Lawsuit Against Patrick Jones' Gun Range Set for Court Tuesday, January 14

The Lawsuit:

The Anderson/Millville residents' lawsuit against Shasta County, Shasta County Board of Supervisors, and Patrick Jones is set for trial on January 14, 2025 at 9 AM in the California Superior Court for Shasta County, Department 63. Anderson/Millville residents filed suit on November 21, 2023 because they believe the High Plains Shooting Sports Center on Millville Plains proposed by Patrick Jones and approved by Shasta County and the Shasta County Board of Supervisors will have significant environmental impacts to biological resources, water quality, noise, public safety, and wildfire.[1]

Anderson/Millville Residents Argument Against the Proposed Shooting Complex:

The Proposed Outdoor Shooting Complex on Millville Plains Fails to Satisfy the California Environmental Quality Act, and Presents a Clear Public Safety Hazard Due to Increased Risk of Wildfires and Errant Rifle Shot Fall
by: Edward B. Wilkes, Millville, CA. January 9, 2025

Executive Summary

No Environmental Impact Report

- The Biological Review and other reports prepared for the project and relied upon by Shasta County minimized the Shooting Complex's (hereafter, the "Project") significant impacts to biological resources, water quality, noise, public safety, and wildfire. "As the County failed to provide an environmental impact report ("EIR"), the County's approval of the Project constitutes a prejudicial abuse of discretion and is contrary to law."[2] See the comments by experts on impacts to biological resources on our website, www.stopmillvillegunrange.com.

Increased Risk of Wildfire

- 284 shooting-caused wildfires in California 2012-2022
- 753 shooting-caused wildfires in 11 western states 1992-2018
- steel core/jacketed, solid copper bullets are the primary cause of gun range wildfires
- steel core/jacketed ammunition not allowed on Dillman Outdoor Range (Lincoln, CA)
- lead ammunition less likely to cause fires, but is prohibited on proposed gun range
- errant rifle bullets have potential to impact gasoline tanker trucks and propane delivery trucks
- PG&E 500,000 volt transmission lines - in direct line of fire of 60 rifle firing positions
- Bascom Fire, 6/23/2018, in vicinity of proposed gun range, burned 328 acres and took 195 days to put out

Errant rifle shot fall a clear public safety hazard for residents and motorists on CA Highway 44

- 10 of the most common rifle/ammunition combinations can reach CA Highway 44, with 5,500 vehicles per day traveling this area
- 97 homes and businesses within range of 60 rifle firing positions on proposed gun range
- Any large-caliber rifle bullet that travels outside the proposed shooting complex will have sufficient velocity to penetrate the human skull when it falls to earth.
- To build a backstop berm for the 600-yard rifle range high enough to meet the "Best Practices" espoused by Patrick Jones would require 1,022,210 dump truck loads of dirt and would take 58.3 years to construct. Clearly, this is why as a Best Practice, rifle ranges are sited with either: the rifle firing positions located far enough so that the maximum range of any ammunition to be used on the shooting complex would not reach any homes, businesses, or traffic; or a mountain as a backstop.

[1] Shasta County Superior Court Case #23CV-0203713

[2] Petitioner's Opening Brief filed Oct. 21, 2024, page 8; Shasta County Superior Court Case #23CV-0203713

Wildfire Danger

1. Bullets and resulting ricochets have significant potential to start wildfires.
   a. Wildfires starting at gun ranges was brought up at the Shasta County Board of Supervisors Meeting: "Today, as of right now, we have not had a fire out at the gun range this year, which is abnormal."[3] (Fire Chief O'Hara)
   b. There were 284 shooting-caused fires in California from 2012 to 2022 with 26,069 acres burned.[4] There have been 753 wildfires reported in the 11 western states caused by shooting at inert targets from 1992-2018.[5] "While previously disputed as a plausible ignition source, civilian firearms use has emerged as a wildfire cause of concern in the United States (US)."[6]
   c. Steel or solid copper bullets are recognized as a primary source of gun range-caused fires: "civilian firearms use and commercial ammunition … revealed some physical mechanisms for ignition … vegetation may ignite from steel or solid copper bullets from modern rifles after fragmenting against a hard target such as steel or rock…Traditional rifle bullets for hunting are made of lead with copper jackets and are much less likely to cause ignitions than those made with steel.[7] However, lead ammunition is prohibited by Shasta County on the proposed gun range.[8]
   d. Steel core and steel jacket ammunition is no longer allowed on the Dillman Outdoor Range (in Lincoln, California) due to dry vegetation. They follow a strict protocol to remove spent lead bullets from the environment before they can oxidize and form hazardous waste.[9] It should be noted that the topography of the Dillman Range (dry grassland, no wetland areas) is significantly different from the proposed gun range on Millville Plains, with wetlands/vernal pools and the Bear Creek drainage. The EPA highly regulates lead ammunition at gun ranges: "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…. where the shotfall zone impacts water or wetland areas. The potential environmental and human health risks are greater at these ranges."[10] Also California Assembly Bill 711, passed in 2013 and fully implemented in 2019, prohibits hunting of all wildlife using lead ammunition, and states: "Fifty years of research has shown that the presence of lead in the environment poses an ongoing threat to the health of the general public and the viability of the state's wildlife species, including federally listed threatened and endangered species." As a result, lead ammunition is prohibited, and only steel core and copper/steel jacket ammunition is allowed on the proposed Millville Plains gun range, significantly increasing the risk of wildfires.
2. Bullets impacting electrical components have the potential to start wildfires.
   a. The increased risk of wildfire caused by errant rifle bullets impacting electrical components was recognized by the engineering firm designing the range in May of 2020: "Impact areas: …Protect all electrical outlets and fixtures from stray shots or ricochets."[11] However, 500,000 volt transmission lines cross directly into the errant shotfall zone of the three rifle ranges, where 60 people could be shooting at the same time: this issue has been forwarded to PG&E Corporate Security[12]. A hunter's stray rifle bullet brought down a power line sparking a brush fire in Bern Township, Pennsylvania, on Dec. 3, 2013.[13]

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[3] Fire Chief O'Hara, speaking at Board of Supervisors Meeting 10/24/23 concerning the BLM range in Keswick. From Transcript of meeting, Administrative Record page #01402; Shasta County Superior Court Case #23CV-0203713

[4] CalFire Wildfire Redbooks. Website www.fire.ca.gov

[5] *Fire Safety Journal; Agency records of wildfires caused by firearms in the United States*. Karen C. Short and Mark A. Finney. USDA Forest Service. 2021. Available online 28 May 2022. https://doi.org/10.1016/j.firesaf.2022.103622

[6] Ibid

[7] Ibid

[8] Ordinance No. 378-2074, Shasta County Board of Supervisors; passed (3 ayes, 1 no) October 24, 2023; Section 4.E.3.t.vi

[9] www.lincolnrifleclub.com; website and Facebook page; 8/26/2024

[10] EPA Best Management Practices for Lead at Outdoors Shooting Ranges; EPA-902-B-01-001, June 2005, p. 1-2 & 1-6

[11] Fuels & Vegetation Management Plan High Plains Shooting Sports Center, Butler Engineering Group, Inc., Redding CA. May 11, 2020

[12] Email from PG&E to Edward B. Wilkes, July 12, 2024 10:05 AM.

[13] www.wfmz.com/news. WFMZ TV. Television Channel 69 News. December 3, 2013.

3. The Bascom Fire, which started in the immediate vicinity of the proposed shooting complex on June 23, 2018, burned 328 acres and was not contained until January 4, 2019: 195 days later.[14]
4. Bullets impacting vehicles, particularly gasoline tanker trucks and propane delivery trucks, have significant potential to start wildfires, especially if the impact causes the vehicle to overturn and crash (e.g.: gasoline tanker truck crashes causing fires: I-95 in Philadelphia, June 11, 2023; I-95 in Connecticut, May 2, 2024; I-55 in Memphis, Oct. 17, 2024; propane truck crash causing fire: Gridley, CA, Nov. 30, 2020).
   a. California State Highway 44 is within range of at least 10 of the most common and popular rifle/ammunition combinations that could be used on the three rifle ranges, where 60 shooters could be firing at the same time. (See following section "Rifle Shot Fall Danger")

Rifle Shot Fall Danger

5. Maximum Range of Popular Ammunition and Large Caliber Rifles

The following is a partial list of current ammunition with a maximum range capable of reaching California Highway 44 (a distance of 5,233 yards from the 60 rifle firing positions) and many homes and businesses. The NRA defines maximum range as the "Approximate maximum distance a bullet will travel to point of first impact with the ground at standard conditions with the muzzle elevated between 28 and 34 degrees.[15] The *NRA Firearms Sourcebook* lists standard and magnum rifle caliber ammunition, and states "Note that some military ammunition, special sporting ammunition and handloads may have greater flight distances than those listed.[16]

   a. .300 Winchester Magnum. "Americans simply love .300 Magnums, and among the lineup, the .300 Winchester Magnum has become the most popular choice."[17]
      i) .300 Winchester Magnum 220 grain Sierra Match King has a maximum range of 6,994 yards[18]
      ii) .300 Winchester Magnum 190 grain Sierra Match King has a maximum range of 6,577 yards.[19]
      iii) .300 Winchester Magnum 180 grain commercial load has a maximum range of 5,312 yards[20]
   b. The following commercial rifle ammunition is listed in the *NRA Firearms Sourcebook* with maximum range shown:[21]
      i) .338 Lapua Magnum, 250 grain: 7,000 yards
      ii) 7 mm Remington Magnum, 165 grain: 6,951 yards
      iii) .300 Remington SAUM (Short Action Ultra Magnum), 190 grain: 5,800 yards
      iv) .300 Weatherby Magnum, 180 grain: 5,800 yards
      v) .300 WSM (Winchester Short Magnum), 180 grain: 5,700 yards
      vi) .257 Weatherby Magnum, 115 grain: 5,400 yards
      vii) .270 WSM (Winchester Short Magnum), 130 grain: 5,300 yards
   c. .30-06. "…the 1906 design has certainly been getting it done in the hunting fields for well over a century."[22] Maximum range for the 200 grain bullet: 6,190 yards[23]
   d. 450 Marlin. The .450 Marlin is listed by the NRA as having a maximum range of 7,000 yards.[24]

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[14] www.fire.ca.gov/incidents/2018/6/23/bascom-fire; and Redding Record Searchlight, June 23, 2018.

[15] *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting.* Michael E. Bussard and Stanton L. Wormley, Jr. 2006. Page 26. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.

[16] Ibid.

[17] "Top 5 All-Around North American Big-Game Cartridges;" Phillip Massaro, *NRA American Hunter*, posted on November 8, 2021, AmericanHunter.org. National Rifle Association, 11250 Waples Mill Road, Fairfax, VA 22030.

[18] Ammunition available by hand load or on line ($87/20). Maximum range from *Range Safety*, USA 385-63

[19] Ibid.

[20] *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting*. Michael E. Bussard and Stanton L. Wormley, Jr. 2006. Page 28. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.

[21] Ibid

[22] "Top 5 All-Around North American Big-Game Cartridges;" Phillip Massaro, *NRA American Hunter*, posted on November 8, 2021, AmericanHunter.org. National Rifle Association, 11250 Waples Mill Road, Fairfax, VA 22030.

[23] *NRA Firearms Sourcebook*. 2006. Page 27

[24] "Gun Safety: Ammunition Maximum Range", by NRA Staff, posted on November 7, 2019

6. Ineffectiveness of the proposed downrange backstops
   a. The NRA Staff state "A bullet from an errant shot or a miss may fly several miles before it impacts the earth. A knowledge of maximum range (as well as what lies beyond the target area) can help a shooter assess whether it is or is not safe to fire." [25]
   b. Berms alone cannot keep all rifle bullets within the defined area of an open range, no matter how high the berm, or backstop. The proposed shooting complex has four rifle ranges: a 300-yard, 500-yard, 600-yard and a 1,000-yard range. Each range is designed with a dirt backstop 100 feet long and 20 feet high, with no side berms. The 300-, 500- and 600-yard ranges have a total of 60 firing positions. "An open range, with an earth berm and no overhead baffles, is the least expensive to build of all of the containment scenarios but has the largest SDZ [Surface Danger Zone] and is the range layout most likely to have rounds leave the range proper."[26] The proposed shooting complex on Millville Plains is an open range.
   c. Patrick Jones has maintained that his gun range will be built using "Best Practices". His court filing states that the best practices can be found in the DOE [Department of Energy] Range Design Criteria.[27] Two of these best practices, if followed, would prevent or make impossible the construction of the planned shooting complex due to safety concerns from errant rifle shot:
      i. "Surface Danger Zones. SDZs should be established to contain all projectiles and debris caused by firing ammunition…The primary danger area established for the impact of all rounds extends 5° to either side of the left and right limits of fire and downrange to the maximum range of any ammunition to be used on the range."[28] (Paragraph 5 above lists some of the most common ammunition for the most popular hunting rifles in North America, any or all of which could be used on the proposed rifle ranges if constructed, thereby placing dozens of homes and over 5 miles of California State Highway 44 within the Surface Danger Zone.)
      ii. "Natural terrain such as a mountain or a hill provides an excellent backstop for firing. The terrain should be high enough to capture rounds fired at up to a maximum 15° muzzle elevation."[29] Instead of a mountain or hill, the natural terrain is essentially flat. To achieve a backstop tall enough to capture rounds fired at 15° muzzle elevation would require the following backstops, shown in Table 1 (see Addendum 1 for assumptions and calculations):

Table 1. Best Practices Backstop Height Required for Rifle Ranges to Capture Rounds at 15° Elevation

Rifle Range	Required height of backstop	Required cubic yards of dirt	Number of dump truck loads of dirt	Time to build (years)*
300-yard	238 feet	1,535,711	153,571	8.8
500-yard	390 feet	6,117,944	611,794	34.9
600-yard	467 feet	10,222,100	1,022,210	58.3

*Time to build is based on 1 dump truck load every 15 minutes, for 12 hours/day (48 truckloads per day), 7 days/week, with no holidays (one year = 365.25 days)

It is obvious that it is impossible to construct backstops to meet the Best Practices espoused by Patrick Jones.

Clearly, this is why as a Best Practice, rifle ranges are sited with either:

[25] Ibid

[26] *Environmental Management at Operating Outdoor Small Arms Firing Ranges: Technical Guidance*. Interstate Technology Regulatory Council (ITRC). 50 F Street NW, Suite 350, Washington, DC 20001. February 2005. p. 31

[27] Case No. 23CV-0203713, Patrick Jones, Real Party in Interest, Verified Answer filed August 22, 2024, paragraph 45

[28] *Range Design Criteria*. United States Department of Energy. June 2012, p. 5

[29] Ibid, p. 6

- the rifle firing positions located far enough away from homes, businesses, and traffic so that the maximum range of any ammunition to be used on the shooting complex would not reach any homes, businesses, or traffic (e.g., a desert as a background), or
- a mountain as a backstop.

7. Homes, Businesses, and Highway Within the Maximum Range
   a. There are 97 homes and businesses, and 5.5 miles of California State Highway 44 within 7,000 yards. There is a portion (650 yards long) of Highway 44 that is at a distance of 5,233 yards from the three rifle ranges, which is the closest Highway 44 is to the proposed rifle ranges.
   b. Table 2 (sorted by increasing distance) provides a list of the 97 homes and businesses within 7,000 yards of the (300-, 500- and 600-yard range) rifle firing positions. Table 3 shows the same information, sorted by address.[30]
   c. Three USGS topographic maps were combined to depict the location of the proposed shooting complex and downrange area. This can be found on our website, www.stopmillvillegunrange.com under "Danger Zone Map (11"x17" jpg) updated May 23, 2024".
   d. Averaging the Ahead AADT (Annual Average Daily Traffic) and the Back AADT on Highway 44 at Millville Plains Road, there was a traffic volume of 5,500 vehicles per day in 2017.[31] California Highway 44, as noted above, has 5.5 miles of road surface within 7,000 yards of the three rifle ranges. Likewise, 2.6 miles of Highway 44 are within 5,800 yards, or in range of eight of the popular rifle ammunition listed above. Note that this is not a complete list.

8. Danger from Falling Bullets to People, Livestock, Outdoor Propane Tanks, and High Voltage Lines
   a. "Falling bullets or gravitational bullets are the ones that move under the effect of gravity force after the muzzle force diminished….the movement of the bullets will change to downward and their velocities will be accelerated by the effect of the gravity until the air resistance drag equalizes the effect of the gravity so the bullets will reach the terminal constant velocity….bullets travelling at 200 ft/sec can penetrate the skull."[32]
   b. "Experimental results found for an upwards fired 7.62 mm bullet terminal velocity is about 90 m/s [295, or approximately 300 ft/sec]…The typical terminal velocities given in literature for spent bullets are from 300 fps to 600 fps…In many simulated cases through the launch angle region the bullet possessed the estimated minimum lethal energy 40 J [40 joules, or 29.5 ft/lbs] at the end of trajectory. The skull penetrating speed 60 m/s [197 ft/sec] was mostly clearly exceeded. A preliminary value for shooter-centered danger zone diameter obtained was found to be approximately 8 km [8,749 yards].[33]
   c. From this data we can conclude that any large-caliber rifle bullet that travels outside the proposed shooting complex will have sufficient velocity to penetrate the human skull when it falls to earth.
   d. In addition to the danger to humans (residents of homes in range, clients and staff of the Millville Veterinary Clinic, Parishioners of Millville Community Baptist Church, etc.), and in addition to danger to livestock, errant shot fall presents a significant hazard to the large (250-gallon, 500-gallon, and larger) outdoor propane tanks used by most of the rural homes and businesses within rifle range. For example, a 500-gallon propane tank has a shell thickness of 0.218 inches, and a head thickness of 0.185 inches steel[34], with exterior shut-off valve(s), a pressure reducing valve, and related tubing made of bronze and copper that could be penetrated or shorn off by an errant bullet, causing a propane leak. High voltage transmission lines also cross into the errant shot fall zone of the 300-, 500- and 600-yard rifle ranges.

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[30] Address and range data determined and measured from Shasta County Map Viewer, Geographic Information Systems (GIS) Division, shastacounty.gov; and Google Maps Imagery, ©2023 Maxar Technologies

[31] DOT.CA.GOV, 2017 Traffic Volumes: Route 44 at Millville Plains Road

[32] Abdali, H.A., et al. "Cranial Gravitational (Falling) Bullet Injuries: Point of View." Journal of Neurosciences in Rural Practice. 2018 Apr-Jun; 9(2): 278-280. From the National Institutes of Health database.

[33] Sailaranta, T., et al. "Upwards Fired Bullet Terminal Velocity." 27th International Symposium on Ballistics, Freiburg, Germany, April 22-26, 2013.

[34] The American Society of Mechanical Engineers (ASME) specification.

9. Scope of the Shooting Complex

   Note: This accounting of firing ranges and shooting positions does not include the 3 law enforcement pistol ranges (two 25-yard and one 50-yard range) within their fenced enclosure.

   a. Firing ranges and number of shooting positions

      The below table lists the firing ranges and number of firing positions for each, as shown on the Site Plan.[35]

Number and Type of Firing Ranges

Firing Range	Number of Positions
25 Yard Pistol	45
50 Yard Pistol	25
300-, 500-, and 600- Yard Rifle	60
1,000 Yard Rifle	1
Shotgun (Skeet)	21
Shotgun (Trap)	8
Total	160

<u>References for Rifle Shot Fall Danger</u>

Abdali, H.A., et al. "Cranial Gravitational (Falling) Bullet Injuries: Point of View." Journal of Neurosciences in Rural Practice. 2018 Apr-Jun; 9(2): 278-280. From the National Institutes of Health database.

The American Society of Mechanical Engineers (ASME)

DOT.CA.GOV, 2017 Traffic Volumes: Route 44 at Millville Plains Road

Environmental Management at Operating Outdoor Small Arms Firing Ranges: Technical Guidance. Interstate Technology Regulatory Council (ITRC). 50 F Street NW, Suite 350, Washington, DC 20001. February 2005.

Google Maps Imagery, ©2023 Maxar Technologies

"Gun Safety: Ammunition Maximum Range", by NRA Staff, posted on November 7, 2019

Massaro, Phillip. "Top 5 All-Around North American Big-Game Cartridges;" NRA American Hunter, posted on November 8, 2021, AmericanHunter.org. National Rifle Association, 11250 Waples Mill Road, Fairfax, VA 22030.

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Shasta County Map Viewer, Geographic Information Systems (GIS) Division, shastacounty.gov

USA 2014. "Range Safety", Pamphlet 385-63, 16 April 2014.

[35] Site Plan – Exhibit A2. High Plains Shooting Sports Center. Butler Engineering, Sheet C-1, Revision 3, 03/29/23.

Table 2. Distance in Yards from Rifle Firing Positions to Homes and Businesses (Sorted by Distance)

	Address	Yards			Address	Yards
1	7447 Leopard Dr., Anderson	1716		50	23944 Hwy. 44, Millville	5947
2	7576 Bear Creek Way, Millville	2872		51	23932 Hwy. 44, Millville	5961
3	8095 Bear Creek Way, Millville	3664		52	23906 Hwy. 44, Millville	5961
4	24423 Bascom Rd., Millville	4260		53	25213 Hwy. 44, Millville	5961
5	24289 Bascom Rd., Millville	4275		54	24400 Old 44 Dr., Millville	6107
6	23991 Bascom Rd., Millville	4398		55	25000 Hwy. 44, Millville	6121
7	24561 Hwy. 44, Millville	4427		56	25241 Hwy. 44, Millville	6129
8	24288 Bascom Rd., Millville	4580		57	23848 Springwood Way, Millville	6143
9	8563 Bear Creek Way, Millville	4711		58	25147 S. Cow Creek Rd., Millville	6165
10	8232 Tompata Trl., Millville	4944		59	24524 Quail Terrace Ln., Millville	6165
11	24495 Hwy. 44, Millville	5067		60	23863 Deer Canyon Rd., Millville	6180
12	24609 Hwy. 44, Millville	5082		61	8605 Skylight Ridge Dr., Millville	6180
13	24185 Hwy. 44, Millville	5089		62	25100 Hwy. 44, Millville	6194
14	24325 Hwy. 44, Millville	5147		63	24530 Quail Terrace Ln., Millville	6194
15	24359 Hwy. 44, Millville	5191		64	8667 Oak Terrace Ln., Millville	6209
16	24403 Hwy. 44, Millville	5220		65	23653 Millville Way, Millville (Vet)	6216
17	24771 Hwy. 44, Millville	5242		66	25279 Hwy. 44, Millville	6230
18	24253 Hwy. 44, Millville	5249		67	25149 S. Cow Creek Rd., Millville	6230
19	24237 Hwy. 44, Millville	5263		68	24444 Old 44 Dr., Millville	6238
20	24219 Hwy. 44, Millville	5271		69	25281 Hwy. 44, Millville	6252
21	24801 Hwy. 44, Millville	5373		70	24708 Gypsy Moth Rd., Millville	6252
22	25025 Hwy. 44, Millville	5416		71	24691 Gypsy Moth Rd., Millville	6252
23	24887 Hwy. 44, Millville	5416		72	25002 Hwy. 44, Millville	6281
24	8500 Forevermore Dr., Millville	5460		73	24421 Old 44 Dr., Millville	6325
25	8504 Oak Terrace Ln., Millville	5489		74	23625 Millville Way, Millville	6325
26	24991 Hwy. 44, Millville	5503		75	23780 Springwood Way, Millville	6325
27	24510 Hwy. 44, Millville	5525		76	25150 S. Cow Creek Rd., Millville	6325
28	8600 Forevermore Dr., Millville	5547		77	23900 Sunnyslope Dr., Millville	6339
29	24140 Hwy. 44, Millville	5554		78	23662 Millville Way, Millville	6347
30	8519 Oak Terrace Ln., Millville	5583		79	24018 Deer Canyon Rd., Millville	6383
31	8556 Oak Terrace Ln., Millville	5612		80	23756 Springwood Way, Millville	6419
32	8615 Oak Terrace Ln., Millville	5642		81	23634 Millville Way, Millville	6434
33	8561 Oak Terrace Ln., Millville	5692		82	23606 Millville Way, Millville	6456
34	8574 Oak Terrace Ln., Millville	5729		83	8782 Hufford Way, Millville	6470
35	24326 Hwy. 44, Millville	5743		84	8764 Hufford Way, Millville	6470
36	24880 Hwy. 44, Millville	5743		85	8754 Hufford Way, Millville	6470
37	24900 Hwy. 44, Millville	5758		86	8718 Hufford Way, Millville	6470
38	25029 Hwy. 44, Millville	5765		87	8773 Hufford Way, Millville	6470
39	25151 Hwy. 44, Millville	5794		88	23703 Springwood Way, Millville	6507
40	8575 Oak Terrace Ln., Millville	5794		89	23950 Sunnyslope Dr., Millville	6528
41	24024 Hwy. 44, Millville	5801		90	24381 Old 44 Dr., Millville	6543
42	24522 Oswego Lake Rd., Millville	5816		91	23744 Springwood Way, Millville	6543
43	25195 Hwy. 44, Millville	5867		92	23694 Springwood Way, Millville	6565
44	8600 Oak Terrace Ln., Millville	5881		93	23712 Springwood Way, Millville	6565
45	24560 Oswego Lake Rd., Millville	5889		94	23720 Springwood Way, Millville	6565
46	24998 Hwy. 44, Millville	5903		95	23736 Springwood Way, Millville	6565
47	23972 Hwy. 44, Millville	5911		96	24370 Old 44 Dr., Millville	6579
48	25117 Hwy. 44, Millville	5911		97	25313 S. Cow Creek Rd., Millville	6797
49	8558 Skylight Ridge Dr., Millville	5925				

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	Address	Yards			Address	Yards
1	23991 Bascom Rd., Millville	4398		51	25213 Hwy. 44, Millville	5961
2	24288 Bascom Rd., Millville	4580		52	25241 Hwy. 44, Millville	6129
3	24289 Bascom Rd., Millville	4275		53	25279 Hwy. 44, Millville	6230
4	24423 Bascom Rd., Millville	4260		54	25281 Hwy. 44, Millville	6252
5	7576 Bear Creek Way, Millville	2872		55	8718 Hufford Way, Millville	6470
6	8095 Bear Creek Way, Millville	3664		56	8754 Hufford Way, Millville	6470
7	8563 Bear Creek Way, Millville	4711		57	8764 Hufford Way, Millville	6470
8	25147 S. Cow Creek Rd., Millville	6165		58	8773 Hufford Way, Millville	6470
9	25149 S. Cow Creek Rd., Millville	6230		59	8782 Hufford Way, Millville	6470
10	25150 S. Cow Creek Rd., Millville	6325		60	7447 Leopard Dr., Anderson	1716
11	25313 S. Cow Creek Rd., Millville	6797		61	23606 Millville Way, Millville	6456
12	23863 Deer Canyon Rd., Millville	6180		62	23625 Millville Way, Millville	6325
13	24018 Deer Canyon Rd., Millville	6383		63	23634 Millville Way, Millville	6434
14	8500 Forevermore Dr., Millville	5460		64	23653 Millville Way, Millville (Vet)	6216
15	8600 Forevermore Dr., Millville	5547		65	23662 Millville Way, Millville	6347
16	24691 Gypsy Moth Rd., Millville	6252		66	8504 Oak Terrace Ln., Millville	5489
17	24708 Gypsy Moth Rd., Millville	6252		67	8519 Oak Terrace Ln., Millville	5583
18	23906 Hwy. 44, Millville	5961		68	8556 Oak Terrace Ln., Millville	5612
19	23932 Hwy. 44, Millville	5961		69	8561 Oak Terrace Ln., Millville	5692
20	23944 Hwy. 44, Millville	5947		70	8574 Oak Terrace Ln., Millville	5729
21	23972 Hwy. 44, Millville	5911		71	8575 Oak Terrace Ln., Millville	5794
22	24024 Hwy. 44, Millville	5801		72	8600 Oak Terrace Ln., Millville	5881
23	24140 Hwy. 44, Millville	5554		73	8615 Oak Terrace Ln., Millville	5642
24	24185 Hwy. 44, Millville	5089		74	8667 Oak Terrace Ln., Millville	6209
25	24219 Hwy. 44, Millville	5271		75	24370 Old 44 Dr., Millville	6579
26	24237 Hwy. 44, Millville	5263		76	24381 Old 44 Dr., Millville	6543
27	24253 Hwy. 44, Millville	5249		77	24400 Old 44 Dr., Millville	6107
28	24325 Hwy. 44, Millville	5147		78	24421 Old 44 Dr., Millville	6325
29	24326 Hwy. 44, Millville	5743		79	24444 Old 44 Dr., Millville	6238
30	24359 Hwy. 44, Millville	5191		80	24522 Oswego Lake Rd., Millville	5816
31	24403 Hwy. 44, Millville	5220		81	24560 Oswego Lake Rd., Millville	5889
32	24495 Hwy. 44, Millville	5067		82	24524 Quail Terrace Ln., Millville	6165
33	24510 Hwy. 44, Millville	5525		83	24530 Quail Terrace Ln., Millville	6194
34	24561 Hwy. 44, Millville	4427		84	8558 Skylight Ridge Dr., Millville	5925
35	24609 Hwy. 44, Millville	5082		85	8605 Skylight Ridge Dr., Millville	6180
36	24771 Hwy. 44, Millville	5242		86	23694 Springwood Way, Millville	6565
37	24801 Hwy. 44, Millville	5373		87	23703 Springwood Way, Millville	6507
38	24880 Hwy. 44, Millville	5743		88	23712 Springwood Way, Millville	6565
39	24887 Hwy. 44, Millville	5416		89	23720 Springwood Way, Millville	6565
40	24900 Hwy. 44, Millville	5758		90	23736 Springwood Way, Millville	6565
41	24991 Hwy. 44, Millville	5503		91	23744 Springwood Way, Millville	6543
42	24998 Hwy. 44, Millville	5903		92	23756 Springwood Way, Millville	6419
43	25000 Hwy. 44, Millville	6121		93	23780 Springwood Way, Millville	6325
44	25002 Hwy. 44, Millville	6281		94	23848 Springwood Way, Millville	6143
45	25025 Hwy. 44, Millville	5416		95	23900 Sunnyslope Dr., Millville	6339
46	25029 Hwy. 44, Millville	5765		96	23950 Sunnyslope Dr., Millville	6528
47	25100 Hwy. 44, Millville	6194		97	8232 Tompata Trl., Millville	4944
48	25117 Hwy. 44, Millville	5911				
49	25151 Hwy. 44, Millville	5794				
50	25195 Hwy. 44, Millville	5867				

Addendum 1: Rifle Range Backstop Calculations

Given: Worst case (largest bullet drop) ballistics data from manufacturers for ammunition shown in paragraph 5: bullet drop for 300-yard range = 30 inches (round to 3 feet) and for 500 yard range = 140 inches (round to 12 feet). Assume 600 yard range bullet drop of 15 feet.

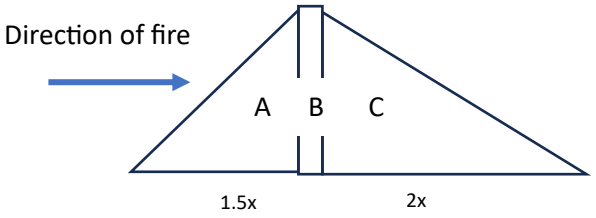
Find: 1) height of backstop for each range to capture round shot at 15° elevation

2) required cubic yards of dirt to achieve backstop, using same design as proposed by Butler Engineering for 20-foot high backstops.

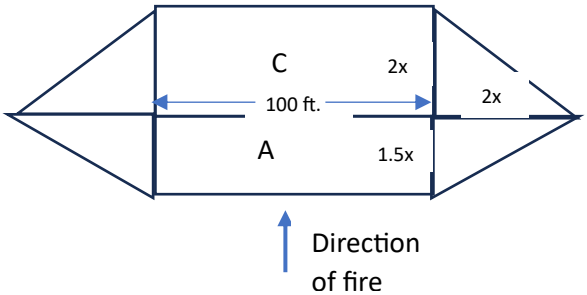
3) Number of dump truck loads of dirt to construct backstop, assuming each truck = 10 cubic yards

4) Time to build each backstop, assuming 1 dump truck load of dirt every 15 minutes, 12 hours/day (48 truckloads per day), 7 days/week, no holidays.

Side View of Backstop



Top View of Backstop



B is 4 feet wide at top

Let x = height of backstop

For 300 yard rifle range: x = (tan 15°)(900') = 241' – bullet drop of 3 feet = 238 feet

For 500-yard rifle range x = (tan 15°)(1500') = 402' – bullet drop of 12 feet = 390 feet

For 600-yard rifle range x = (tan 15°)(1800') = 482' – bullet drop of 15 feet = 467 feet

Looking at the Side View diagram above: Area of cross section of backstop:

$[(0.5)(1.5x)(x)] + 4x + [(0.5)(2x)(x)] = 0.75\ x^2 + 4x + x^2 = 1.75x^2 + 4x$

Volume of backstop ABC (not including end ramps) = $(100')(1.75x^2 + 4x)$

Looking at the Top View diagram above:

Because of the height of the backstop, the left and right ends of the backstop must also be tapered. Making the simplifying assumption that the 4' top is inconsequential, then the ends of the backstops can each be considered as ½ of a regular pyramid. Regular pyramid volume = [1/3] {area of base} [height].

Then one regular pyramid volume = $[1/3]\{[2][(0.5)(1.5x)(2x)+(0.5)(2x)(2x)]\}[x] = [1/3]\{7x^2\}[x]=(7/3)x^3$

Then volume of backstop in cubic feet = $[(100')(1.75x^2 + 4x)] + [(7/3)x^3]$

And the volume in cubic yards is of course (vol in ft^3)/27.

Substituting the height for each backstop in feet for x:

Rifle Range	Required height of backstop	Required cubic yards of dirt	Number of dump truck loads of dirt	Time to build (years)
300-yard	238 feet	1,535,711	153,571	8.8
500-yard	390 feet	6,117,944	611,794	34.9
600-yard	467 feet	10,222,100	1,022,210	58.3