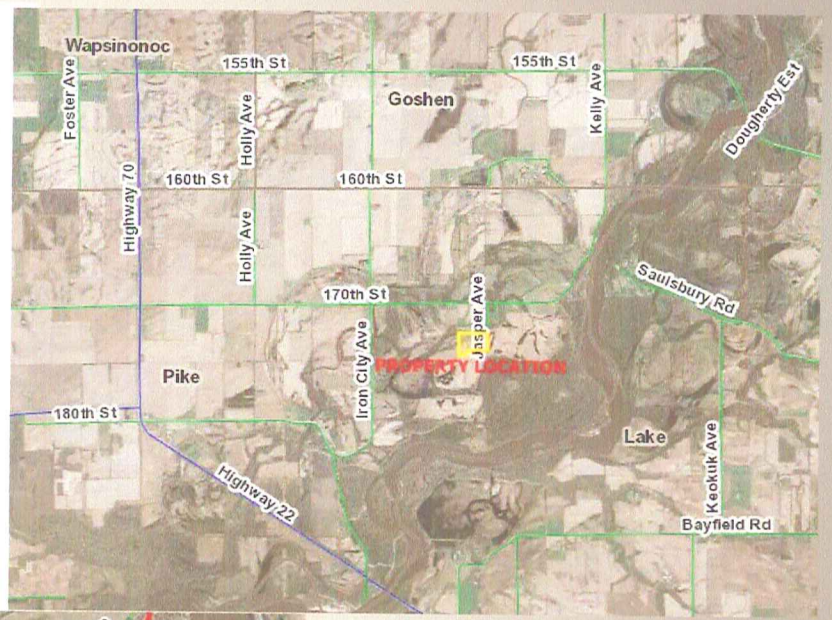
Public Interest !

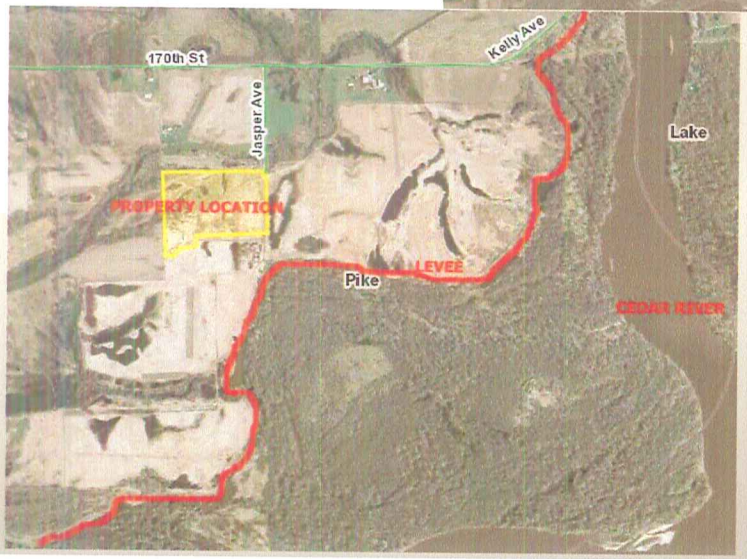
- The idea of building a public shooting range in Muscatine County comes from citizen requests over the years – especially the last 15+ years when target shooting was stopped on public hunting areas in the county due to safety concerns.

- The trouble we had was finding a suitable site already in public ownership for a shooting range.

Found a Location







Will This Site Work?

- **Safety Concerns**
  - What's down range
  - Neighbors
  - DNR (Public Hunting Area)
- **What Can We Offer**
  - 200 yard maximum distance

Working with FEMA

- Follow FEMA requirements (no building, no concrete, berm material on site, etc.)
- May 2014 - Requested approval from FEMA to construct a shooting range on this property
- January 2015 - FEMA required an environment stewardship and closure plan to be completed
- May 2016 -New request for approval sent to FEMA
- January 2017 -Received permission from FEMA

Permits/Studies

- May 2017 -Applied for Floodplain Permits from Army Corps of Engineers and DNR (received permission from the Corps, DNR running about 3 months behind)
- Two state threatened species of turtles do occur in this area of the County
- Phase 1A archaeology study completed by the University of Iowa

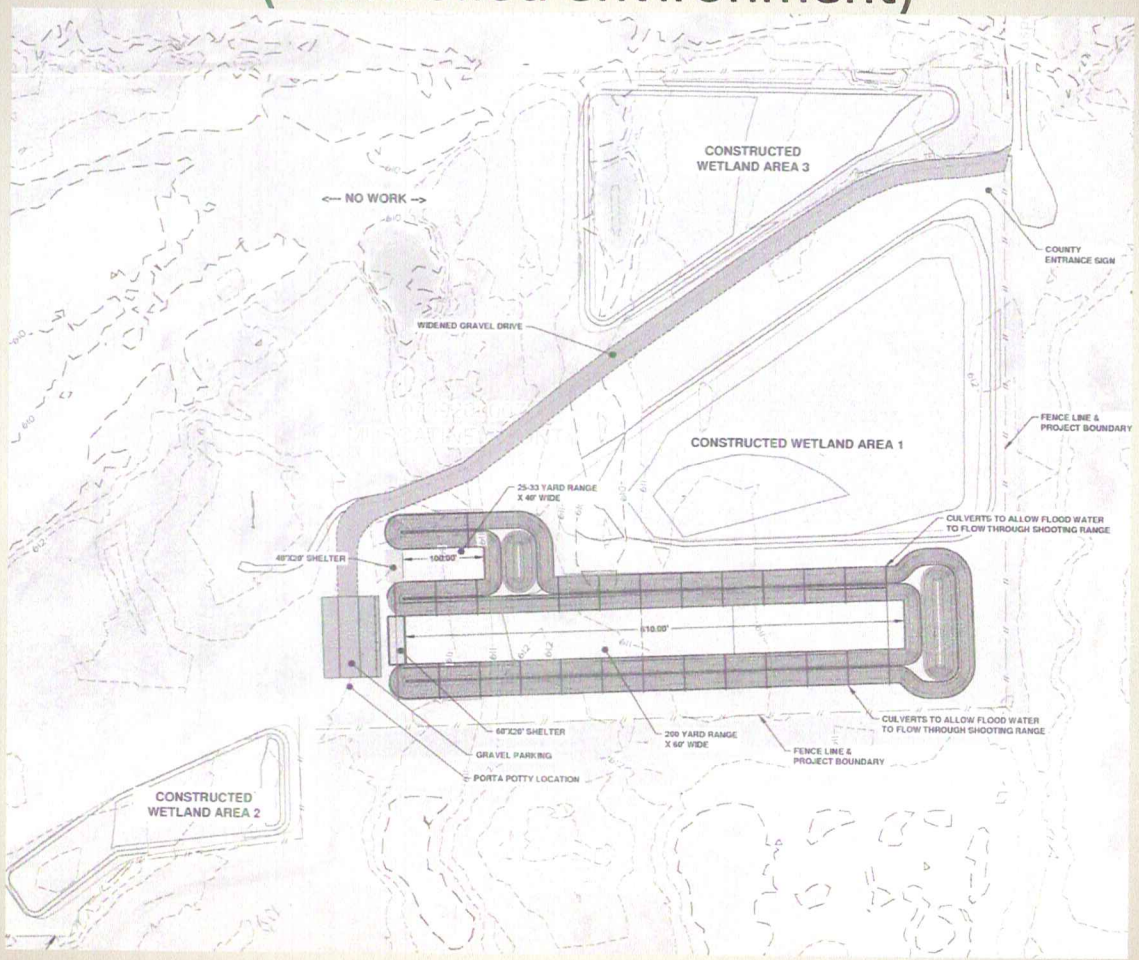
Planning Process

Visited Linn County Conservation Board's Range

Visited Des Moines County Conservation Board's Range

Range Design

(Controlled environment)



Designed by Martin & Whitacre
Surveyors & Engineers, Inc.

Who Will Use This Range

- General Public (target shooters or people just sighting their guns in for hunting season)
- Youth Shooting Sports/Hunter Education
- Muscatine County Sheriff's Office
- Other Law Enforcement Agencies

Rules/Regulations

- Looking to model our range after Des Moines and Linn County Conservation Boards' ranges.
- Area will be fence and signed

Maintenance and Enforcement on the Area

- The County Conservation Board will be responsible for maintaining the range.
- The small yearly user fee should cover most of the cost for materials (backboards, gravel, portable toilet rental, etc.).
- Enforcement will be by County Conservation Board officers as well as the Sheriff's office.

Cost of Construction

- 21,000 cu. yds. of soil to be moved for the berms, creating three new wetlands on the area
- Six 18" culverts placed in the side berms
- Two shelters over the shooting stations
- Improve roadway into range

Estimated cost is about $150,000 for dirt work

We hope to build shelters with staff/volunteers

United States
Environmental Protection
Agency

EPA-902-B-01-001
Revised June 2005
Region 2

Best Management Practices for Lead at Outdoor Shooting Ranges

For additional copies of this manual, please contact:

United States Environmental Protection Agency
Division of Enforcement and Compliance Assistance
RCRA Compliance Branch
290 Broadway, 22nd Fl.
New York, New York 10007-1866

Tel: 212-637-4145
Fax: 212-637-4949

Copies of this manual along with any additions or updates can also be obtained on-line at:
http://www.epa.gov/region2/waste/leadshot

Copying and Reprinting

Fourth Printing, June 2005

Best Management Practices for Lead at Outdoor Shooting Ranges

Notice

This manual is intended to provide useful general information to shooting range owners/operators. The United States Environmental Protection Agency (EPA) does not certify or approve ranges, range design or lead management practices. While every effort has been made to provide up-to-date technical information, this manual is not to be used as a substitute for consultation with scientists, engineers, attorneys, and other appropriate professionals who should be called upon to make specific recommendations for individual range design and lead management.

Any variation between applicable regulations and the summaries contained in this guidance document are unintentional, and, in the case of such variations, the requirements of the regulations govern.

This guidance was developed by EPA Region 2 in cooperation with a few states as well as many EPA offices. In addition, EPA, with the assistance of the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) provided all 50 states with an opportunity to review the RCRA regulatory portion of the guidance. At the time of printing, about 40 states had contacted the EPA and given their support and concurrence. EPA is continuing to get the agreement of the remaining states. Therefore, it appears that most, if not all, states will share the same view as to how lead shot is regulated.

Following the steps set forth in this guidance should result in compliance with applicable regulations. EPA does not make any guarantee or assume any liability with respect to the use of any information or recommendations contained in this document.

This guidance does not constitute rulemaking by the EPA and may not be relied on to create a substantive or procedural right or benefit enforceable, at law or in equity, by any person.

Acknowledgements

The USEPA would like to acknowledge the support of:

- The National Rifle Association of America
- The National Shooting Sports Foundation
- The Wildlife Management Institute
- Mark Begley of the Massachusetts Department of Environmental Protection
- Mr. Dick Peddicord of Dick Peddicord and Company, Inc.

These participants provided valuable information and assistance as peer reviewers in the development of the manual and their efforts are truly appreciated. EPA also wishes to give special thanks to Dr. Charles W. Sever of Okie Environmental Consulting, L.L.C., Inc., Mr. Mike Warminsky of Brice Environmental Services Corp., and Mr. Victor Ordija of Sporting Goods Properties.The EPA also wishes to acknowledge and thank the many others who provided important comments and insight, and especially those individuals who took the time to meet with us in person or on the phone.

Cover photo by: Mr. Jack Hoyt, EPA Region 2

Statement of Goals

The goals of this manual are:

- to inform shooting ranges :
    - that the United States Environmental Protection Agency's (EPA) purpose in developing and distributing this manual is to assist range owners and operators to operate in an environmentally protective manner.

- to promote an understanding of:
    - why lead is an environmental, public and regulatory concern,
    - what laws and regulations apply,
    - the benefits of applying good management practices,
    - what can be done to successfully manage lead,
    - why implementing lead best management practices is an integral part of environmental stewardship,
    - how to minimize litigation risk.

- to promote action by ranges to:
    - adopt and implement best management practices for managing lead,
    - recycle a finite natural resource,
    - become a model for other ranges through proper lead management,
    - advocate environmental stewardship.

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EPA Statement on National Guidance

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 10 2001

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: National Guidance on Best Management Practices for Lead at Outdoor Shooting Ranges

FROM: Elizabeth A. Cotsworth, Director
Office of Solid Waste

TO: RCRA Senior Policy Advisors

The purpose of this memo is to transmit a Region 2 document entitled "Best Management Practices for Lead at Outdoor Shooting Ranges," EPA-902-B-01-001, January 2001. This report is a technical information manual to assist range owners and operators in managing lead at shooting ranges. The report covers the environmental concerns, applicable laws and regulations, and current best management practices. This document was developed collaboratively with a number of stakeholders and is considered by my office to be the national guidance on this subject.

Background

Lead at some shooting ranges can be a significant environmental concern depending on location (e.g., proximity to wetlands) and hydrogeologic setting, as evidenced by a number of cases where lead pellets and shot have been taken in by fish and fowl at ranges over wetlands, and at some ranges where streams in acid lead-leaching environments have picked up lead contamination. Recognizing these problems, Region 2 in collaboration with EPA HQ, States, shooting range associations, and other shooting range experts, developed the enclosed technical guidance to identify the problems and solutions for preventing and controlling these problems. We commend this guidance to you as an information source for your use in working with range owners and operators to identify and address these concerns at specific ranges. Copies of this manual have been sent to all 50 States, with the help of ASTSWMO, and at least 40 States have responded with concurrence and support for this guidance.

Also enclosed for your information is a list of references "Summary of Shooting Range Lead Management Guidance" prepared by various shooting range-interested associations, and a copy of an NPDES permit for the Naperville, IL Sportsman's Park shooting range.

Internet Address (URL) • http://www.epa.gov
Recycled/Recyclable • Printed with Vegetable Oil Based Inks on Recycled Paper (Minimum 25% Postconsumer)

If you have any questions regarding lead at shooting ranges, please contact George Meyer (Chief, RCRA Compliance Branch, Region 2) at 212-637-4144, Meyer.George@epa.gov, or Ken Shuster in the Office of Solid Waste at 703-308-8759, shuster.kenneth@epa.gov.

It is my hope that wide distribution of these documents will help encourage greater cooperation and coordination on shooting range issues among RCRA, Superfund, and Water staff in the regions and states. To this end, it would be helpful if you would send the name of a point of contact in your region to Ken Shuster and George Meyer.

For additional copies of the Region 2 guidance, please contact George Meyer. It is also available at www.epa.gov/region2/waste/leadshot.

Enclosures

cc: George Meyer, Region 2
Elaine Davies, OERR
Michael Cook, OW
Eric Schaeffer, ORE, OECA
Craig Hooks, FFEO, OECA
Bob Byrne, Wildlife Management Institute
Barbara Simcoe, ASTSWMO
Regional Superfund Division Directors w/o Region 2 enclosure
Regional Water Division Directors w/o Region 2 enclosure
Regional RCRA Enforcement Section Chiefs w/o Region 2 enclosure

Best Management Practices for Lead at Outdoor Shooting Ranges

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Introduction

This manual provides owners and operators of outdoor rifle, pistol, trap, skeet and sporting clay ranges with information on lead management at their ranges. This manual serves as a reference guide and presents best management practices (BMPs) available to the shooting range community. The practices have been proven to effectively reduce or eliminate lead contamination and may also be economically beneficial to the range owner/operator. Since each range is unique in both the type of shooting activity and its environmental setting, specific solutions are not provided in this manual. Rather, a range owner or operator may use this manual to identify and select the most appropriate BMP(s) for their facility. Other information on environmental aspects of management at outdoor shooting ranges can be found in the National Shooting Sports Foundation's *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges*.

The manual does not address range layout or design to meet range safety or competition requirements. For information on range safety and competition requirements, range owners/operators are directed to other comprehensive reference materials available on that subject, such as the National Rifle Association's *Range Source Book,* and the National Association of Shooting Range's website (www.rangeinfo.org).

Owners/operators of ranges may want to assign the use of this BMP Manual to a specific team or committee. Delegating this responsibility to a specific team or group helps to assure that the BMP's are identified and implemented.

The manual is organized as follows:

- Chapter I provides the background on why lead is of concern to human health and the environment. It includes a discussion of how environmental laws impact shooting ranges and the importance of an integrated BMP program to manage lead.

- Chapter II discusses physical and operational characteristics to be considered when selecting a successful BMP program.

- Chapter III addresses best management techniques for rifle/pistol ranges, skeet and trap ranges, and sporting clay ranges. In this chapter, the manual explores possible solutions to prevent, reduce and/or remove lead contamination for each type of range.

- The Appendices provide current (as of June 2005) contacts for lead reclamation and recycling companies, vendors that provide prevention and/or remediation techniques and shooting organizations that have additional information on the lead issue. Additionally, the Appendices provide information on alternatives to lead, diagrams of bullet trap designs, summaries of regulatory requirements and interpretations, and a sample Environmental Stewardship Plan.

EPA is very interested in any suggestions you have about practices included in this manual which have proven effective in controlling lead contamination or recycling lead bullets/shot. Please send such information to the address below. Also, for additional information, or to be added to the list of lead reclaimers or remediation contractors, contact the National Rifle Association (NRA), the National Shooting Sports Foundation (NSSF) or:

Lead Shot Coordinator
RCRA Compliance Branch
U.S. Environmental Protection Agency
Region 2
290 Broadway
New York, New York 10007-1866
Telephone: (212)637-4145
E-Mail: Leadshot.Region2@epa.gov

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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.

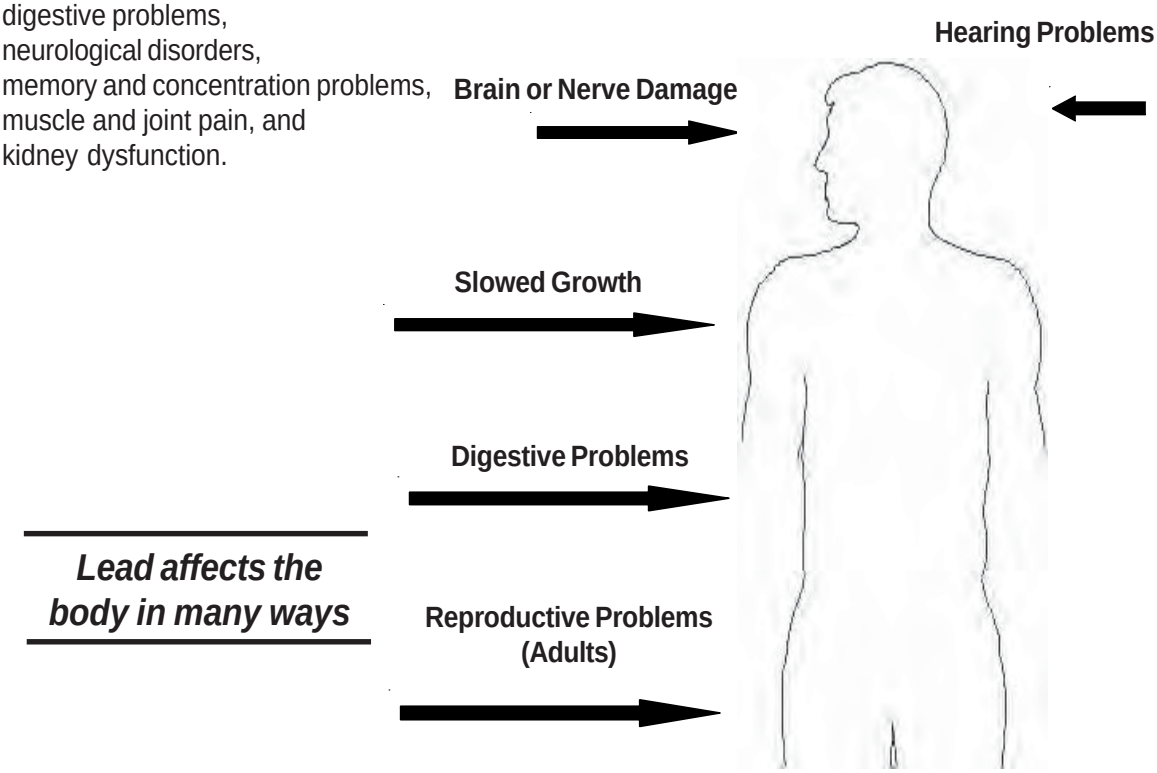

Figure 1-1: Effects on the Human Body from Excessive Exposure to Lead

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

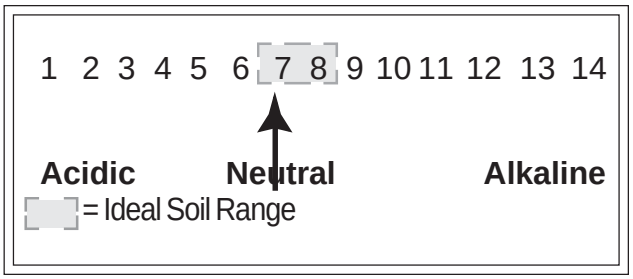

Figure 2-1 – pH scale

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.

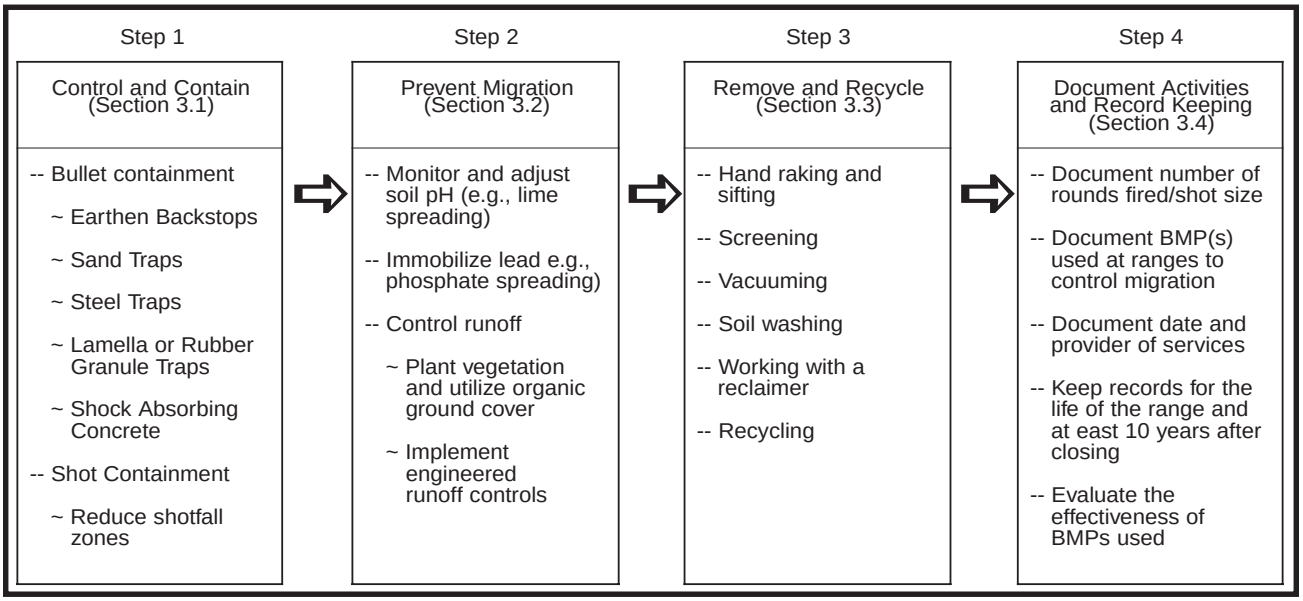

Figure 3-1 – 4 Steps to Build a Successful Lead Management Program Utilizing a Variety of BMPs

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,

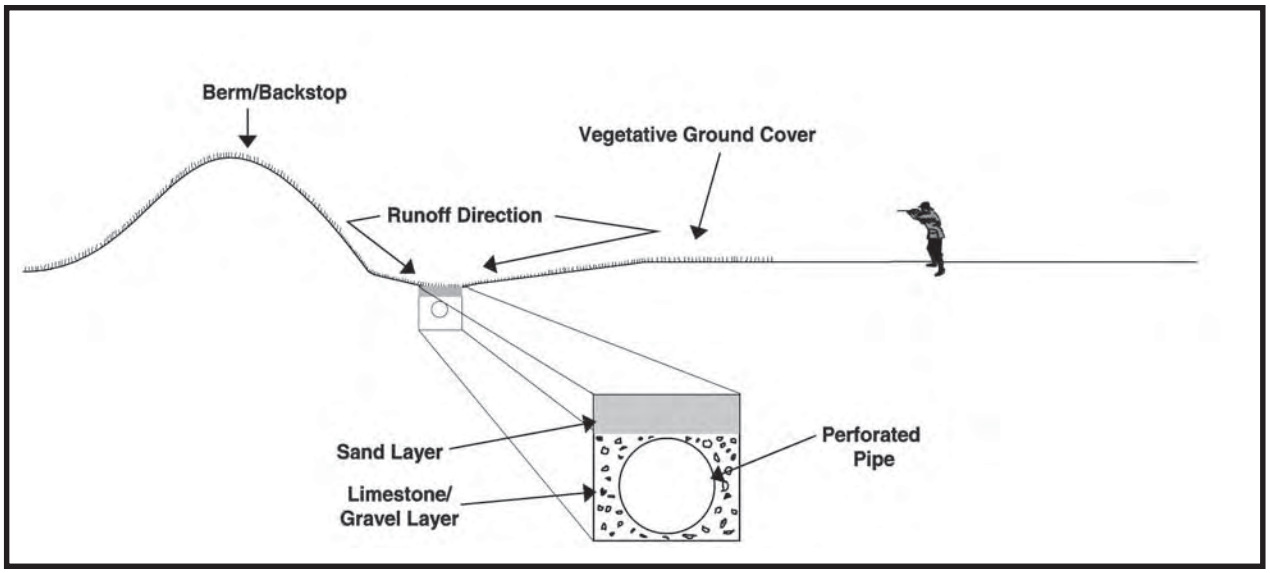

Figure 3-2 – Sample Filter Bed System (Adapted from Proceedings for National Shooting, Range Symposium, October 17-19, 1993, North American Hunting Club and Wildlife Forever)

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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U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C., Directive 9355.4-12, *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, July 14 1994

U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington D.C., *A Citizen's Guide to Soil Washing*, EPA 542-F-96-002. , April 1996.

U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. *Physical/Chemical Treatment Technology Resource Guide*, EPA 542-B-94-008. September 1994.

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 Industies, 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 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
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[1]	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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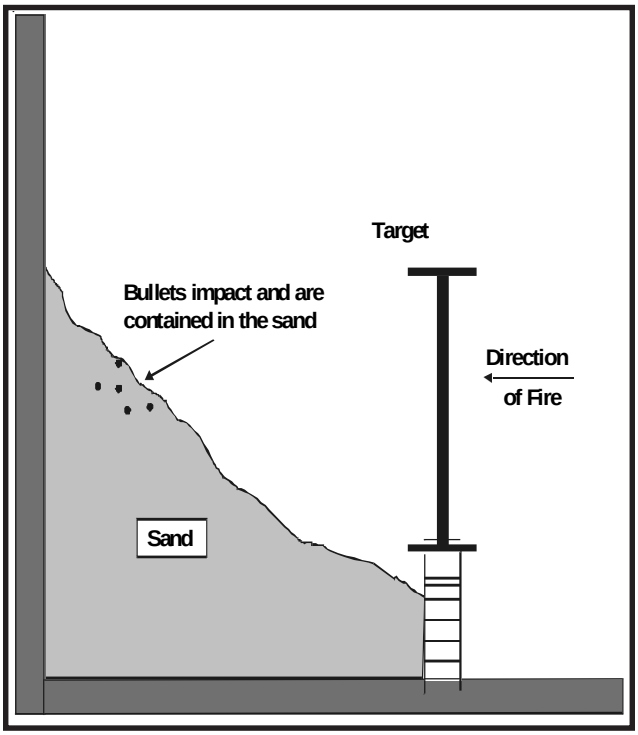
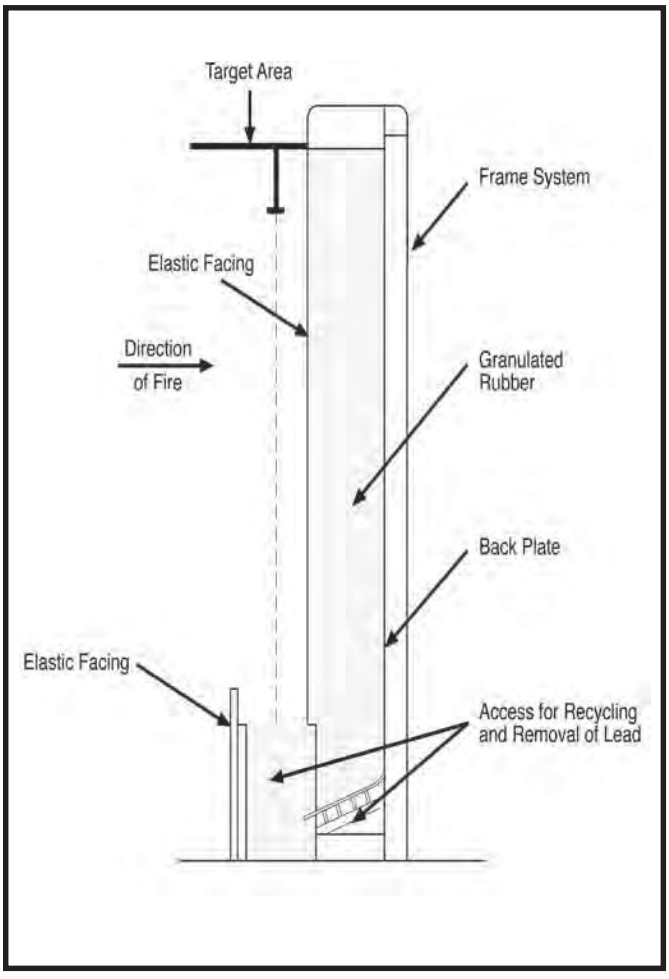
Appendix C: Sample Bullet Containment Devices

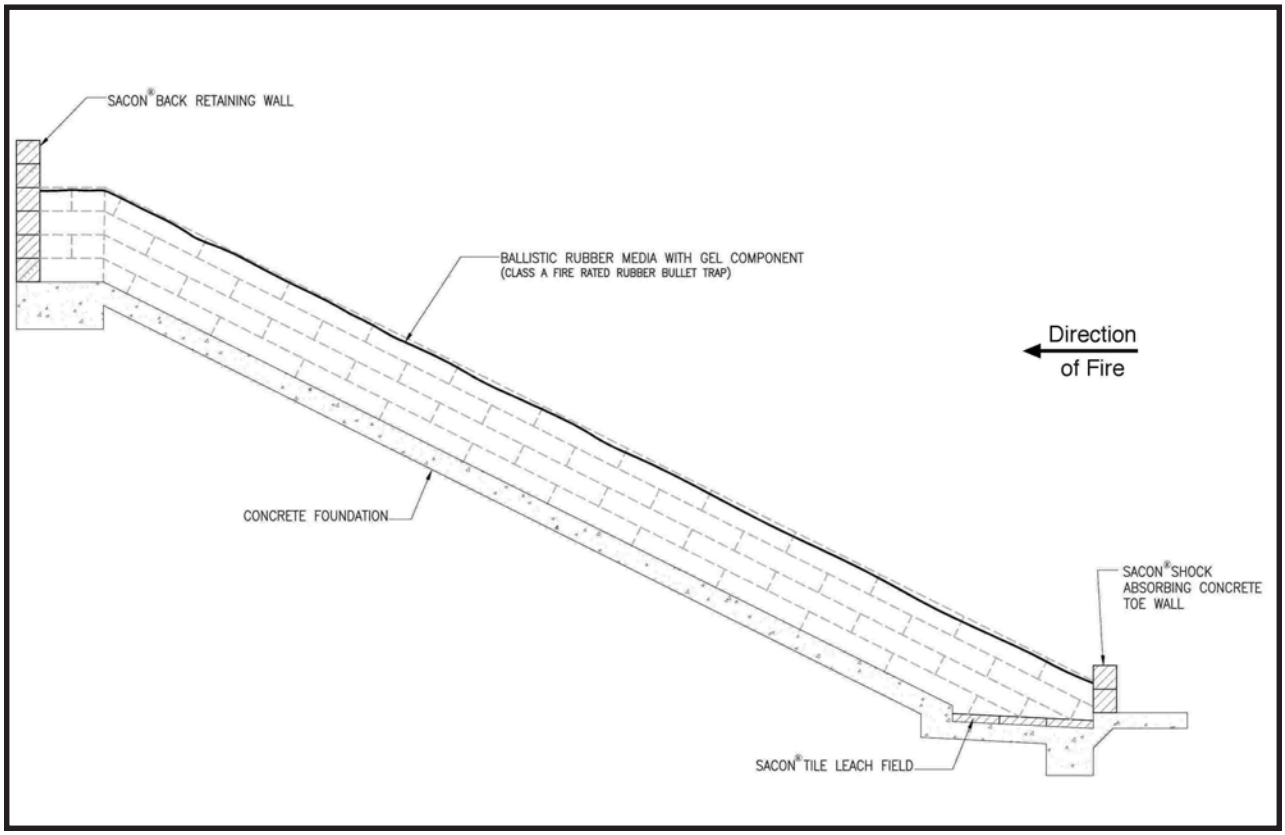
The bullet containment designs in this appendix are sample designs for the containment systems mentioned in this manual. Design systems may vary from different manufacturers. Reference to various individual bullet containment devices is included in this manual for informational purposes only. EPA does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



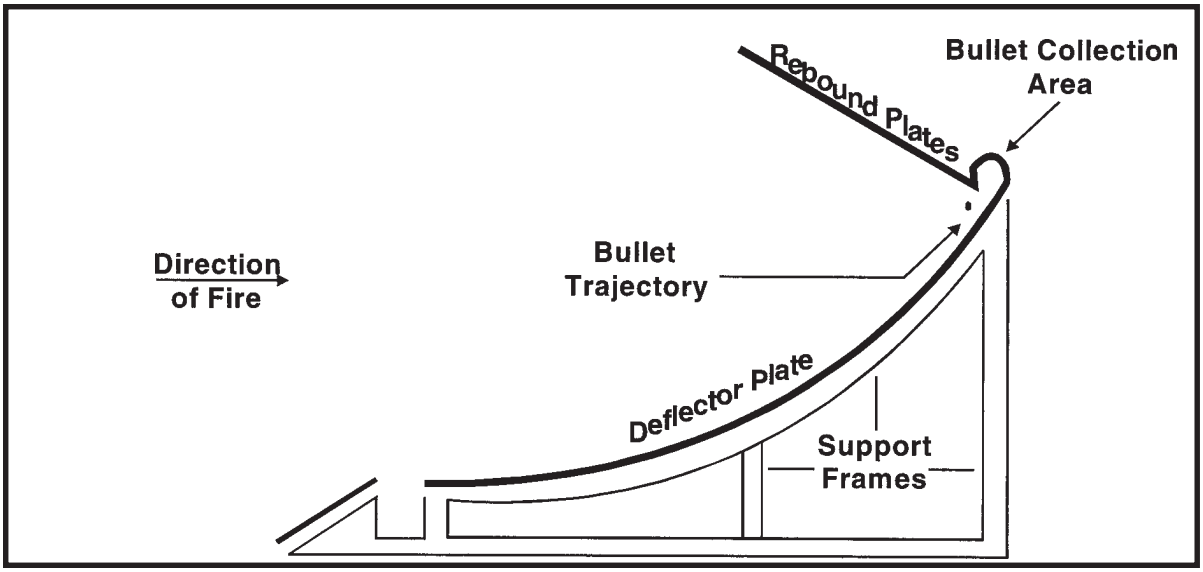
Sand Trap



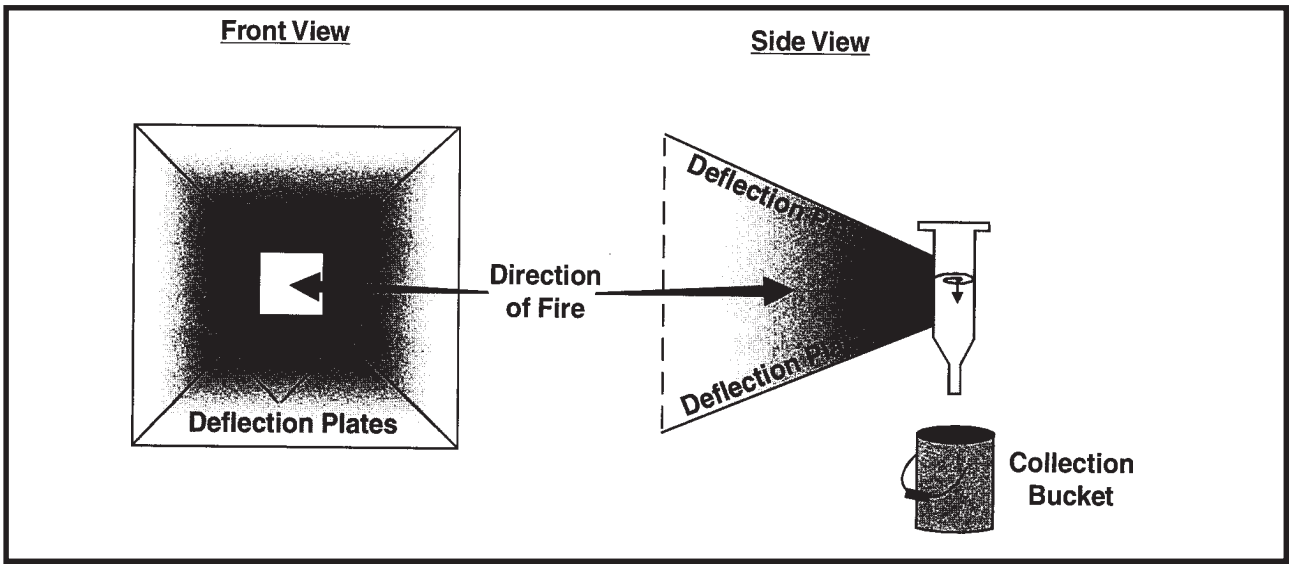
Rubber Granule Trap (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)



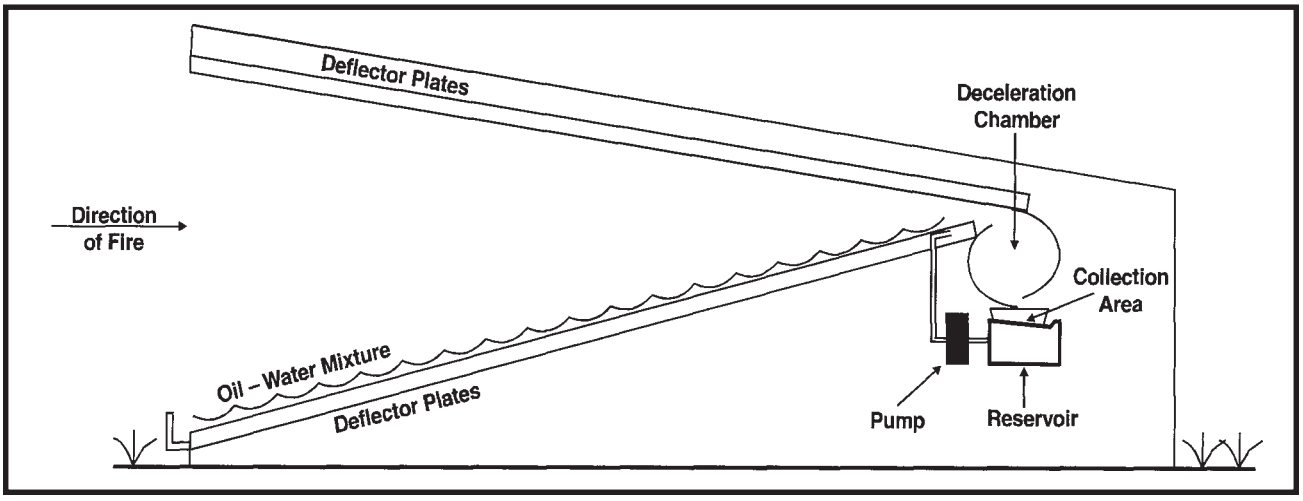
Gel-Cor Bullet Trap™ (Provided by Super Trap, Inc.)



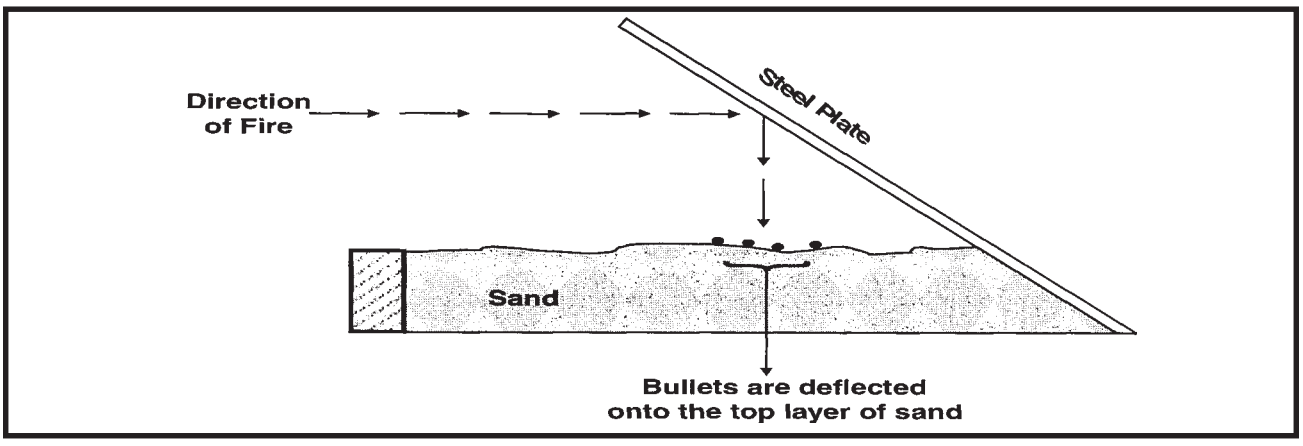
Escalator Trap (Adapted from: *Bullet Trap Technologies,* Action Target Educational Video Series)



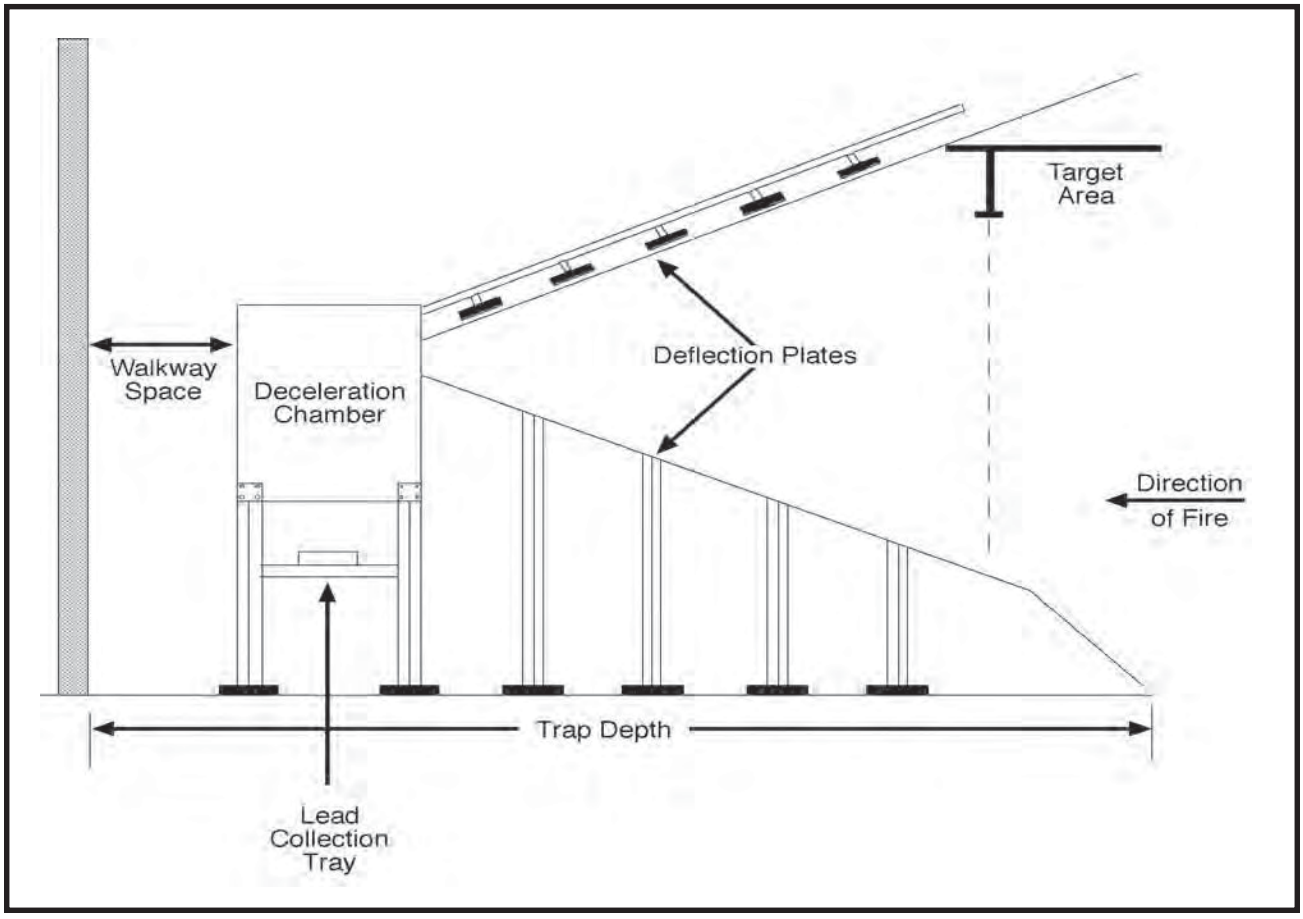
Vertical Swirl Trap (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)



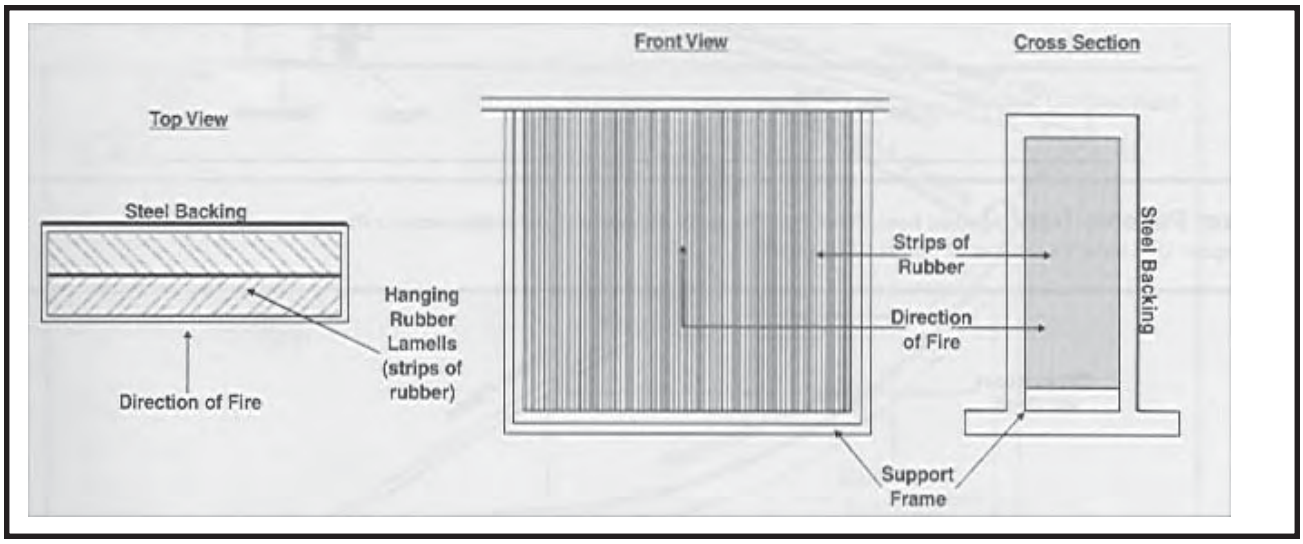
Wet Passive Trap (Adapted from: *Bullet Trap Feasibility Assessment and Implementation Plan: Technology Identification Final Report*, U.S. Army Environmental Center, March 1996)



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

Table of Contents

Table of Contents (continued)

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

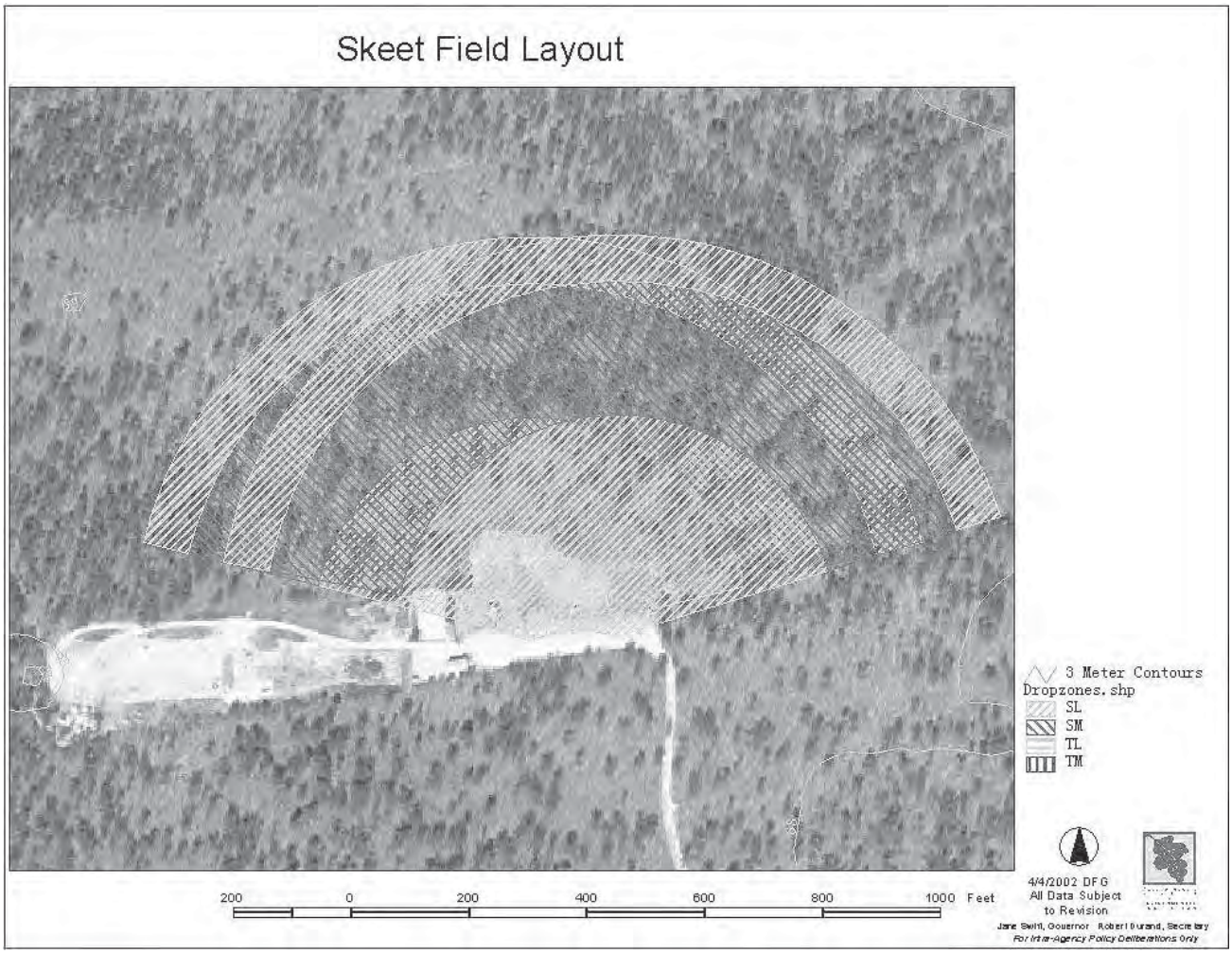
Appendix A
(Optional)

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.]

U.S. Environmental
Protection Agency
Region 2

EPA-902-B-01-001
Revised June 2005

United States Environmental Protection Agency
290 Broadway
New York, NY 10007-1866
Official Business
Penalty for Private Use $300
Forwarding and Address
Correction Requested

FIRST-CLASS MAIL
U.S. POSTAGE
PAID
MAILED FROM ZIP CODE 10007
PERMIT NO. G-35

CONCEPTUAL CLOSURE PLAN: PIKE RUN SHOOTING RANGE

Pike Run Shooting Range
Muscatine County Conservation Board
P. O. Box 109
Muscatine, IA 52761

Conceptual Plan Prepared by:

Dick Peddicord & Company, Inc.
1115 Coopers Landing Road
Heathsville, VA 22473

APRIL 2016

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CONCEPTUAL CLOSURE PLAN: PIKE RUN SHOOTING RANGE

1.0 INTRODUCTION

The Muscatine County, Iowa, Conservation Board is developing Pike Run Shooting Range on Jasper Avenue just south of 170th Street, northwest of the town of Muscatine. Pike Run Shooting Range is presently planned as a 200-yard rifle range, although a 25- or 50-yard pistol range may be added to the design adjacent to the rifle range sharing a common side berm. The plan is for the rifle range backstop to be 100 feet wide and 20 feet high, and the pistol range backstop to be 50 feet wide and 20 feet high. Side berms are planned as 8 feet high. Plans are for backstops ands side berms to be constructed of site soil with a 2:1 slope. Shotgun shooting at stationary targets (e.g., sight-in and practice with deer or turkey shotguns) will be allowed, but there are no plans to allow shotgun shooting at aerial targets. Both the rifle range and the possible pistol range are considered herein.

As Pike Run Shooting Range was being planned and designed, the Conservation Board developed two documents to guide environment aspects of managing the range.

- A site-specific environmental stewardship plan or ESP (Muscatine County 2015), describing environmental aspects of design, construction, and ongoing operation of the range consistent with guidance from the United States Environmental Protection Agency (EPA 2005) and relevant case law.

- This Conceptual Closure Plan, describing continuation of environmental stewardship through cleaning up Pike Run Shooting Range for closure at whatever time and under whatever conditions that closure may take place. This Conceptual Closure Plan is based on the ESP (Muscatine County 2015, and is consistent with the guidance and recommendations of EPA (2005) and the National Shooting Sports Foundation (NSSF 1997) at the time this Plan was developed in April 2016.

The Conceptual Closure Plan was developed pro-actively on the initiative of the Muscatine County Conservation Board through a contract with Dick Peddicord & Company, Inc. The expectation is that the Conservation Board personnel will keep the Conceptual Closure Plan up to date through periodic review and revision as appropriate based on ongoing environmental stewardship activities and evolving regulatory, economic, and other circumstances. All revisions of the Conceptual Closure Plan are the responsibility of the Conservation Board; Dick Peddicord & Company, Inc. assumes no responsibility for the nature or consequences of any revisions or lack thereof.

2.0 OVERVIEW

Environmental aspects of cleaning up properly designed, operated, and maintained outdoor shooting ranges for closure have received relatively little attention to date. Simply ceasing to

shoot at a range with no environmental closure, as was sometimes done in the past, is clearly not in the best interest of Muscatine County at this range because of legal and regulatory requirements, the potential for adverse environmental effects, associated financial liabilities, and adverse public image for the County and the entire shooting community. Outdoor shooting ranges that have operated according to sound environmental practices (e.g. the Pike Run Shooting Range Environmental Stewardship Plan [Muscatine County 2015]) can be cleaned up in an environmentally sound and legally satisfactory manner consistent with the EPA (2005) guidance under which they have operated.

While it is possible that any outdoor shooting range will be cleaned up and closed at some time in the future, most shooting range closure plans that have been developed to date were prepared at the time of closure. In contrast, this Conceptual Closure Plan for Pike Run Shooting Range was developed when the closure time was unpredictable and likely to be well into the future. Therefore, while the major components of range closure are relatively clear, the details for Pike Run cannot be determined until active planning for closure begins. The major determinants of the detailed closure activities will be (1) the regulatory requirements, (2) state-of-the-practice closure technologies, and (3) the environmental conditions at the range at the time of closure, all of which can be foreseen only in general terms until near the time of closure. While it would be unwise to attempt to predict any of these topics for some unknown time in the (distant?) future, this Conceptual Closure Plan is developed in light of present regulations and technologies, and the assumption that the Pike Run Shooting Range ESP (Muscatine County 2015) will be consistently implemented until closure. It is reasonable to assume that at the time of closure the regulations and technologies will be based on those of the present but will have evolved in presently unpredictable ways, and that the environmental conditions at the range will be reflected in evolution of the present ESP as it is kept up to date.

The approximate cost ranges calculated herein cannot be considered a prediction of actual range closure costs. They are provided only to illustrate the major considerations that are likely to influence actual closure decisions and costs, and to provide an indication of the possible magnitude of actual range closure costs. The scoping-level cost approximations in the range closure illustration are intended to be useful for planning purposes but *not* for budgeting purposes.

3.0 REGULATIONS

At the future time when potential closure of the range first comes under serious consideration, the appropriate Conservation Board personnel should identify and contact an environmental attorney and an environmental engineer or scientist experienced specifically in environmental aspects of closure of outdoor shooting ranges. Attorneys and engineers/scientists with such experience can be identified through the NSSF, the National Rifle Association (NRA) Range Services Department, other major shooting sports organizations, an Internet search, or a combination thereof. Some considerations to bear in mind when evaluating and selecting an attorney and an engineer or scientist are briefly summarized in Appendix A of the NSSF (1997) range environmental guidance, and in Section II, Chapter 3, Article 2.05 of the NRA Range Resource Book (NRA in preparation).

When this Conceptual Closure Plan was developed, there were no Federal or Iowa laws or regulations specifically addressing environmental closure of outdoor shooting ranges. However, several major Federal environmental laws, and by implication their Iowa counterparts, have been suggested or used to regulate environmental aspects of closure of outdoor shooting ranges, and their fundamental provisions can reasonably be expected to constitute the major requirements for future closures of outdoor ranges. In addition, there may well be local ordnances and regulations at the time of closure that will have to be addressed, perhaps including construction or other permits, noise regulations, etc., in addition to more overtly environmental regulations.

The major Federal laws that address environmental aspects of closure activities in general and will be applied to future closure of outdoor shooting ranges are:

- Resource Conservation and Recovery Act (RCRA), which governs solid and hazardous waste management and disposal at active sites.
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund"), which governs site closure of inactive sites and environmental restoration
- Clean Water Act (CWA), which governs the quality of the nation's surface waters, including wetlands. The CWA affects Pike Run Shooting Range more in relation to the ESP (Muscatine County 2015) than to this Initial Closure Plan. Although the CWA can require cleanup or restoration of damages caused by pollutant discharges or physical alterations, its most likely influence on closure of Pike Run Shooting Range is in relation to permits. Therefore, the CWA is not considered further in this Initial Closure Plan even though permits may be required at the time this plan is implemented

The Iowa counterpart to RCRA for non-hazardous (solid) waste is found at Iowa Code 455B.301 to .316, and the corresponding regulations are found at IA Code 567-100.1(455B, 455D) to 567-123.13(455B, 455D. 455F). Solid wastes in Iowa are managed under the Department of Natural Resources, Environmental Services Division, Land Quality Bureau, Solid Waste Section. The Iowa counterpart to RCRA for hazardous waste is found at Iowa Code 455B.411 and .422 to .433. Hazardous wastes in Iowa are managed under the Department of Natural Resources, Environmental Services Division, Land Quality Bureau, Contaminated Sites Section.

These Federal and State laws and the regulations that implement them are comprehensive, complex, and detailed. Attorneys, engineers, scientists, and others, including regulators, familiar with these laws but not experienced with shooting ranges may not be fully aware of their proper application to outdoor shooting ranges.

Well before specific range closure activities are seriously considered, the appropriate Conservation Board personnel should become familiar with the major provisions of these laws and their application to ranges. The following summarizes some of the most important aspects of these laws and their implications consistent with EPA (2005) guidance and case law in the context of environmental management of ongoing and historical outdoor shooting range operations. *Note that (1) the following is derived from case law and EPA guidance based on the laws and regulations prevailing at the time this summary was developed, and is subject to changes, (2) there are credible sources that consistently advocate alternative views, and (3) the following are general statements true under most circumstances but not necessarily true in every site-specific situation. The discussions in this section are subject to change with future legal,*

regulatory, or administrative developments, and do NOT constitute legal guidance; an attorney experienced in environmental law applied to outdoor shooting ranges should be consulted for specifics.

RCRA

1. Shooting ranges, per se, are not considered hazardous waste generation, storage, treatment, or disposal facilities under RCRA, and a RCRA permit is not required to operate a shooting range.
2. Using bullets, cartridges, shot, wads, clay targets, or hulls for their intended purposes at shooting ranges does not constitute discarding or disposing of solid waste (and therefore not "hazardous" waste) under RCRA, and these materials are not subject to the narrower regulatory, as distinct from the broader statutory, requirements of RCRA. The importance of this distinction is that shooting ranges are not subject to RCRA's permitting and operating requirements.

   However:

   - Bullets, cartridges, shot, wads, clay targets, or hulls may be subject to RCRA's waste management requirements if they are "left to accumulate in the environment long after they have served their intended purpose" and come to be considered "abandoned" in the environment and therefore RCRA statutory "waste" and thus possibly "hazardous" waste. If materials become statutory RCRA "hazardous" waste and are alleged to constitute an "imminent and substantial endangerment" to human health or the environment under Sections 7002 and 7003 of RCRA, regulatory agencies, private citizens, or other groups may initiate legal action to compel the range to clean up the waste and restore the environment.
   - Bullets, cartridges, shot, wads, clay targets, or hulls are generally not considered "abandoned" under RCRA and thus not RCRA statutory wastes if they are managed consistent with (EPA 2005) guidance. Because lead and other materials accumulate on operating ranges between reclaiming activities, management to minimize potential environmental activity of these materials as part of an Environmental Stewardship Plan may be appropriate, and may constitute evidence that the materials have not been "abandoned".

3. Bullets, cartridges, shot, wads, clay targets, or hulls deposited or migrating beyond range property may be considered RCRA statutory waste (and thus perhaps "hazardous" waste) under the view that allowing them to leave the property and thus become inaccessible for management constitutes either "abandoning" or *de facto* "discarding" these materials.
4. Bullets, shot, and empty cartridge cases may be recycled under the scrap metal recycling exemptions of RCRA [40 CFR Sections 261.4(a)(13) and 261.6(a)(3)(ii)]. Under conditions summarized in EPA (2005) Appendix D, reclaimed metals destined for recycling or reuse may be temporarily stored on range property under RCRA for periods that depend on site-specific conditions and applicable state regulations.

5. Backstop material (and by implication other similar material) may be moved from one area of a range to another "contiguous" area and used for a similar purpose without being considered a RCRA "waste" under conditions summarized in the EPA (2005) guidance.

The essence of the EPA (2005) guidance, consistent with case law, is that EPA considers RCRA the primary regulation of operating shooting ranges, and considers ranges operated consistent with the EPA (2005) guidance to come under the scrap metal recycling exemptions of RCRA.

CERCLA

1. When (1) a range is closed[1] [i.e., the land use *de facto* changes because the range is no longer operational], (2) bullets, cartridges, shot, wads, clay targets, or hulls are considered "abandoned", or (3) lead or other material removed from a range is improperly managed, regulatory agencies, private citizens, or other groups may initiate legal action under CERCLA to compel current or previous range owners or operators, past or present owners of the land, and anyone else associated with the range, potentially even including individual shooters, to bear the costs of site closure and restoration.
2. The Natural Resource Damage provisions of CERCLA allow a range to be held liable[2] for the costs of health and environmental assessments, closure, and restoration of damages to natural resources. While CERCLA is independent of RCRA, appropriate management under RCRA tend to reduce both the likelihood and the potential magnitude of legal actions under the Natural Resource Damage provisions of CERCLA.
3. The U. S. District Court for Southern California has ruled (Otay Land Company, et al. vs. U. E. Limited, LP, et al.) that a range is not a "facility" and thus not subject to CERCLA if shooting has been done exclusively by consumers using consumer products. This ruling made it clear that the Court considered ranges used exclusively for recreation not to be "facilities" subject to CERCLA; this ruling is less clear as to whether a range run as a business, or a range used wholly or in part for government purposes (e.g., military, law enforcement), may be considered a "facility" subject to CERCLA. Due to the wording of this ruling, its implications for other ranges are not clear, and it appears that the CERCLA "facility" question has not reached final resolution.

State Laws and Regulations

It is important to note that court decisions under the laws of many States and localities independent of RCRA and CERCLA:

[1] Closing a range, whether or not a sale is involved, necessarily results in changing the land use and may constitute an "abandonment" of waste under RCRA if not properly managed.

[2] Under CERCLA, a range may be held liable as a business entity (e.g., corporation), but it may also be possible for individual officers, directors, or managers of the business entity (in this case the County) operating the range to be held liable, even possibly to the point of individuals or shooters. Under both CERCLA and RCRA, liability is "joint and several", meaning that any entity that has ever been involved with contamination on a property, including owners of the property, the County, those providing financing, and others, may be held liable for environmental closure and restoration costs. Consult qualified legal counsel for guidance on these matters.

1. Allow bullets, cartridges, shot, wads, clay targets, or hulls, deposited or migrating beyond range property to be viewed as nuisance, litter, and/or trespass (in the case of lead, with a "hazardous" substance).

2. When a range that has been operated consistent with the applicable laws and regulations is to be closed[5], State and local laws independent of RCRA and CERCLA may well require that the site be cleaned up to standards applicable to the new land use. This is a very important point for ranges because:

    A. Most ranges can foresee at least the reasonable possibility of closing at some time in the future, and therefore can approximate the costs years in advance and begin planning and budgeting accordingly.

    B. Costs to clean up a properly managed range to meet standards applicable to the new intended land use, while never small, are almost certain to be less than the cost of dealing with an improperly managed range under RCRA or CERCLA.

Under the Pike Run Shooting Range ESP (Muscatine County 2015), lead will be properly managed, including periodic reclamation and recycling as scrap metal, and recycling can be repeated as an initial step of a future closure, if warranted. However, when the range is closed and there will be no future reclaiming activities and no ongoing management of any lead remaining after the final reclamation, the site must be cleaned up to applicable standards. To avoid possible allegations that the lead has been "abandoned", making the range a hazardous waste site as discussed above under RCRA, promptly following the decision to close the range the Conservation Board must undertake proper closure activities consistent with applicable regulations as outlined herein.

In most cases at present the applicable standards are determined primarily by State law, and often depend on the reasonably anticipated or intended future land use for the site. At the time this Conceptual Closure Plan was developed, the State of Iowa regulations that appear most applicable are those of the Iowa Land Recycling and Environmental Remediation Standards Act (Iowa Code Chapter 455H). This Conceptual Closure Plan assumes that at the time of closure, lead will be reclaimed and recycled consistent with the Pike Run Shooting Range Environmental Stewardship Plan (Muscatine County 2015), then the site will be cleaned up to the applicable criteria in effect at the time for the reasonably anticipated future land use. Note that the applicable criteria for all contaminants, not just lead, will have to be met consistent with the regulations in effect at the time.

4.0 RANGE CONDITIONS

The regulatory discussion above is based on the assumption that lead management including reclamation and recycling has been implemented periodically consistent with EPA (2005) guidance as described in the Pike Run ESP (Muscatine County 2015), and that a final reclamation will likely be a part of closure actions, if for no other reason than source reduction. Reclamation and recycling will have periodically removed a substantial proportion of the total

mass of lead and associated metals deposited at the range. However, lead particles[3] too small to be recovered by the reclamation process, or outside the area from which lead is reclaimed, will remain on the site. This lead remaining on the site may well exceed the applicable criteria in at least some areas. This Conceptual Closure Plan assumes:

- At the time of closure the site conditions reflect consistent and appropriate implementation and evolution of the Pike Run Shooting Range ESP (Muscatine County 2015). This implies that shooting-associated materials from the range are not found beyond the property boundaries.

- Some closure action in addition to a final lead reclamation will be necessary to comply with the then-applicable criteria.

While future conditions at the site cannot be predicted, reasonable assumptions consistent with implementation of the Pike Run Shooting Range ESP (Muscatine County 2015) can be made as a basis for general planning for closure. Some such assumptions are discussed in the following sections.

4.1 RANGE FLOORS, BACKSTOPS, AND SIDE BERMS

The Pike Run Shooting Range ESP (Muscatine County 2015) includes reclamation of lead to the extent practical consistent with EPA (2005) guidance, application of agricultural lime as necessary to keep soil pH at levels that minimize environmental activity and dissolution of lead, maintenance of areas in which small lead particles may settle from runoff leaving the range, and other management practices. However, it is likely that as shooting occurs over time at the site, tiny particles of compounds of lead and other metals may weather from bullets and accumulate in some areas. Due to un-reclaimable small lead particles and/or accumulation of metal compounds from weathering, the Conceptual Closure Plan assumes tests at the time of closure may show, even after a final lead reclamation, (1) soil in some areas to exceed the applicable soil criteria, and (2) soil in some areas to be classifiable as hazardous.

4.2 SETTLING AREAS

This closure plan assumes that, consistent with EPA (2005) guidance and the Pike Run Shooting Range ESP (Muscatine County 2015), areas will have been constructed to allow small lead particles to settle from runoff leaving the range. The soil accumulated in these settling areas may well exceed the applicable soil closure criteria. Experience with implementing the Pike Run Shooting Range ESP (Muscatine County 2015) will show whether this settled material may test as hazardous, but the Conceptual Closure Plan assumes that it may have to be managed as hazardous waste.

[3] Throughout this document and consistent with the Pike Run Shooting Range Environmental Stewardship Plan, bullets and metal compounds weathered from bullets are collectively referred to as lead particles, recognizing that these particles vary considerably in size and contain compounds of various metals in addition to lead, particularly copper and other metals in bullet jackets.

5.0 CLOSURE ACTIONS

5.1 NEED FOR CLEANUP

The need for cleanup, the areas needing cleanup, and the appropriate closure actions to meet the applicable criteria can only be determined by on-site testing consistent with the regulations applicable at the time of closure. The advice of an attorney and environmental engineer or scientist experienced in cleanup and closure of outdoor shooting ranges will be necessary in determining the applicable regulations and their requirements, selecting appropriate tests, evaluating and applying the results to shooting range closure, and selecting appropriate site-specific actions to meet the then-applicable criteria at the Pike Run Shooting Range.

The appropriate tests and regulatory requirements at the time of closure cannot be predicted at present. However, this Conceptual Closure Plan assumes the future tests and regulations will have evolved from those of the present, and bases the discussions in Sections 5 and 6 on this assumption.

It is reasonable to assume the future regulations will require that early in the closure process the Pike Run Shooting Range property be sampled and tested to determine whether it meets the applicable criteria for the reasonably anticipated future land use, and if not, to delineate and characterize areas that exceed those criteria. The regulations are likely to provide for some sort of ecological- and human health-based evaluation of contamination (often as simple as default criteria) to help determine the appropriate site-specific closure actions.

Once management alternatives that would satisfy the applicable regulatory requirements are identified, the selection among such alternatives is based primarily on financial considerations of testing and evaluation costs, implementation capital costs, monitoring costs (if required), and potential long-term liabilities.

5.2 GENERAL CONTAMINANT MANAGEMENT METHODS

A wide spectrum of general contaminant management methods is included in this Conceptual Closure Plan for the sake of completeness for future consideration, recognizing that some may be less consistent with present agency positions than others. Depending on the contaminants and the extent and intensity of contamination, general contaminant management methods fall into three general categories:

- Site controls. If the contaminants are in forms, concentrations, or areas that pose relatively minor risks, it may be sufficient under the applicable regulations at the time of closure to manage access, limit activities, restrict allowable future land uses for all or part of the site, and/or establish other site controls to minimize potential adverse environmental effects. When site controls are an acceptable alternative for meeting the regulatory requirements, they often have a lower capital cost than the other two general categories of contaminant management methods. However, some sort of long-term monitoring may be required, with the potential for additional action if monitoring results indicate the need. Not-readily-apparent liabilities and costs associated with monitoring and the possibility of additional future action, or other issues, may decrease the relative

attractiveness of site controls compared to other general categories of contaminant management methods.

- Contaminant management on-site. Under appropriate circumstances, contaminated soil may be managed on site by one or some combination of *in-situ* or *ex-situ* stabilization, burial (perhaps under a low permeability surface such as a parking lot or building), or other management methods consistent with the applicable regulations at the time of closure. When on-site contaminant management is an acceptable alternative for meeting the regulatory requirements, it may have a somewhat lower capital cost than off-site management. However, even if on-site contaminant management appears satisfactory from regulatory, engineering, and environmental perspectives, acceptance by regulatory agencies and/or the public, and not-readily-apparent liabilities and costs associated with monitoring and the possibility of additional future action, or other issues may decrease the attractiveness of on-site contaminant management compared to off-site contaminant management.

- Contaminant management off-site. This type of contaminant management consists of excavation of contaminated soils with transportation and disposal at a licensed solid or hazardous waste disposal facility, as required by the waste characteristics. While this approach may have the highest capital cost, monitoring is seldom required, the potential for future liabilities tends to be low, and it is usually readily accepted by regulatory agencies and the public, often helping make it an attractive category of action.

In practice, optimal site closure may involve some combination of the above general types of actions applied to various portions of the site.

6.0 COST ILLUSTRATIONS

It is presently not possible to predict the regulations and requirements that will be in effect for cleaning up Pike Run Shooting Range at some unknown future time, the areas of the range that will require closure, or the type of closure action(s) that will be necessary to achieve regulatory compliance. Therefore, it is not possible to predict the magnitude or timing of closure costs. However, it is reasonable to expect that some closure will be necessary, and to prepare for closure expenditures at some time in the future. While it is possible that those costs will be minimal and at some far distant time, it seems prudent to plan for relatively substantial costs at some time in the finite future. This Conceptual Closure Plan takes the latter approach, while recognizing that the actual closure costs may be substantially different from those illustrated herein. The rationale is that if closure comes later and/or costs less than planned, complaints will be minimal; if closure comes sooner and/or costs more than planned, at least some of the costs will have been planned and the remaining burden will be less than if an Conceptual Closure Plan had not been developed.

The following illustration of likely major cost components of the closure that might be expected at some future time uses quantities of various types of material and reasonable estimates of the expected range of costs in 2015 dollars based on experience at similar ranges and/or discussions with vendors. At the time of closure, it will be necessary to sample to develop quantities of

material in then-applicable regulatory categories, and to estimate real-time costs, perhaps modifying and adding activities.

This illustration describes a voluntary closure conducted by the Conservation Board when it decides to close the range. If the Board were to simply cease shooting without timely closure of the site, the resulting government-managed closure (see discussion in Section 2) could be expected to cost considerably more and would be paid for by Muscatine County.

As the need to implement this Conceptual Closure Plan becomes clear, the Conservation Board likely will assemble a Project Team to develop and implement detailed closure plans consistent with then-applicable regulations (Section 6.1) and current technology. Probably the two most important members of this future Project Team are an attorney and an engineer experienced with Iowa and Federal waste management laws as they are applied to closing shooting ranges that have been operated consistent with EPA (2005) guidance, i.e., the Pike Run Shooting Range ESP (Muscatine County 2015). The presently anticipated major cost components of the detailed closure plan the future Project Team will develop are addressed in Section 6.2

6.1 APPLICABLE REGULATORY REQUIREMENTS

Consistent with the discussions in Section 3, under case law and agency interpretations of RCRA and CERCLA at the time this Conceptual Closure Plan was developed, active ranges operated consistent with EPA (2005) best management practices are not considered to be waste sites during operation. However, material excavated from the range as part of closure would be considered waste. Of course, if the range were simply abandoned and not cleaned up, it would become a waste site under RCRA as discussed in Section 3. This illustration assumes that these basic regulatory interpretations will prevail at the time this Conceptual Closure Plan is implemented.

When the range is to be closed, it must be cleaned up consistent with Iowa law (Section 3) to meet the criteria applicable to the intended future land use.

6.2 MAJOR COST COMPONENTS

6.2.1 Work Plans, Design, Permitting, Sampling, Analysis

The future Project Team will be familiar with the overall project planning process and requirements, as well as the component plans (e.g., Health and Safety Plan, Erosion Control Plan) that will be necessary. These components will be pulled together in an overall project plan that will likely include the major cost components discussed in Section 6.2 in whatever form is appropriate at the time.

It is likely that several Federal, State, and/or local permits will be required for various activities (e.g., construction activities in a floodplain, air quality permits related to dust control) necessary in cleaning up the site and closing the range. Typically, obtaining the necessary permits is primarily an administrative process.

Lead reclamation and recycling is likely to be an early step in the final design for implementing this Conceptual Closure Plan. Although periodic reclamation and recycling is a key element in

management of ongoing range operations under the Pike Run Shooting Range ESP (Muscatine County 2015), seldom does the value of the metal reclaimed from ranges of this size and type exceed the cost of reclamation and recycling. Even so, reclamation and recycling for source minimization purposes is an important part of a future site closure.

The objective of the sampling and analysis is to describe the horizontal and vertical distribution of soil contamination. The results will be used to determine the quantity of soil that will be treated so that it classifies as non-hazardous or solid waste, and the total quantity of soil that must be disposed off-site.

Analyses should focus on those contaminants that are

1. typically associated with the types of shooting that will be conducted at the Pike Run range (i.e., lead, copper, arsenic, antimony, zinc, nickel, tin),
   and
2. for which applicable criteria or standards exist at the time of range closure

Sampling should focus on the areas most likely to exceed the criteria for the intended future land use. At this range operated consistent with the site-specific ESP (Muscatine County 2015), those areas most likely to exceed the criteria are portions of the range floors, the backstops, and the settling areas designed to capture particles settling from runoff from range floor and backstop. At the time of range closure, other portions of the property may not have to be sampled, or may be sampled much less intensively to provide assurance that unanticipated contamination is not overlooked. Sampling of other areas, other matrices, or other types of analyses or parameters may be warranted if there is clear reason for doing so, including a specific, helpful use for the information. Examples of possible additional requirements include:

- Surface water and sediment. At the time this Conceptual Closure Plan was developed, it appeared that no surface waters or wetlands were in close enough proximity to be affected by Pike Run Shooting Range. However, if the range were to be subject to future flooding it is possible that some sampling of downgradient sedimentation deposits may be appropriate. However, it is unlikely that such sampling would indicate contamination of surface waters or sediments and cleanup of such material is not included in this illustration of range closure costs.
- Groundwater. If groundwater sampling is appropriate, only a few sampling locations may be necessary but even so, well installation and sampling may be a relatively substantial cost. Because experience has shown that groundwater contamination is seldom associated with properly operated ranges, management of groundwater contamination is considered unlikely to be necessary and is not included in this illustration of range closure costs.

At present it appears reasonable to illustrate the cost for preparation of work plans, design, permitting, sampling, analysis, and data evaluation as in the approximate range of $60,000 to $160,000.

6.2.2 Removal of Structures

Any structures not part of the intended future use of the site will have to be removed. This will likely include the firing line (roof, shooting benches, etc.), target holders, and other range-specific devices or features, and may include more general structures such as parking areas,

erosion structures (e.g., riprap, culverts), etc. The required level of effort will be determined by the number and nature of structures that have to be removed. This illustration assumes that the removed structural debris can be transported off site and disposed as solid waste; any structural debris that classifies as hazardous waste will have to be properly transported and disposed as such at additional cost.

At present it appears reasonable to illustrate the cost for removal, transportation, and disposal of structures as in the approximate range of $25,000 to $65,000, not including removal of perimeter fencing or access road if this were to be required at the time of closure.

6.2.3 Excavation and Reclamation

The cost illustration of Section 6.2 is based not on estimates but on assumptions purely for purposes of illustration of the quantities of material that future sampling and analytical results may show require treatment and off-site disposal as discussed in Section 6.2.1 Sampling and analytical results at the time of closure will determine actual quantities and costs.

Purely for illustrative purposes, assume that future sampling and analysis shows that:

- Much of the soil in the side berms and backstop will be uncontaminated such that it does not require management, and therefore will not require excavation but can simply be graded to site contours as discussed in Section 6.2.5.
- Approximately 1,000 cy of soil will require excavation for treatment (Section 6.2.4) so they classify as non-hazardous solid waste before they are transported off site for disposal.
- Of these 1,000 cy, approximately 250 cy will contain sufficient bullets and bullet fragments to warrant excavation and lead reclamation for purposes of source reduction.
- Approximately 1,000 additional cy of soil will require excavation but not treatment before they are transported off site for disposal.

At present it appears reasonable to illustrate the cost for excavation, reclamation as warranted, and temporary stockpiling of this soil in the approximate range of $60,000 to $100,000.

6.2.4 Treatment, Transportation, and Disposal

This illustration assumes that of the approximately 2,000 cy of material to be disposed off-site, approximately 1,000 cy classify as hazardous. This soil can be treated with a soil stabilization agent that will bind the metals that cause the hazardous classification in such a way that the treated material will classify as non-hazardous (or solid) waste. The treated material can then be transported off-site to a licensed solid waste disposal facility. The added cost of stabilization is most often more than offset by a combination of:

- the lower disposal fees at solid waste disposal facilities compared to hazardous waste disposal facilities
- the often lower transportation costs to solid waste facilities that are more numerous and thus often closer than hazardous waste disposal facilities

The soil stabilization agent used for this purpose should be approved by EPA for treatment of hazardous waste or closure of hazardous waste sites and be well proven by a history of

successful and satisfactory use for such purposes. (It may be possible from a technical perspective to manage hazardous material on-site if it is first stabilized as discussed above, and perhaps buried under clean site soil or under an impervious barrier. This may warrant consideration at the time this Conceptual Closure Plan is implemented, although in view of the likely agency and/or public concerns about on-site management of such material, this is not considered further in this illustration.)

At present it appears reasonable to illustrate the cost for treatment of approximately 1,000 cy of soil as in the approximate range of $50,000 to $75,000, and loading, transportation, and disposal of the approximately 2,000 cy of soil as in the approximate range of $175,000 to $300,000.

6.2.5 Site Grading and Revegetation

The final major step in cleaning up the site and closing the range is grading and revegetation to minimize erosion. Finish grading should return the site to contours consistent with the intended future land use. This illustration assumes that no major earthmoving will be involved. Once grading is completed, bare areas should be treated with a seed mix appropriate for the intended future land use.

At present it appears reasonable to illustrate the cost for grading and seeding as in the approximate range of $50,000 to $80,000.

6.3 SUMMARY OF MAJOR COSTS

The following table summarizes from Section 6.2 the assumptions and illustrative costs of site closure as part of range closure.

Activity	Illustrative Approximate Range of Cost
Work Plans/Designs/Permitting/Sampling/Analysis (Sec. 6.2.1)	$60,000 to $160,000
Removal of Structures (Sec. 6.2.2)	$25,000 to $65,000
Excavation & Reclamation (Sec. 6.2.3)	$60,000 to $100,000
Treatment, Transportation, and Disposal (Sec. 6.2.4)	$225,000 to $375,000
Grading & Revegetation (Sec. 6.2.5)	$50,000 to $80,000
Contingency (25% of activity costs)	$105,000 to $195,000
ILLUSTRATIVE APPROXIMATE RANGE OF TOTAL COST	**$525,000 - $975,000**

The above illustration leads to an approximate total range of costs of $525,000 to $975,000 for range closure, not including administrative costs and other necessary non-construction expenses. The actual cost at the time of closure can only be estimated based on site testing appropriate to the applicable regulations at the time of closure. Other than unforeseeable changes in requirements and/or technologies, the variable having the greatest influence on the actual closure costs is probably the quantity of soil that sampling and analysis shows has to be cleaned up.

7.0 SUMMARY

The Conservation Board personnel should consider this document and experience with implementation of the Pike Run Shooting Range Environmental Stewardship Plan (Muscatine County, 2015) as they develop knowledge and expertise relative to the evolving Federal and Iowa laws and regulations applicable to closure of outdoor shooting ranges as part of range closure. This Conceptual Closure Plan should be updated and revised as Conservation Board personnel consider appropriate. The Conservation Board should use the evolving Conceptual Closure Plan as the basis for incorporating closure prior to range closure into financial plans for the Pike Run Shooting Range.

8.0 REFERENCES

EPA. 2005. *Best Management Practices for Lead at Outdoor Shooting Ranges.* EPA-902-B-01-001. U.S. EPA Division of Enforcement and Compliance Assistance, RCRA Compliance Branch, 290 Broadway, 22nd Floor, New York, NY 10007-1866. Published January 2001, revised June 2005. www.epa.gov/region2/waste/leadshot.

Muscatine County. 2015. *Environmental Stewardship Plan: Pike Run Shooting Range.* Prepared for Muscatine County Conservation Board, P. O. Box 109, Muscatine, IA 52761 by Dick Peddicord & Company, 1115 Cooper's Landing Road, Heathsville, VA 22473. October 2015.

NRA. In preparation. *Range Resource Book.* National Rifle Association, Range Services Department, 11250 Waples Mill Road, Fairfax, VA 22030 (Publication planned for 2016)

NSSF. 1997. *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges.* Facilitates Development Series No. 2. National Shooting Sports Foundation, Facilities Development Division, 11 Mile Hill Road, Newtown, CT 6470-2359. www.rangeinfo.org.

PIKE RUN SHOOTING RANGE

MUSCATINE COUNTY CONSERVATION BOARD

MUSCATINE COUNTY, IOWA

PROJECT ENGINEER
ADAM SHUTT, P.E.
MARTIN & WHITACRE SURVEYORS & ENGINEERS, INC
563-263-7691

MCCB CONTACT
CURT WEISS

BID LETTING DATE/TIME: XXXXXXXX XXXXXXX

BIDDER QUESTIONS SHOULD BE DIRECTED TO THE MUSCATINE COUNTY CONSERVATION BOARD OFFICE

PROJECT DESCRIPTION: NRA COMPLIANT SHOOTING RANGES
WETLANDS
PARKING AREAS

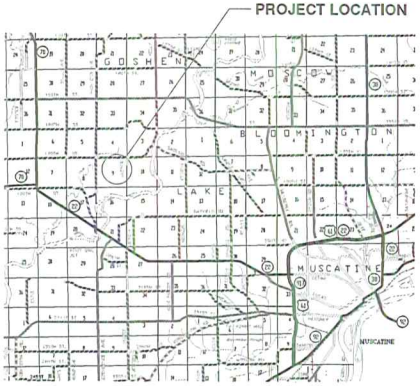
LOCATION: 1886 170TH STREET
SECTION 9, PIKE TOWNSHIP
MUSCATINE COUNTY, IOWA

PROPOSED WORK DIVISIONS:

BY CONTRACTOR: GRADING
GRAVEL SURFACING
STORMWATER PIPING

BY COUNTY: SEEDING
LANDSCAPING
BUILDING CONSTRUCTION
SIGNAGE
SHOOTING MATERIALS

SHEET NO.	SHEET TITLE
A.01	TITLE SHEET
A.02	SITE PLAN
A.03	EXISTING CONDITIONS
A.04	GRADING PLAN
B.01	TYPICAL SECTIONS
C.01	RANGE SITE PLAN
S.01	SWPPP



VICINITY MAP
NO SCALE

SUDAS

THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH CURRENT IOWA STATEWIDE URBAN DESIGN STANDARDS AND SPECIFICATIONS, COUNTY BIDDING DOCUMENTS AND PROJECT SPECIAL CONDITIONS

THIS PROJECT SHALL OPERATE UNDER NPDES GENERAL PERMIT NO. 2 FOR "STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY FOR CONSTRUCTION ACTIVITIES" THE DEVELOPER HAS FILED A PERMIT, ALL CONTRACTORS SHALL SIGN AND ADHERE TO PROJECT SWPPP

CONTRACTORS SHALL CALL IOWA ONE CALL 811 PRIOR TO START OF WORK. EXISTING UTILITIES SHOWN ARE DERIVED FROM SURVEY & MAPPING DATA. FIELD LOCATE AND VERIFY ALL UTILITIES SHOWN. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES AND REPAIR DAMAGES.

LICENSED PROFESSIONAL ENGINEER — ADAM H. SHUTT 19254 — IOWA

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA

07/06/2016

ADAM H. SHUTT, P.E. IA. REG. NO 19254 DATE

MY LICENSE RENEWAL DATE IS DECEMBER 31, 2016

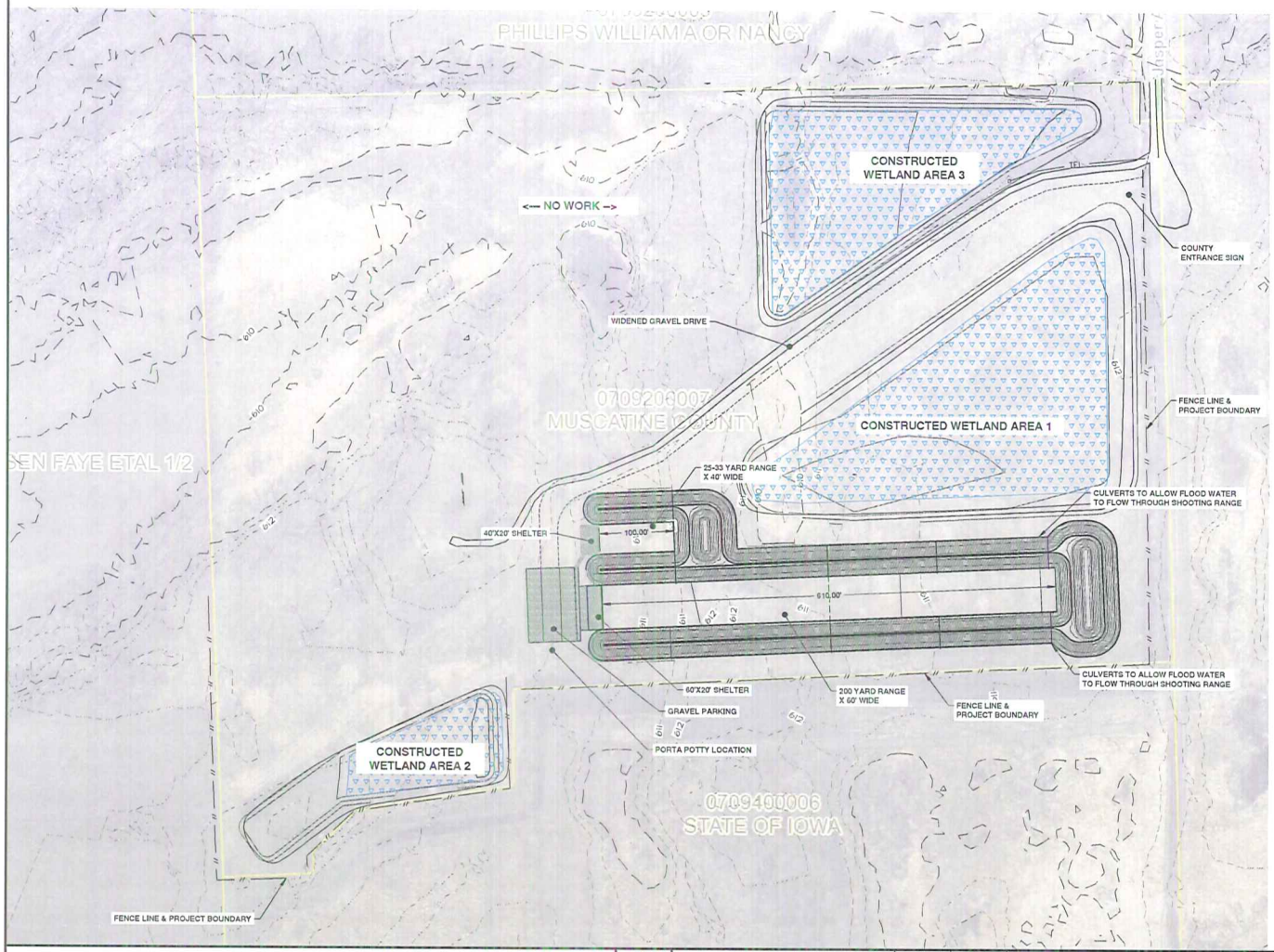
Pages or sheets covered by this seal: A.01-S.01

PIKE RUN SHOOTING RANGE
MCCB
MUSCATINE, IOWA
8151.17

Martin & Whitacre
Surveyors & Engineers, Inc.
P.O. BOX 413 MUSCATINE, IOWA
VOICE (563) 263-7691 FAX (563) 263-0048 EMAIL info@martin-whitacre.com

REVISIONS
1
2
3
4

DATE: REVIEW
JOB NO: 8151.17
SHEETS 7
SHEET A.01



SITE PLAN INFORMATION:

DEVELOPER INFORMATION:	MUSCATINE COUNTY CONSERVATION BOARD
PARCEL:	0709200007
SEC-TWN-RANGE	9-77-3W
	25.52 ACRES
ZONING:	A-1 (AGRICULTURAL DISTRICT)
SETBACK REQUIREMENTS:	FRONT YARD: 30'
	SIDE YARD: NONE
	REAR YARD: NONE
FLOOD ZONE:	ZONE A (ASSUME ALL AREAS ARE FLOOD PRONE)
	BFE TO BE DETERMINED BY IOWA DNR

EXPECTED DEVELOPMENT:

- CONSTRUCTION OF NRA COMPLIANT RIFLE SHOOTING RANGE
- OPEN PARK SHELTER TYPE COVER BY COUNTY
- GRAVEL PARKING LOT
- EXCAVATIONS TO BECOME CONSTRUCTED WETLANDS
- NATIVE SEEDING BY COUNTY

UTILITIES:

ELECTRIC:	NONE
WATER:	NONE
SEWER:	PORTA POTTYS
STORM:	ON-SITE DRAINAGE
COMMUNICATIONS:	NONE
LIGHTING:	NONE

GENERAL NOTES:

- CIVIL PLANS TO ADDRESS GRADING, BERM CONSTRUCTION, DRIVING & PARKING SURFACES
- COUNTY TO SPECIFY & INSTALL SIGNAGE, FENCING AND SHOOTING STRUCTURES
- COUNTY TO PROVIDE ALL SEEDING AND LANDSCAPING WORK

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north

NO.	REVISIONS	INITIALS	DATE
	DRAWN BY: AHS		
	APPROVED:		

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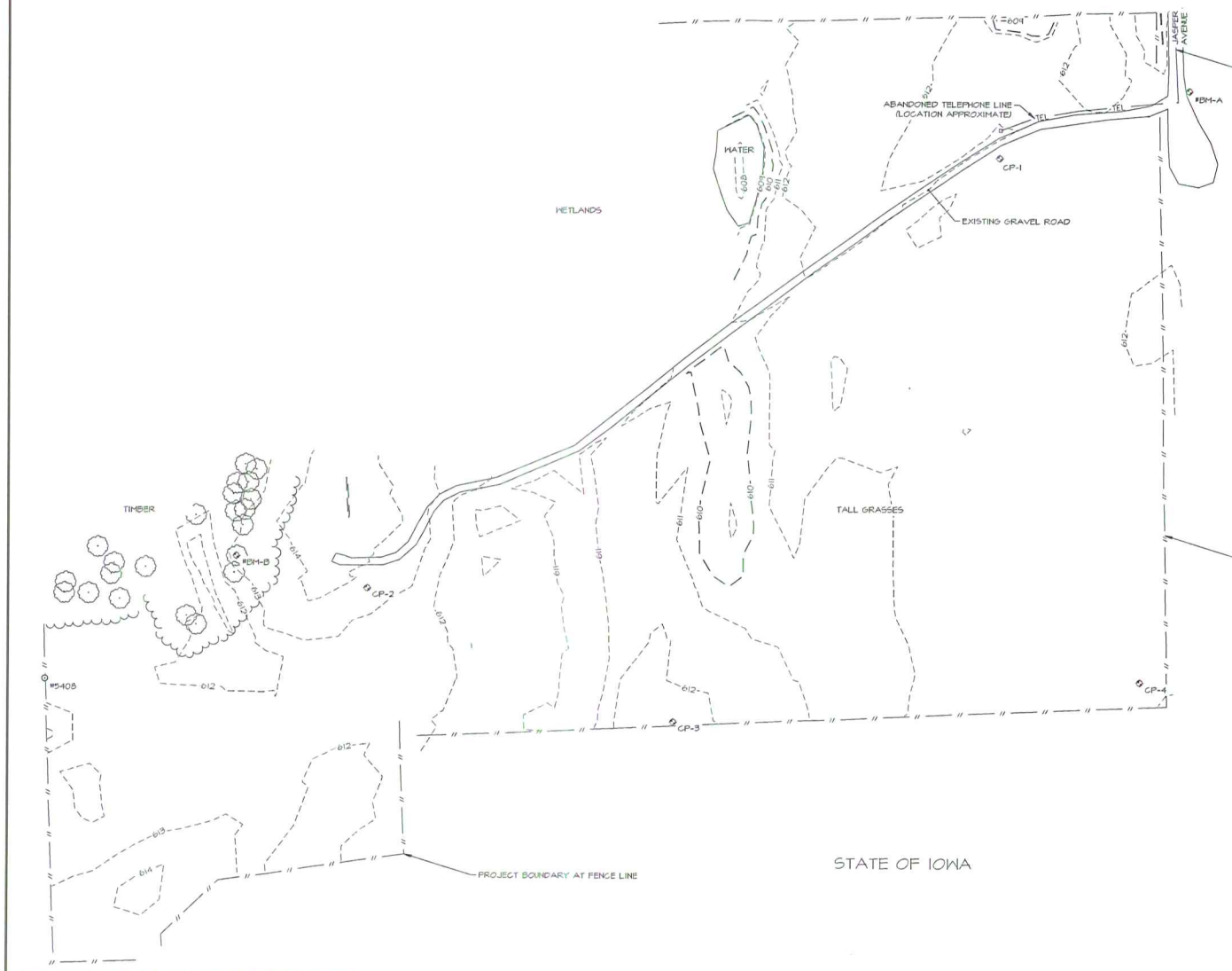
MCCB
MUSCATINE COUNTY
PIKE RUN SHOOTING RANGE
SITE PLAN
PROJECT NO. 8151.17

DWG:8151-BASE.DWG
DATE REVIEW

SHEET
A.02



LEGEND:

- EXISTING CONTOUR LINE:
- EXISTING INDEX CONTOUR LINE:
- EXISTING GRAVEL LINE:
- EXISTING TELEPHONE LINE: TEL
- EXISTING WATER'S EDGE LINE:
- EXISTING FENCE LINE:
- EXISTING SURVEY MONUMENT:
- SET BENCH MARK OR CONTROL:

CONTROL POINTS

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP-1	106596.23	246863.79	612.62	SET REBAR
CP-2	106104.09	246152.98	614.51	SET REBAR
CP-3	105954.23	246498.28	612.91	SET REBAR
CP-4	106001.57	247023.29	611.78	SET REBAR
BM-B			616.28	NAIL IN 30" OAK TREE
BM-A			613.54	SPIKE IN WOOD BOLLARD
#5408	105999.09	245790.30	613.00	FOUND REBAR W/YELLOW CAP

60 0 60

north

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	APPROVED:		

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MCCB
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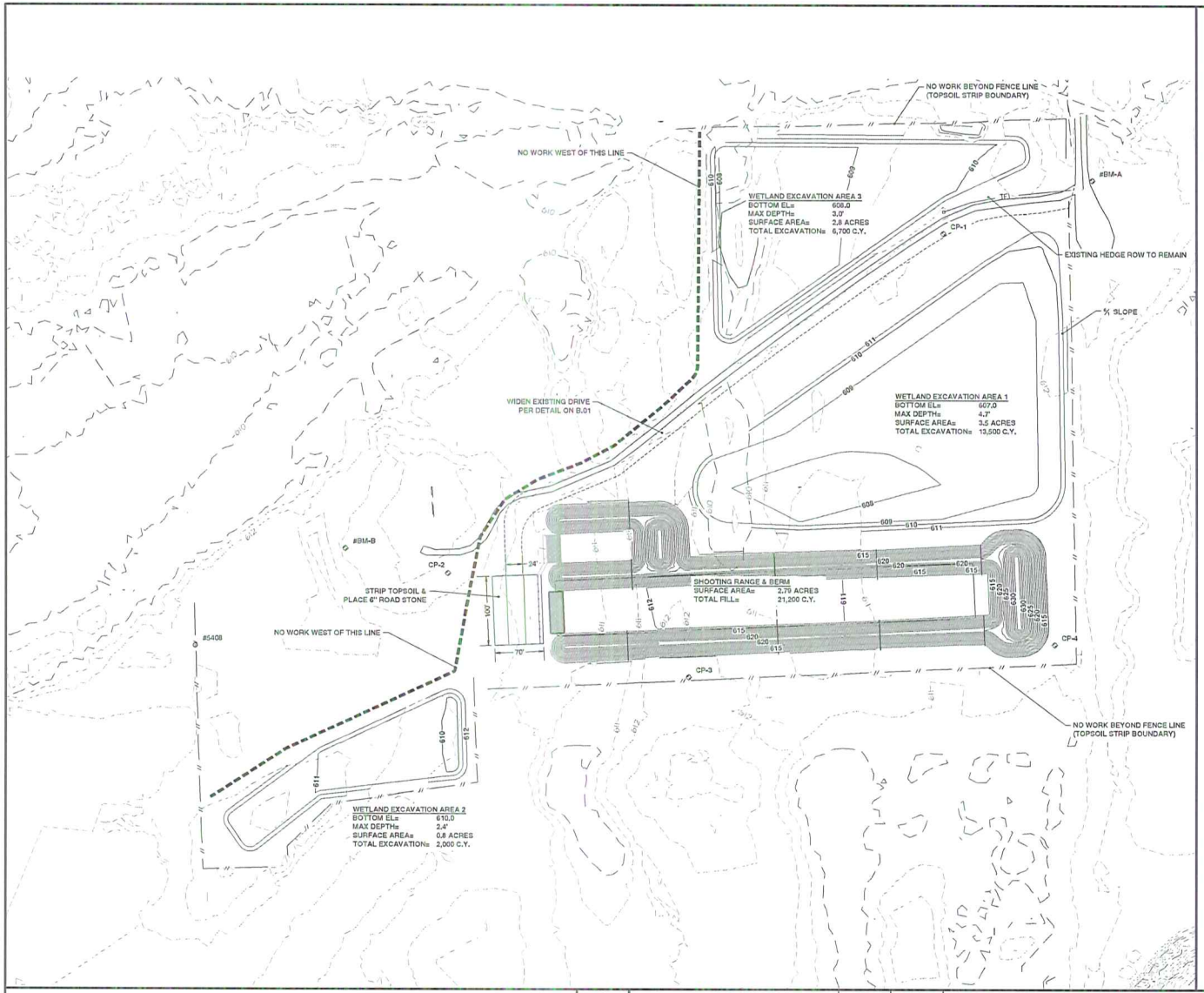
PIKE RUN SHOOTING RANGE
EXISTING CONDITIONS
PROJECT NO. 8151.17

DWG:8151-TOPO.DWG
DATE REVIEW
SHEET A.03



GRADING PLAN NOTES:

GENERAL PLAN NOTES:

- MOW ALL AREAS TO RECEIVE WORK, REMOVE TREES & SHRUBS AND BURN ON-SITE
- THE COUNTY WILL PROVIDE A TIN OR XML SURFACE MODEL FOR THE FINISHED GRADE OF EACH GRADING AREA. CONTRACTORS USING MACHINE CONTROLLED GRADING SHALL DEVELOP THEIR OWN CONTROL SYSTEM USING MARKERS PLACED IN THE FIELD AT THEIR OWN RISK
- AREAS OUTSIDE OF EXPECTED WORK AREAS SHALL BE PROTECTED THROUGHOUT PROJECT LIFE
- BERM TOP ELEVATIONS SHALL BE STRICTLY MAINTAINED AND WILL BE FIELD VERIFIED BY THE COUNTY PRIOR TO ACCEPTANCE OF FINAL WORK
- ALL AREAS TO BE SEEDED SHALL BE FINE GRADED PRIOR TO ACCEPTANCE BY COUNTY, SEEDING WORK BY COUNTY IN SEPARATE CONTRAC
- EXISTING RESIDENTIAL UTILITIES MAY EXIST ON-SITE, CONTACT IOWA ONE CALL PRIOR TO START OF WORK

TOPSOIL

- ** STRIP TOP 8" EXISTING SOIL WITHIN DASHED BOUNDARY SHOWN
- ** IF TOPSOIL IS NOT EXISTENT IN DEPTHS REQUIRED, MODIFY TOPSOIL CUT & FILL DEPTHS AS DIRECTED BY THE COUNTY TO DISTRIBUTE LIMITED MATERIALS TO PROPER LOCATIONS
- ** STOCKPILE TOPSOIL FOR FUTURE USE

QUANTITIES

- ** CONTRACTORS SHALL EXCAVATE AND PLACE SUFFICIENT MATERIAL TO CONSTRUCT THE SHOOTING RANGE AND BERMS
- ** THE RANGE AND BERMS WILL REQUIRE APPROXIMATELY 21,200 C.Y. COMPACTED FILL
- ** EXCAVATION QUANTITIES SHOWN ON THIS PLAN REFLECT A COMPARISON OF TOP OF FINISHED GRADE SURFACE MODEL AND TOP OF SURVEYED SURFACE
- ** NO CUT FILL SHRINKAGE WAS INCLUDED IN EXCAVATION QUANTITIES
- ** IF ADDITIONAL EXCAVATED MATERIAL IS REQUIRED, LOWER WETLAND BOTTOMS TO PROVIDE SUFFICIENT MATERIAL

SHOOTING RANGE CONSTRUCTION NOTES:

- THE TOP 8" OF EXISTING SOIL WITHIN BERM BOUNDARIES SHALL BE STRIPPED AND STOCKPILED
- IF ON-SITE TOPSOIL DEPTH EXCEEDS 8", NO ADDITIONAL STRIPPING WILL BE REQUIRED
- FILL MATERIAL PLACED ON BERMS SHALL BE COMPACTED USING IDOT "TYPE A" COMPACTION (1 PASS WITH SHEEP'S FOOT ROLLER PER INCH OF FILL IN LIFT)
- SPREAD 12" TOP SOIL OVER TOP OF CONSTRUCTED BERMS
- SPREAD 6" TOPSOIL OVER FLAT SHOOTING RANGE SURFACE

WETLAND EXCAVATION CONSTRUCTION NOTES:

- STRIP 8" TOPSOIL WITHIN EXCAVATION AREAS AND STOCKPILE
- EXCAVATE TO ELEVATIONS SHOWN
- OVERSTRIP 6" TO ALLOW FOR TOPSOIL REPLACEMENT
- PREPARE FINISHED GRADE FOR SEEDING BY COUNTY

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north

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	DRAWN BY: AHS		
	APPROVED:		

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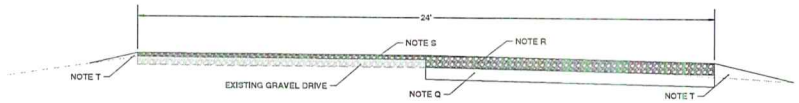
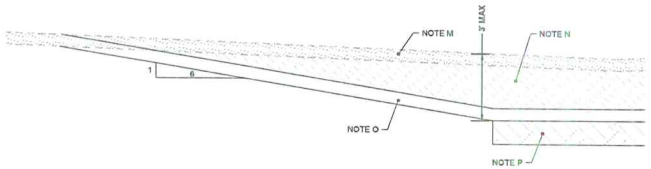
PIKE RUN SHOOTING RANGE
GRADING PLAN
PROJECT NO. 8151.17

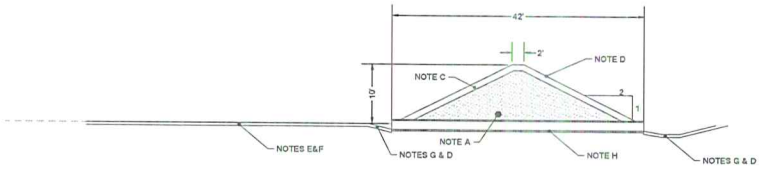
DWG:8151-BASE.DWG
DATE REVIEW
SHEET A.04



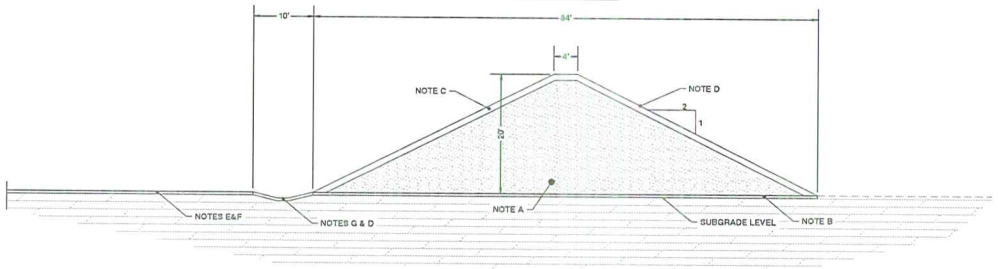
ENTRANCE DRIVE CONSTRUCTION
TYPICAL SECTION



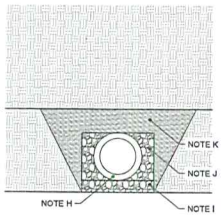
CONSTRUCTED WETLAND EXCAVATION
TYPICAL SECTION



SIDE BERM
TYPICAL SECTION



BACK BERM
TYPICAL SECTION



PIPE THROUGH BERM
TYPICAL SECTION

DETAIL SHEET NOTES:

- ALL WORK ASSUMES SUFFICIENT TOPSOIL EXISTS ON SITE
- IF TOPSOIL IS NOT EXISTENT IN DEPTHS REQUIRED, MODIFY TOPSOIL DEPTHS AS DIRECTED BY THE COUNTY TO DISTRIBUTE LIMITED MATERIALS TO PROPER LOCATIONS
- ALL SEEDING WORK TO BE PROVIDED BY THE COUNTY & NOT PART OF THE SITE WORK PACKAGE

NOTE A: PLACE COMPACTED ON-SITE FILL IN 9" LIFTS
ROLL WITH SHEEP'S FOOT @ 1 PASS PER INCH OF FILL PLACED
NOTE B: STRIP 8" TOPSOIL UNDER PROPOSED BERMS
PROOF ROLL & COMPACT TOP 12" BEFORE PLACING FILL
NOTE C: SPREAD 12" TOPSOIL ON BERM & PREPARE FOR SEEDING
NOTE D: APPLY NATIVE SEEDING (BY COUNTY)
NOTE E: PLACE 6" TOPSOIL ON SHOOTING RANGE
NOTE F: PLACE LAWN SEED, MULCH & FERTILIZER ON SHOOTING RANGE (BY COUNTY)
NOTE G: EXCAVATE 6" DEEP SWALE & PLACE 6" TOPSOIL
NOTE H: INSTALL 18" CMP CULVERTS
CULVERT PER IDOT SPECIFICATIONS: AASHTO M 36 TYPE 1
GRADE TOWARDS OUTSIDE OF BERM AT 0.2% TO PREVENT PONDING
NOTE I: 6" BEDDING STONE
NOTE J: HAND COMPACT WITH ON-SITE SANDY MATERIAL TO ENCASE PIPE
NOTE K: RECOMPACT AFTER ROCK ENCASEMENT WORK
NOTE M: STRIP TOP 6" TOPSOIL & ORGANIC MATERIAL
STOCKPILE FOR FUTURE USE
NOTE N: CUT MATERIAL & PLACE ON SHOOTING RANGE BERM
NOTE O: OVEREXCAVATE 6" & PLACE STOCKPILED TOPSOIL & PREPARE FOR SEED
NOTE P: OVER DIG AS NEEDED TO ACQUIRE SUITABLE FILL MATERIAL
WASTE UNSUITABLE MATERIAL TO REPLACE EXCAVATION
NOTE Q: STRIP 6" TOPSOIL & STOCKPILE
REPLACE REMOVED SOIL WITH COMPACTED FILL
NOTE R: PLACE ROAD STONE TO BRING GRADE TO 2" ABOVE EXISTING GRAVEL SURFACE
NOTE S: TOP EXISTING GRAVEL SURFACE WITH 2" ROAD STONE TO CREATE 24' WIDE DRIVE
NOTE T: PROVIDE TOPSOIL SHOULDER (SEEDING BY COUNTY)

NO.	REVISIONS	INITIALS	DATE
	DRAWN BY: AHS		
	APPROVED:		

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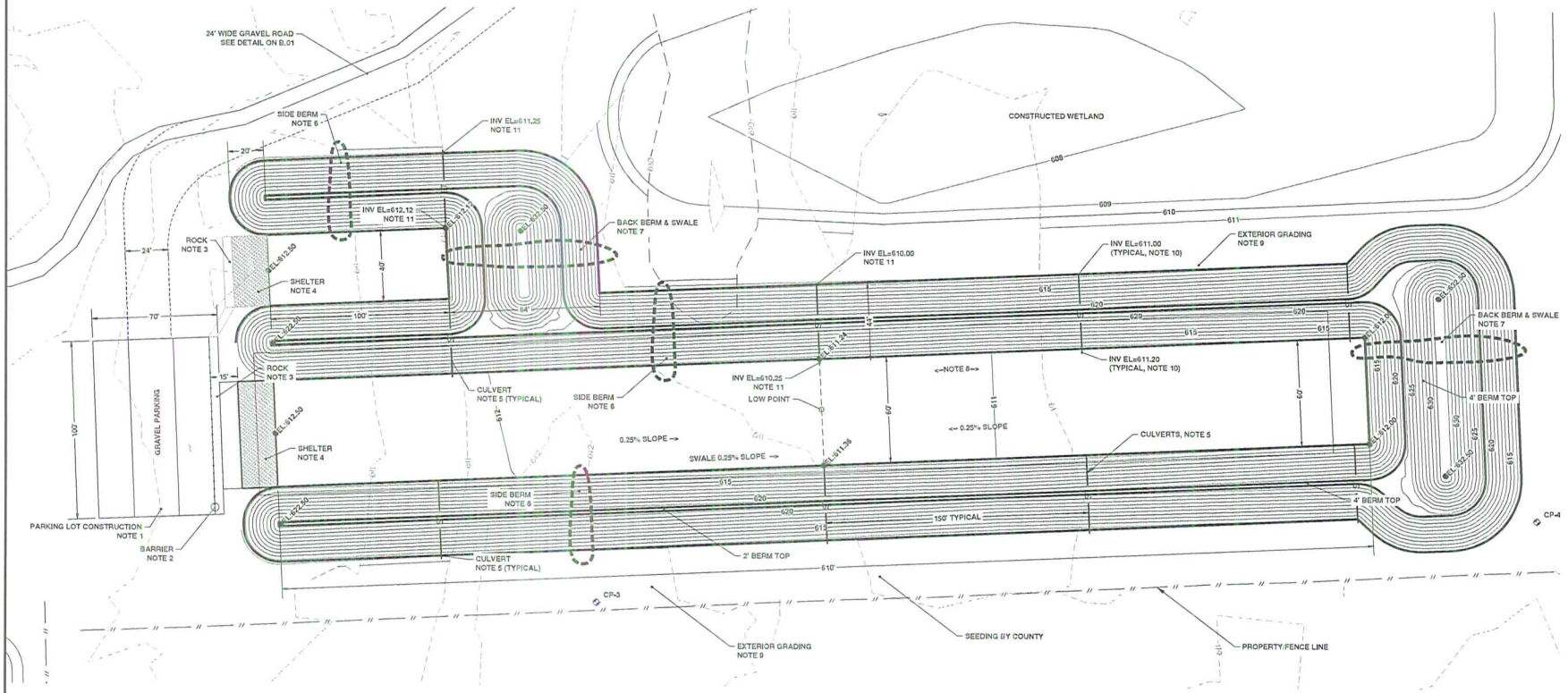
MCCB
MUSCATINE COUNTY
PIKE RUN SHOOTING RANGE
TYPICAL SECTIONS
PROJECT NO. 8151.17

DWG:8151-BASE.DWG
DATE REVIEW
SHEET B.01



SHEET NOTES:

NOTE 1: STRIP TOPSOIL, COMPACT TOP 12" EXISTING SOIL, PLACE ENGINEERING FABRIC & 6" ROAD STONE
NOTE 2: COUNTY TO CONSTRUCT CAR STOP BARRIER
NOTE 3: PROVIDE ROCK WALKING PATH TO SHOOTING AREAS
NOTE 4: COUNTY TO CONSTRUCT WOOD FRAME SHELTER
SHELTER DESIGN & INSTALLATION BY COUNTY
SHELTER FLOOR GRADE TO BE 612.75 +-
NOTE 5: INSTALL 44 L.F. 18" CMP CULVERT PER DETAIL ON B.01
GRADE TOWARDS OUTSIDE OF BERM AT 0.20%
NOTE 6: CONSTRUCT SIDE BERM PER DETAIL ON B.01
NOTE 7: CONSTRUCT BACK BERM & SWALE PER DETAIL ON B.01
NOTE 8: FINISH TOP 6" GRADE WITH TOP SOIL, SEEDING BY COUNTY
NOTE 9: GRADE OUTSIDE OF BERM TOE TO TAKE WATER AWAY FROM BERM & PREVENT WATER PONDING INSIDE OF BERM
NOTE 10: TYPICAL CULVERT ELEVATIONS SHOWN ARE TYPICAL TO ALLOW FOR FLOOD WATER TO FLOW THROUGH BERM AND NOT INTENDED FOR STORMWATER MANAGEMENT
NOTE 11: MEET CULVERT GRADES SHOWN TO ALLOW FOR INTERNAL DRAINAGE AND STORMWATER MANAGEMENT

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north

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	APPROVED:		

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MCCB
MUSCATINE COUNTY
PIKE RUN SHOOTING RANGE
RANGE SITE PLAN
PROJECT NO. 8151.17

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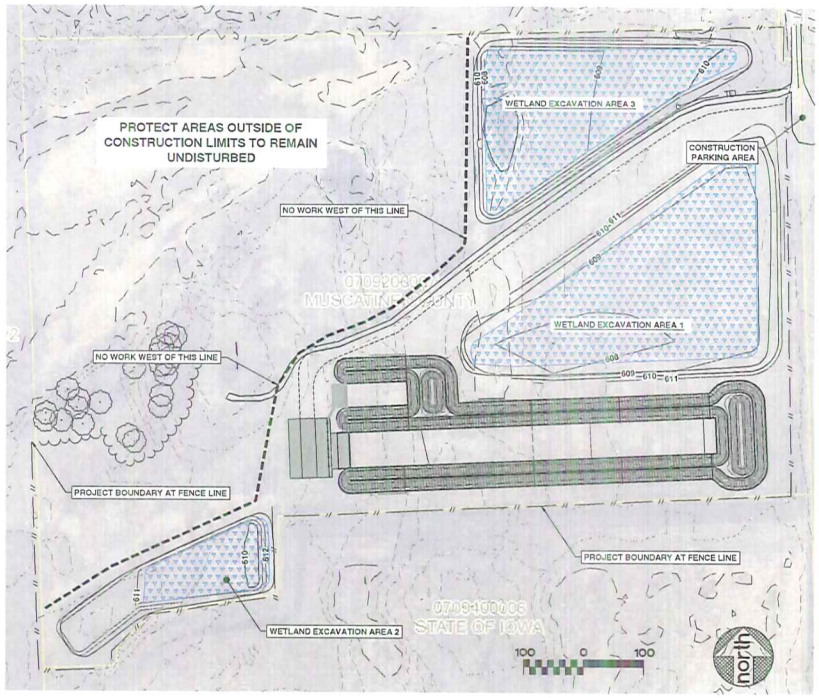
DATE REVIEW
SHEET C.01



1. SITE EVALUATION AND DESIGN DEVELOPMENT

- NOTE: INFORMATION CONTAINED HEREIN APPLIES TO ALL CONTRACTORS AND OTHER PARTIES PERFORMING WORK ON THIS PROJECT.
- SITE INFORMATION FOR THIS PROPERTY HAS BEEN COLLECTED USING SURVEYING EQUIPMENT, ONLINE AND SOIL CONSERVATION SERVICE REFERENCE MATERIAL, AND A VISUAL INSPECTION OF THE SITE.
- THE SITE IS CURRENTLY COVERED WITH SCRUB BRUSH, TREES AND COVER GRASSES
- NO DATA IS AVAILABLE TO DETERMINE EXISTING RUNOFF WATER QUALITY.
- THE EXISTING SITE DRAINS TO A WATERWAYS AT THE EAST AND NORTH SIDES OF THE PROPERTY
- THE SITE IS WELL DRAINED

THIS PROJECT WILL INCLUDE:
- GRADING, CLEARING & GRUBBING
- SHELTER CONSTRUCTION
- SHOOTING RANGE SIGNS AND SUPPORTS
- CONSTRUCTION ACTIVITIES WILL COMMENCE IN FALL 2017
- CONSTRUCTION PLANS HAVE BEEN DEVELOPED AND ARE AVAILABLE AT THE JOB TRAILER
- TOTAL SITE AREA IS APPROXIMATELY 25 ACRES.
- THE DISTURBED AREA WILL INCLUDE APPROXIMATELY 14 ACRES
- EXISTING AVERAGE RUNOFF COEFFICIENT IS .25 IN ALL AREAS
- THE POST DEVELOPMENT AVERAGE COEFFICIENT WILL BE 0.25

2. CONTROLS

CONSTRUCTION SEQUENCE:
- PREPARE CONSTRUCTION ENTRANCE
- STRIP & STOCKPILE TOPSOIL
- PERFORM CUT/FILL GRADING
- PLACE TOPSOIL & SEED
- CONSTRUCT PARKING LOT AND GRAVEL ENTRANCE
- CONSTRUCT SHOOTING SHELTER
- CLEANUP

STABILIZATION PRACTICES:
- AREAS NOT SUBJECT TO CONSTRUCTION ACTIVITY FOR 21 DAYS OR MORE SHALL HAVE STABILIZING MEASURES WITHIN 14 DAYS AFTER CONSTRUCTION HAS CEASED
- TEMPORARY SEEDING SHALL BE APPLIED TO AREAS REQUIRING STABILIZATION
- SEEDING SHALL BE IMPROVED BY USE OF ROLLED EROSION CONTROL PRODUCTS AND TURF REINFORCEMENT MATS
- FINAL SEEDING BY COUNTY CONTRACTOR
- AS AREAS REACH THEIR COMPLETION, ADDITIONAL SILT FENCES, SILT BASINS, INTERCEPTING DITCHES, SOD FLUMES, LETDOWNS, AND EARTH DIKES SHALL BE INSTALLED AS SPECIFIED IN THE PLANS AND OR AS REQUIRED BY THE PROJECT ENGINEER. INSTALLATION AND MAINTENANCE OF DEVICES SHALL BE IN ACCORDANCE WITH IOWA SUDAS SECTION 9.

STRUCTURAL PRACTICES:
- DUE TO THE NATURE OF CONSTRUCTION AND SANDY SOILS, EXTERIOR SILT FENCING IS NOT REQUIRED. TEMPORARY BERMS MAY BE NEEDED TO PREVENT RUNOFF IF SITE CONDITIONS OR CONSTRUCTION DO NOT MEET EXPECTATIONS
- ADDITIONAL STRUCTURAL PRACTICES SHALL BE IMPLEMENTED AS NEEDED THROUGHOUT THE PROJECT LIFE.

STORMWATER MANAGEMENT:
- THE SITE HAS BEEN EXEMPTED FROM STORMWATER MANAGEMENT REGULATIONS
- EXISTING AND PROPOSED STORMWATER MANAGEMENT FEATURES SHALL BE PROTECTED FROM SEDIMENTATION AND CLEANED UPON COMPLETION OF PROJECT

OTHER CONTROLS:
- CONTRACTORS SHALL DISPOSE OF RUBBLE, REMOVED UTILITY EQUIPMENT, CONSTRUCTION MATERIALS ETC IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REQUIREMENTS
- HAZARDOUS MATERIALS SHALL BE STORED IN ACCORDANCE WITH APPLICABLE LAWS
- AREAS NOT INCLUDED IN THIS SWPPP SHALL NOT BE DISTURBED
- ACCESS TO SITE SHALL BE LIMITED TO CLEARLY DESIGNATED AREAS AND STABILIZED CONSTRUCTION ENTRANCES SHALL BE CONSTRUCTED WHERE NECESSARY TO PREVENT SEDIMENTS FROM LEAVING THE SITE
- WASTE DISPOSAL FROM THE CONSTRUCTION SITE SHALL INCLUDE DISPOSAL OF RUBBLE (IF ANY IS FOUND) AND PROPER DISPOSAL OF CONSTRUCTION WASTE.
- SANITARY WASTES GENERATED ON SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH STATE OR LOCAL REQUIREMENTS.
- DUST CONTROL SHALL BE IMPLEMENTED ON THE SITE BY APPLICATION OF WATER. THE SITE OWNER IS TO ENSURE THAT TRUCKS ENTERING AND EXITING THE SITE ARE NOT TRACKING DEBRIS ONTO EXISTING ROADWAYS. THE CONTRACTOR SHALL IMMEDIATELY REMOVE ANY DEBRIS THAT IS TRACKED ONTO ADJACENT ROADWAYS.
- NON-STORM WATER DISCHARGES SHALL BE PROHIBITED FROM LEAVING THE SITE. THE CONTRACTOR IS TO MAKE SURE THAT EQUIPMENT LEAKS, SPILLS AND ANY OTHER POLLUTANTS ARE KEPT FROM LEAVING THE SITE AND THAT THEY ARE CONTAINED AND PREVENTED FROM CONTAMINATING THE SITE FURTHER.
- ADDITIONAL CONTROLS MAY BE ADDED AS NECESSARY TO COMPLY WITH THE NPDES PERMIT. AMENDMENTS SHOULD BE ATTACHED TO THIS DOCUMENT.
- CONTROLS THAT ARE IDENTIFIED SHALL EACH BE INSTALLED ACCORDING TO THE MOST CURRENT VERSION OF THE IOWA STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS).
- COUNTY ROAD SHALL BE MAINTAINED AND BE KEPT FREE OF MUD, RUTS & DEBRIS

STATE AND LOCAL REQUIREMENTS:
- AN NPDES GENERAL PERMIT NO. 2 HAS BEEN FILED WITH THE STATE OF IOWA ALL CONTRACTORS ARE REQUIRED TO SIGN AND FOLLOW THE REQUIREMENTS OF THIS PLAN

3. MAINTENANCE

- ONGOING MAINTENANCE:
  - SEDIMENT CONTROL DEVICES SHALL BE CLEANED AND SEDIMENTS REMOVED AFTER 50% OF UTILITY HAS BEEN REACHED
  - TEARS OR BREACHES IN EROSION CONTROL MEASURES SHALL BE REPAIRED AS NEEDED
  - KEEP COUNTY ROAD FREE OF DEBRIS, MUD & RUTS
- END OF PROJECT MAINTENANCE:
  - AT THE END OF CONSTRUCTION ALL PERMANENT SEDIMENT AND EROSION CONTROL DEVICES SHALL BE CLEANED
  - TEMPORARY CONTROL DEVICES SUCH AS SILT FENCES SHALL BE REMOVED AND DISPOSED OF PROPERLY
  - ALL PAVEMENTS ON Y AND CITY PROPERTY SHALL BE SWEPT

4. INSPECTIONS

- INSPECTIONS ARE REQUIRED ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HRS OF THE END OF A RAIN STORM OF 1.2 INCH OR GREAT
- INSPECTIONS SHALL INCLUDE THE FOLLOWING:
  - INSPECT DISTURBED AREAS AND AREAS USED FOR STORAGE OF MATERIALS FOR EVIDENCE OF POLLUTANTS LEAVING THE SITE AND OR ENTERING THE DRAINAGE SYSTEM.
  - INSPECT EROSION AND SEDIMENT CONTROL MEASURES IDENTIFIED IN THE SWPPP TO ENSURE THEY ARE FUNCTIONING CORRECTLY
  - INSPECT DISCHARGE LOCATIONS TO ASCERTAIN IF THE CURRENT CONTROL MEASURES ARE EFFECTIVE IN PREVENTING SIGNIFICANT IMPACTS TO THE RECEIVING WATERS
  - INSPECT LOCATIONS WHERE VEHICLES ENTER/EXIT THE CONSTRUCTION SITE FOR SIGNS OF SEDIMENT TRACKING
  - PREPARE AN INSPECTION REPORT THAT LISTS THE DATE, THE NAME OF THE INSPECTOR, AND THE INSPECTOR'S QUALIFICATIONS. THE REPORT MUST SUMMARIZE THE INSPECTION AND NOTE ANY MAINTENANCE OF THE CONTROLS OR CHANGES TO THE SWPPP THAT ARE REQUIRED
  - IMPLEMENT REQUIRED MAINTENANCE OR CHANGES TO THE SWPPP IDENTIFIED DURING THE INSPECTION WITHIN SEVEN CALENDAR DAYS FOLLOWING THE INSPECTION.

5. NON-STORMWATER DISCHARGES

- VARIOUS NON-STORMWATER RELATED FLOWS ARE ALLOWED TO BE DISCHARGED INTO THE STORMWATER SYSTEM, PROVIDED THAT THEY ARE NOT CONTAMINATED BY DETERGENTS OR SPILLS/LEAKS OF TOXIC/HAZARDOUS MATERIALS. ALLOWABLE NON-STORMWATER DISCHARGES INCLUDE FLOWS FROM FIRE HYDRANT AND POTABLE WATERLINE FLUSHING, VEHICLE WASHING, EXTERNAL BUILDING WASH DOWN, PAVEMENT WASH WATER, AIR CONDITIONING CONDENSATE, SPRINGS, AND FOOTING DRAINS. WHEN THERE IS A POSSIBILITY FOR THESE TYPES OF DISCHARGES ON THE SITE, THEY MUST BE IDENTIFIED IN THE SWPPP AND INCLUDE A DESCRIPTION OF THE MEASURES THAT WILL BE IMPLEMENTED TO PREVENT THESE FLOWS FROM BECOMING CONTAMINATED BY HAZARDOUS MATERIALS OR SEDIMENT.

6. ADDITIONAL NOTES

- ANY HAZARDOUS CONDITIONS THAT OCCUR ON THE SITE SHOULD BE RECORDED. THE SITE ENGINEER SHALL BE CONTACTED IMMEDIATELY TO DETERMINE THE BEST COURSE OF MITIGATION FOR THESE ISSUES. THE POLLUTION PREVENTION PLAN WILL THEN BE UPDATED ACCORDINGLY.
- THE POLLUTION PREVENTION PLAN MUST BE LOCATED ON SITE AND AVAILABLE UPON DEMAND DURING WORKING HOURS.
- RETENTION OF THESE RECORDS, INCLUDING THIS PLAN, REPORTS REQUIRED BY THE PERMIT, AND DATA USED TO COMPLETE THE NOTICE OF INTENT SHALL BE RETAINED FOR 3 YEARS AFTER THE COMPLETION OF FINAL SITE STABILIZATION.
- THIS PLAN AND ASSOCIATED RECORDS MUST BE MADE AVAILABLE TO THE IOWA DEPARTMENT OF NATURAL RESOURCES UPON REQUEST
- UPDATES TO THE PLAN WILL BE MADE WHENEVER CHANGES OCCUR.

7. CERTIFICATION AND NOTIFICATION

- CERTIFICATION STATEMENT:

I CERTIFY UNDER PENALTY OF LAW THAT I UNDERSTAND THE TERMS AND CONDITIONS OF THE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT THAT AUTHORIZES THE STORM WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY FROM THE CONSTRUCTION SITE AS PART OF THIS CERTIFICATION. FURTHER, BY MY SIGNATURE, I UNDERSTAND THAT I AM BECOMING A CO-PERMITTEE, ALONG WITH THE OWNER(S) AND OTHER CONTRACTORS AND SUBCONTRACTORS SIGNING SUCH CERTIFICATIONS, TO THE IOWA DEPARTMENT OF NATURAL RESOURCES NPDES GENERAL PERMIT NO. 2 FOR "STORM WATER DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY FOR CONSTRUCTION ACTIVITIES" AT THE IDENTIFIED SITE. AS A CO-PERMITTEE, I UNDERSTAND THAT I, AND MY COMPANY, ARE LEGALLY REQUIRED UNDER THE CLEAN WATER ACT AND THE CODE OF IOWA, TO ENSURE COMPLIANCE WITH THE TERMS AND CONDITIONS OF THE STORM WATER POLLUTION PREVENTION PLAN DEVELOPED UNDER THIS NPDES PERMIT AND THE TERMS AND CONDITIONS OF THIS NPDES PERMIT.

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

THIS CERTIFICATION MUST INCLUDE THE NAME AND TITLE OF THE PERSON PROVIDING THE SIGNATURE; THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE CONTRACTING FIRM; THE ADDRESS (OR OTHER IDENTIFYING DESCRIPTION) OF THE SITE; AND THE DATE THE CERTIFICATION IS MADE.

SEE ATTACHED SIGNATURE PAGE BELOW

SITE OWNER ADDRESS:

MUSCATINE COUNTY CONSERVATION BOARD
3300 CEDAR STREET
MUSCATINE, IA 52761

NOTICE OF INTENT HAS BEEN SUBMITTED FOR THIS PROJECT.

PROJECT MANAGER:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

CONTRACTOR:_____DATE:_____

8. FINAL STABILIZATION AND NOTICE OF DISCONTINUATION

- FINAL STABILIZATION IS DEFINED IN THE GENERAL PERMIT AS MEANING THAT ALL SOIL DISTURBING ACTIVITIES AT THE SITE HAVE BEEN COMPLETED, AND THAT A UNIFORM PERENNIAL VEGETATIVE COVER FOR UNPAVED AREAS NOT COVERED BY PERMANENT STRUCTURES HAS BEEN ESTABLISHED OR EQUIVALENT PERMANENT STABILIZATION MEASURES (SUCH AS THE USE OF RIP RAP, GABIONS, OR GEOTEXTILES) HAVE BEEN EMPLOYED.
- A STORM WATER DISCHARGE THAT IS COVERED UNDER THE GENERAL PERMIT IS REQUIRED TO NOTIFY THE IOWA DNR THAT THE DISCHARGE HAS BEEN DISCONTINUED AND THAT THE DISCHARGE IS NO LONGER SUBJECT TO THE NPDES PERMITTING REQUIREMENTS. FOR CONSTRUCTION ACTIVITIES, THIS MEANS THAT THE FINAL STABILIZATION HAS BEEN REACHED. THIS NOTIFICATION IS MADE BY PROVIDING THE IDNR WITH A NOTICE OF DISCONTINUATION. WITHIN 30 DAYS AFTER FINAL STABILIZATION HAS BEEN REACHED THE OWNER OR GENERAL CONTRACTOR MUST SUBMIT THE NOTICE OF DISCONTINUATION TO THE IDNR. INFORMATION TO BE INCLUDED ON THE NOTICE OF DISCONTINUATION INCLUDES THE FOLLOWING:

  THE NAME OF THE OWNER OR OPERATOR TO WHICH THE COVERAGE UNDER THE GENERAL PERMIT WAS ISSUED

  THE GENERAL PERMIT NUMBER AND THE PERMIT AUTHORIZATION NUMBER

  THE DATE THE CONSTRUCTION SITE REACHED FINAL STABILIZATION

  A SIGNED CERTIFICATION

  NOTICE OF DISCONTINUATION SHOULD BE MAILED TO THE FOLLOWING ADDRESS:

  STORM WATER COORDINATOR
  IOWA DEPARTMENT OF NATURAL RESOURCES
  502 E. 9TH STREET
  DES MOINES, IOWA 50319-0034

  A FORM FOR THE NOTICE OF DISCONTINUATION HAS BEEN INCLUDED AT THE END OF THIS PLAN.

  A COPY OF NPDES GENERAL PERMIT NO. 2 IS ATTACHED TO THE PROJECT SPECIFICATIONS

NO.	REVISIONS	INITIALS	DATE
	DRAWN BY: AHS		
	APPROVED:		

Martin & Whitacre Surveyors & Engineers, Inc.
P.O. BOX 413 MUSCATINE, IOWA
PHONE (563) 263-7691 EMAIL info@martin-whitacre.com

MCCB
MUSCATINE COUNTY
PIKE RUN SHOOTING RANGE
SWPPP
PROJECT NO. 8151.17

DWG:8151-BASE.DWG
DATE REVIEW

SHEET
S.01