

## Wildland Apparatus Engineers "A" Challenge

Page #'s for the formulas to figuring the problem, You should have **Q-Ref ver 2.2 E4.23 or E4.24**

Branch & Division have an Assignment for you. 🤔

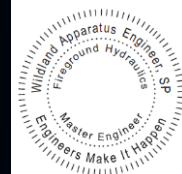
At the end of a Narrow & Single two-track mountain road, they want to set up a Helicopter Dip Site in a clearing. The water source is plentiful but the tree canopy will not allow them to get in close to dip. They want to put 4 Helicopters with 180Gal buckets at a Dip Site with 1 RDT and Pump water to the Dip Site from the bottom staging area at DP1.

There is a couple of maps of the operation with the distances & Elevations. Your job is to provide **NON STOP** operations. The Helicopters and Support Crews cannot afford to have the water supply STOP, forcing aircraft to shut down. Division has stated that there are "no more engines" available due to a Nat'l PL of 5. Division tells you to figure out a way that will get the job done with the only Resources at your disposal. They can supply you with anything else. You will have to select the right size hose preferably other than a 1 ½" trunk. The road from DP1 to DP2 is too narrow and rough for Tenders and engines to keep driving back and forth.

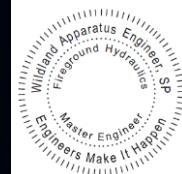
3 Type 3 Engines rated at 250GPM@150PSI, 3 Type 2 Tenders, 3,000Gal. (hose size and quantity are specified by you). You will only use a single hose line for the relay pumping operation. Your level of precision is to be the one that gets the closest answer to win! 3 separate functions are going on at the same time, which are all working in unison and interrelated. So the big clue here is knowing how to isolate and then re-sum them. **Any suggestion for V-lats is a disqualifying factor.**

You are the ENGINEER, make the plan work!

1. 4 Helicopters, (T3), 180Gal buckets. It is 1.35 Nautical Miles from "dip to drop", Round Trip time is what you'll need to determine. The T3 flies at 90 knots. What is the Helicopter Round Trip Time after adding 2min? (pg 28)
2. What are the Helicopters combined Egpm? (pg 10, 11 & 28) .
3. What is the elevation Gain from DP1 (Staging/Drafting area) at the bottom to the Dip site at DP 2?.
4. What is the relay distance from the Dip site DP2 to the Staging Area at DP1?
5. Connecting the hose to the RDT, what Np will you use? (pg 14 & 15)
6. What Hose Size is to be used, & how many gallons are required to charge the line? (pg 8, 9 & 17)



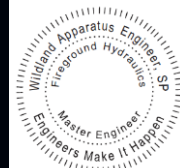
7. What is the Friction loss per 100ft for this size hose? (pg 9 & 17)
8. What hose coefficient did you use? (pg 17)
9. What is the Water Travel Time from Staging DP1 to Dip site DP2 in Minutes? ( pg 9)
10. What considerations will this force you to take? If the helicopters begin operating at the same time as the pumping operations start, how many gallons will the helicopters have pulled before the water reaches the tank? (Clue pg 9 & 10)
11. What, is the engine spacing? (pg 14)
12. What is the Sp? (Clue: NFPA rated capacity vs Psi) 100% @150psi, 70% @ 200psi, 50% @ 250psi. Also, higher PSI is **NOT** always better.
13. What is the Hp, FL and what Np will you use? (pg 8 & 9)
14. Do you have the required number of Tenders to maintain the required Egpm, if you have (3) 3000gal tenders? Tenders' travel rate is 15mph. Add 20 min for connecting & disconnect time. Assume the tenders dump their full volumes. The fill rate is assumed to be 250gpm. (pg 9 & 10)
15. How much BTU absorption capacity can the 4 helicopters provide in total? (Q-Ref)
16. What is the Effective BTU absorption when factoring in their round trip time?



Think about how this aids in your suppression efforts while using the Fire Nomograms from PMS-436-3 & S-490, if you know what the Heat per unit area is?

Engineers Challenge (A) Output Sheet.

1. Helicopter Type \_\_\_\_\_, Bucket Size, \_\_\_\_\_, # in type? \_\_\_\_\_
2. Helicopter Type \_\_\_\_\_, Bucket Size, \_\_\_\_\_, # in type? \_\_\_\_\_
3. Helicopter Type \_\_\_\_\_, Bucket Size, \_\_\_\_\_, # in type? \_\_\_\_\_
4. Helicopter Type \_\_\_\_\_, Bucket Size, \_\_\_\_\_, # in type? \_\_\_\_\_
  
5. Combined total Egpm of all Ships: \_\_\_\_\_ (Gpm Demand)
  
6. Average the helicopter combined Egpm if all ship buckets are different types and/or sizes for the operation to which it is calculated for.  $(Bgal^n + Bgal^n + Bgal^n + Bgal^n, etc.) / \text{Number of Buckets}$  ).
  
7. Maximum Point to Point Head(elevation) from Pump to Target in Feet? \_\_\_\_\_
  
8. Relay or Pumping distance in feet? \_\_\_\_\_
  
9. Trunk Line hose size diameter? \_\_\_\_\_ Gallons to charge line? \_\_\_\_\_
  
10. Friction Loss(FL) per 100ft? \_\_\_\_\_. Total FL of Hose-lay? \_\_\_\_\_, Hose Coefficient used? \_\_\_\_\_
  
11. Travel time of water through the Hose-lay? \_\_\_\_\_
  
12. Special Considerations to account during the operations with regard to the Time factor in # 11 if any? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
  
13. Engine or Pump spacing in feet? \_\_\_\_\_
  
14. Safe Pump Pressure “all” engines will pump to and meet Gpm Demand? \_\_\_\_\_
  
15. Calculated Head Psi? \_\_\_\_\_, Calculated Friction Loss? \_\_\_\_\_, Calculated Np? \_\_\_\_\_

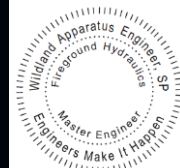


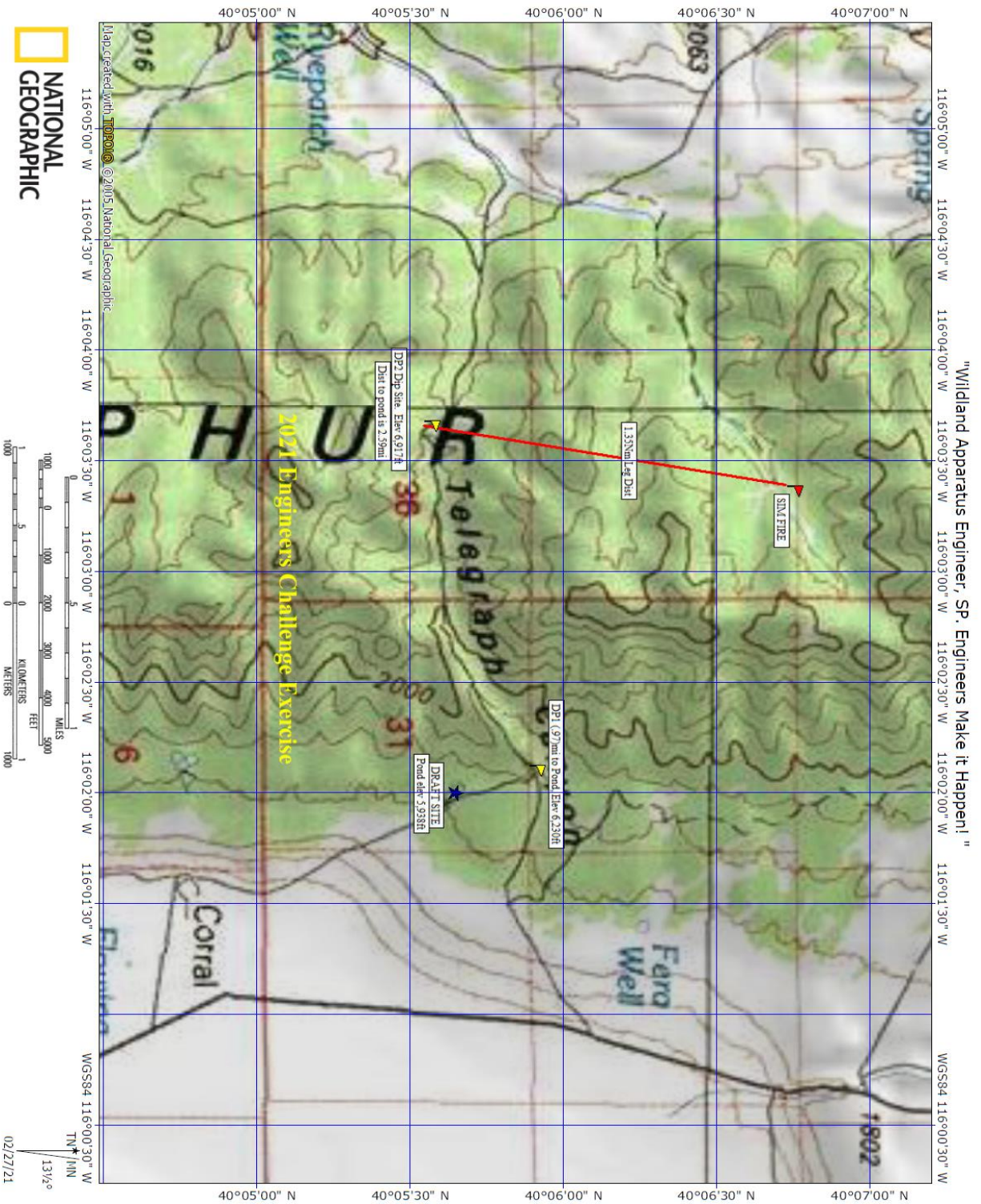
16. Do you have Required Tenders for Operation? \_\_\_\_\_

17. If not how many additional tenders are required? \_\_\_\_\_

18. Do you have correct number of engines? \_\_\_\_\_, Correct Type? \_\_\_\_\_

19. If not, how many additional Engines are required? \_\_\_\_\_





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