

1. The Respondent incorrectly states “The typical rifle cartridge (e.g., 30-06, 30/30, etc (sic)) travels a maximum of two miles. There is no rifle cartridge that travels approximately 7,000 yards (21k feet) except perhaps a .50 caliber BMG.” Petitioner agrees that the .50 caliber BMG (Browning Machine Gun) cartridge bullet can travel 7,000 yards; indeed, the NRA Firearms Sourcebook lists the .50 BMG M2 Ball cartridge in their “Military Calibers” table as having a maximum range of 7,275 yards.¹ However, the .50 BMG was never mentioned by the Petitioners in the Administrative Record, since it is a specialized cartridge and not the typical ammunition used by sportsmen. What was mentioned in the AR was the .300 Winchester Magnum with a maximum range of between 6,994 yards (3.97 miles) and 6,577 yards (3.74 miles), depending on ammunition.² Additionally, the following typical commercial rifle ammunition is listed in the *NRA Firearms Sourcebook* with maximum range shown:³

- .338 Lapua Magnum, 250 grain: 7,000 yards (3.98 miles)
- 7 mm Remington Magnum, 165 grain: 6,951 yards (3.95 miles)
- .30-06 200 grain bullet has a maximum range of 6,190 yards (3.52 miles)
- .300 Remington SAUM (Short Action Ultra Magnum), 190 grain: 5,800 yards (3.3 miles)
- .300 Weatherby Magnum, 180 grain: 5,800 yards (3.3 miles)
- .300 WSM (Winchester Short Magnum), 180 grain: 5,700 yards (3.24 miles)
- .257 Weatherby Magnum, 115 grain: 5,400 yards (3.07 miles)
- .270 WSM (Winchester Short Magnum), 130 grain: 5,300 yards (3.01 miles)

These are not specialized cartridges, but some of the most popular: “Americans simply love .300 Magnums, and among the lineup, the .300 Winchester Magnum has become the most popular choice,” and: “...the [30-06] 1906 design has certainly been getting it done in the hunting fields for well over a century. Bullet weights run from the very light 110-grain pills ...to the long 220- and 250-grain round-nosed choices, but the most popular sit between 150 and 200 grains.”⁴

2. The Respondent compares the proposed shooting complex on Millville Plains to the Record Range and the Redding Gun Club, apparently to give the impression to the reader that because “There are no reported incidents of bullets striking vehicles [in over 50 years]” that the Millville Plains rifle range would have similar results. As noted in the AR: “The Applicant mentioned the Record Range and its proximity to California Highway 299. The Record Range is a Law Enforcement Training Facility and not open to the general public. Neophyte shooters and parents teaching their young children how to safely handle and shoot rifles would not be shooting at this range. The Applicant correctly discussed the Redding Gun Club, and its 100 yard rifle range only 0.5 miles from Deschutes Road. However, what the Applicant didn’t mention was that his proposed 300 yard rifle range has only a 20 foot high berm as a backstop, whereas the Redding Gun Club has a 110 foot high hill behind its 100 yard rifle range.”⁵ Furthermore, any rifle bullets going over the 110 foot high hill would clear Deschutes Road

¹ *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting.* Michael E. Bussard and Stanton L. Wormley, Jr. 2006. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.2006. Page 27.

² AR02965. Magnum 220 grain Sierra Match King has a maximum range of 6,994 yards; 190 grain Sierra Match King has a maximum range of 6,577 yards (Phamplet 385-63, Tables 4-17 and 4-16.)

³ *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting.* Michael E. Bussard and Stanton L. Wormley, Jr. 2006. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.2006. Pages 27-28.

⁴ “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.

⁵ AR03465.

and land in the uninhabited area to the east, whereas errant rifle bullets from the proposed shooting complex could hit many homes and businesses, in addition to California State Highway 44.⁶

3. The Respondent incorrectly states “As noted in the AR, the Project’s berms are being constructed with the highest backstops in California and greatly exceed even the ‘Best Practices’ advanced by the NRA.”
 - a. The proposed rifle range backstops are 20 feet high.⁷ These are not the highest backstops in California. As noted previously, the Redding Gun Club rifle range backstop is 110 feet high.
 - b. The statement “greatly exceed even the ‘Best Practices’ advanced by the NRA” is false and misleading. The Shasta County Staff mistakenly attributes the term “Best Practices” to the NRA as follows: “The project was designed to utilize best practices for outdoor shooting ranges which can be found in the NRA Range Source Book (2004) as well as other shooting range best practices guidebooks.”⁸
 - c. The NRA *Range Source Book* never uses the terms “Best Practices” when discussing design of rifle ranges.⁹ In fact, the NRA specifically prohibits using their Range Source Book as a design standard for gun ranges: “NOTE: The NRA Range Source Book is NOT a code book or certification standard, but rather a publication listing general suggestions. Each range is site-specific, fact-sensitive, risk-driven, and needs to be considered in that light. The National Rifle Association assumes no liability for information contained herein.”¹⁰
 - d. Because the NRA does not allow anyone to rely on their *Range Source Book* to design a rifle range, the Respondent states Best Practices can be found in the Administrative Record: “(see Best Practice in the AR pgs. 5801-6264.)”¹¹ AR06153-6268 is the DOE Range Design Criteria.¹² **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:**
 - “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.”¹³ (AR06173) Paragraph 1 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.
 - “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.”¹⁴ (AR06175) 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

⁶ AR02632

⁷ Site Plan-Exhibit A2, see “H/C-2 Typ” for 600-yard rifle range on page C-1 and corresponding “H/C-2 Typical Backstop Construction” on page C-2. AR00764, pages 25 and 26; (AR00788-AR00789)

⁸ Shasta County Staff Report, October 24, 2023, (AR00764, page 4); (AR00767)

⁹ *The Range Source Book*. National Rifle Association Range Services. 11250 Waples Mill Road, Fairfax, VA 22030. 2023. Word search conducted using electronic copy of *NRA Range Source Book*, 2023 (Flash Drive purchased from NRA website).

¹⁰ *The Range Source Book*. National Rifle Association Range Services. page 5

¹¹ Case No. 23CV-0203713, Patrick Jones, Real Party in Interest, Verified Answer filed August 22, 2024, paragraph 45

¹² *Range Design Criteria*. United States Department of Energy. June 2012 (AR06153-6268)

¹³ *Ibid.* (AR06173)

¹⁴ *Ibid.* (AR06175)

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 the Respondent.

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

- 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.

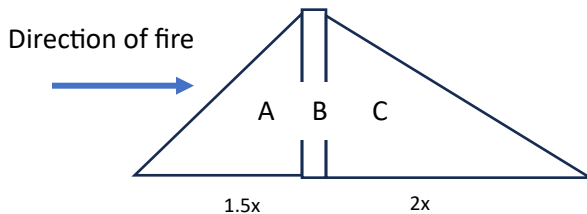
QED.

Addendum 1: Rifle Range Backstop Calculations

Given: Worst case (largest bullet drop) ballistics data from manufacturers for ammunition shown in paragraph 1: 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 (AR01675)
 - 2) required cubic yards of dirt to achieve backstop, using same design as proposed by Butler Engineering for 20-foot high backstops (AR00120).
 - 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



B is 4 feet wide at top

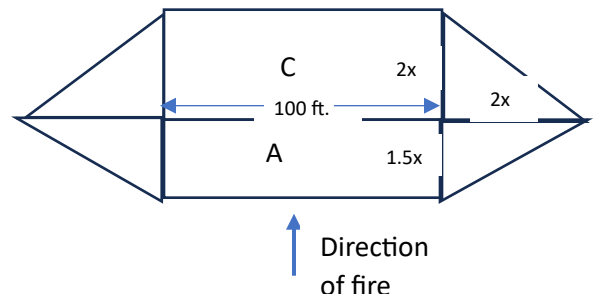
Let x = height of backstop

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

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

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

Top View of Backstop



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

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

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

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 $\frac{1}{2}$ of a regular pyramid. Regular pyramid volume = $[\frac{1}{3}] \{ \text{area of base} \} [\text{height}]$.

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

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

And the volume in cubic yards is of course $(\text{vol in ft}^3)/27$.

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

QED.