WUI Presentation Details:

1. First 50 minutes of First hour of Four (4) hours.
    a. Introduction:
    b. Incidents involving fire apparatus burn-overs.
        i. Three (3) to four (4) examples include firefighters' severe burn injuries and deaths that occur every year.
    c. The 10-minute video at http://HoseRoller.net
        i. 2006, Texas A & M University Fire School Dean of Students requested the copyright to instruct all internationally attending fire personnel on this revolutionary Fire Hose deployment methodology.
        ii. The demonstration fire hose can be fully deployed at 100% nozzle pressure
            1. Within seconds of need.
            2. Within feet of any hose connection discharge/apparatus
            3. With ZERO water-restrictive kinks
            4. By only one (1) firefighter (i.e., Driver/Operator)
            5. For IMMEDIATE protection from heat energy
                a. For ALL crew members
                b. Fire apparatus
                c. All immediate exposures
            6. Deployed in literally any direction to increase firefighter efficiency.
    d. Preparation (Hose pre-coiled to Minimum Inside Critical Diameter) and installation of hose load
        i. Fits in ALL 'standard' fire apparatus hose compartments 'cross-lay' and 'live-line' rear hose beds.
        ii. Fire Hose cabinet (box) load charged in seconds.
        iii. Fire Hose Bundle as the Cleveland, Gnass, etc., to replace double-donut configuration.
    e. Article published at http://Hoseroller.info
        i. Discuss article and graph components and representations
        ii. Compare the practical application of the work-to-effort ratio
        iii. Coil configuration (Garden hose technology)
            1. One thousand two hundred feet of effort produces 1,200 feet of work accomplished.
        iv. The graph proves one (1) firefighter can accomplish the work of four (4)
            1. In a fraction of the time.
            2. Only 26% effort of a 'standard' thirty (30') hose advance.
            3. In mere seconds (firefighter safety)
            4. With a minimum savings of 1/3 of the TOTAL effort at every 100' foot hose lay advance than otherwise necessary.
        v. Double Donut (traditional) - Illustrate on a chalkboard
            1. 1,800' of effort produces 1,200 feet of work accomplished.
            2. Firefighters never pull less than 50' feet
            3. Expend incredible effort to pull/drag hose uphill a SECOND TIME.
                a. Hose purposely deployed 50' feet BEHIND the start-line…
                b. …after progress has already been achieved.
    f. Procedure to advance a Fully charged hose without ever dragging an inch on the ground surface!

i. The term 'Hose Roller' as a verb to describe the methodology/advancement of a fully charged hose up to its full length.
    1. 'Right' the top coil of the stack of coiled hose to the vertical position.
    2. Hand rolling the hoop of the hose towards the nozzle.
    3. Advance around Right Angle turns.
    4. Nozzle person can advance attack nozzle effortlessly when hose coil approaches the end of the hose line.
    5. The entire loop of the hose out to its entire length.

g. Fully Charge 200' feet of 2 ½" within ten (10') feet of the back of an engine
    i. Deploy FULLY CHARGED hose up to 200' feet in any direction
    ii. Around right angle turns
    iii. Without ever dragging an inch of hose ever as Item F above.

h. Questions are welcome during the presentation for clarification.

2. BREAK for Ten (10) Minutes before the top of the hour.
3. Second Hour of Four (4) – Applied Wildland Hydraulics – Part 1
    a. Basic Hydraulics defined, laws of physics, Occupational Safety, and Health
        i. Internationally researched since 1745
        ii. Henry-Weisbach's formula of 1903
        iii. ''Moody Chart'' of 1944 to establish Mean-Average Coefficient (10,000 tests)
        iv. NFPA 1002 – Chapter 8 – Wildland Fire Apparatus Driver/Operator requirements.
            1. Defined - Every driver/operator shall demonstrate the requisite knowledge of Friction Loss calculation formulas and estimation procedures to…
            2. Produce enough pump pressure to ''produce an effective fire stream at the rated flow of the nozzle.''
        v. NFPA 1041 – Instructional requirements (methodologies & procedures)
            1. Defined - Firefighters shall be trained properly and in a manner not to endanger them.
        vi. OSHA General Duty Clause 5(a) – Every employer shall provide a workplace free of imminent danger, injury, or death. Including a workplace free of harassment.
        vii. OSHA 29 CFR 1910.156 (C)(1) & (C)(2)
            1. Defined - Firefighters shall be trained properly and in a manner not to endanger them.
        viii. USDA Forest Service San Dimas Technology and Development Center – Tech Tips will be a handout as reference WHY the need to RETEST all hose diameters in 2006; a full 62 years after the Moody Chart in 1944.
            1. 1 ½" hose discovered Coefficient at 35 (not 24) at a 46% ERROR!
            2. 1" hose discovered Coefficient at 250 (not 150) at a 67% ERROR!
    b. Wildland Fire Hydraulics – with 1" Overhaul laterals every 200' operated by support personnel to prevent a potential 'Slop-Over' ***[ESCAPE!!!]*** over the fire line.
        i. 'Standard' hose lay configuration (Single Attack/Supply line)
            1. Apparatus necessary every 200' feet.
                a. Water Theif/Tee
                b. 100' of 1" wildland hose
                c. 10/23 GPM 1" nozzle
            2. Limitations (maximum length at 700' on a 32% grade) at 60 GPM

3. Limitations (maximum length at 600' on a 32% grade) at 75 GPM

ii. 'HENway' hose lay configuration (DUAL Attack/Supply line)

1. Apparatus necessary at 200' feet and 400' feet and 800 and 1,200 feet.
    a. Water Theif/Tee
    b. 100' of 1" wildland hose
    c. 10/23 GPM 1" nozzle
2. Apparatus ('HENWAY) at 600' feet, 1,000' feet, and 1,400' feet
    a. Two Double Females
    b. Inverted Gated Wye
    c. Double Male
    d. Water Theif/Tee
    e. Gated Wye
3. A hose lay (maximum length) at 60 GPM extends an additional 400' feet and 50% farther from 800 feet to 1,200 feet on a 32% grade.
4. A hose lay (maximum length) at 75 GPM extends from the maximum of 600' feet an additional 500' feet (83%) to 1,100 feet on a 32% grade.

c. The most significant HENWAY breakthroughs:

i. A second ATTACK nozzle can be immediately attached to the secondary SUPPLY line at nearly any point near to immediately intervene an ESCAPE.

ii. This is achieved through firefighter coordination by isolating and 'making and breaking' and extending the Secondary Supply line as an ATTACK line.

iii. All other nozzle operations are suspended

iv. 75 GPM is 1,066% MORE EFFECTIVE than a 23 GPM lateral to knock down an ESCAPE!

v. A first in Wildland Firefighting procedures to implemented as recommended for decades from countless references to reduce the Friction Loss component as much as 75%

1. ½ * ½ = ¼ the Friction Loss (FL) significantly INCREASES water flow at much greater distances.

d. Questions are encouraged at any point during this session.

e. Ten (10) Minute Break until the top of the hour

4. Third Hour of Four (4) – Applied Wildland Hydraulics – Part 2

a. History, development, and use of Hydraulics App

i. Android version

ii. Apple (iOS) version

iii. Only two (2) variables required

1. Length of the hose lay
2. Estimated Elevation in (+) or (-) HEAD

b. Students instructed to go to http://HydraulicsApp.com

i. Enter coupon code for FREE download (included with course attendance)

ii. Students 'Opens' app.

iii. Students execute 'ATTACK' mode procedures to obtain simulated Engine Pressures (EP) in 'ATTACK' mode.

1. Begin at 'Standard' (single supply/attack line) hose lay configuration mode in which BOTTOM LEFT square icon is BLUE.
2. Select 'OPTIONS'
3. Scroll hose lay 'LENGTH' number ticker to 800'

4. Scroll estimated 'ELEVATION' number ticker in PLUS (+) or MINUS (-) HEAD Pressure to 260'
    a. Observe that 'ATTACK' mode (default) is already selected.
        i. Represents 60/75 GPM 'ATTACK' mode with 10 GPM laterals operating every 200' feet.
    b. Observe the 'OVERHAUL' mode option to be selected AFTER fire is contained.
        i. Represents 20/25 GPM selection on 'ATTACK' nozzle during OVERHAUL operations with 10 GPM laterals operating every 200' feet.
5. Select "SET" to read Engine Pressures as follows upon 800' hose lay, and 260' Elevation provides the following possible TOTAL Engine Pressures (EP):
    a. 60 GPM Attack with 10 GPM laterals:
        i. Upon three (3) laterals operating: 382 PSI
        ii. Upon two (2) laterals operating: 367 PSI
        iii. Upon one (1) lateral operating: 344 PSI
        iv. Upon zero (0) laterals operating: 314 PSI
    b. 75 GPM Attack with 10 GPM laterals:
        i. Upon three (3) laterals operating: 451 PSI
        ii. Upon two (2) laterals operating: 434 PSI
        iii. Upon one (1) lateral operating: 407 PSI
        iv. Upon zero (0) laterals operating: 371 PSI
6. Select middle at 'HENWAY' (Dual supply/attack line hose lay configuration with a HENWAY at 600' ft., 1,000' ft., and 1,400' ft.) mode in which BOTTOM MIDDLE square icon is BLUE.
7. Select 'OPTIONS'
8. Scroll hose lay 'LENGTH' number ticker to 800'
9. Scroll estimated 'ELEVATION' number ticker in PLUS (+) or MINUS (-) HEAD Pressure to 260'
    a. Observe that 'ATTACK' mode (default) is already selected.
        i. Represents 60/75 GPM 'ATTACK' mode with 10 GPM laterals operating every 200' feet.
    b. Observe the 'OVERHAUL' mode option to be selected AFTER fire is contained.
        i. Represents 20/25 GPM selection on 'ATTACK' nozzle during OVERHAUL operations with 10 GPM laterals operating every 200' feet.
10. Select "SET" to read Engine Pressures as follows upon 800' hose lay, and 260' Elevation provides the following possible TOTAL Engine Pressures (EP):
    a. 60 GPM Attack with 10 GPM laterals:
        i. Upon three (3) laterals operating: 290 PSI vs. 382 PSI
        ii. Upon two (2) laterals operating: 280 PSI vs. 367 PSI
        iii. Upon one (1) lateral operating: 266 PSI vs. 344 PSI
        iv. Upon zero (0) laterals operating: 257 PSI vs 314 PSI
    b. 75 GPM Attack with 10 GPM laterals:
        i. Upon three (3) laterals operating: 319 vs. 451 PSI

ii. Upon two (2) laterals operating: 309 vs. 434 PSI
iii. Upon one (1) lateral operating: 293 vs. 407 PSI
iv. Upon zero (0) laterals operating: 282 vs. 371 PSI

iv. Students execute 'OVERHAUL' mode procedures to obtain simulated Engine Pressures (EP) in 'OVERHAUL' mode clearly with YELLOW lettering and RED background.

1. Begin at 'Standard' (single supply/attack line) hose lay configuration mode in which BOTTOM LEFT square icon is BLUE.
2. Select 'OPTIONS'
3. Scroll hose lay 'LENGTH' number ticker to 800'
4. Scroll estimated 'ELEVATION' number ticker in PLUS (+) or MINUS (-) HEAD Pressure to 260'
    a. Deselect 'ATTACK' mode (default) as previously selected.
    b. All entries are now in the 'OVERHAUL' mode option that is selected AFTER the fire is contained.
        i. Represents 20/25 GPM (attack) nozzle selection on during 'OVERHAUL' operations with 10 GPM laterals operating every 200' feet.
5. Select "SET" to read Engine Pressures as follows upon 800' hose lay, and 260' Elevation provides the following possible TOTAL Engine Pressures (EP):
    a. 20 GPM Attack with 10 GPM laterals:
        i. Upon three (3) laterals operating: 258 PSI
        ii. Upon two (2) laterals operating: 250 PSI
        iii. Upon one (1) lateral operating: 237 PSI
        iv. Upon zero (0) laterals operating: 224 PSI
    b. 25 GPM Attack with 10 GPM laterals:
        i. Upon three (3) laterals operating: 269 PSI
        ii. Upon two (2) laterals operating: 259 PSI
        iii. Upon one (1) lateral operating: 246 PSI
        iv. Upon zero (0) laterals operating: 231 PSI
6. Select middle square at 'HENWAY' (Dual supply/attack line hose lay configuration with a HENWAY at 600' ft., 1,000' ft., and 1,400' ft.) mode in which BOTTOM MIDDLE square icon is BLUE.
7. Select 'OPTIONS'
8. Scroll hose lay 'LENGTH' number ticker to 800' feet.
9. Scroll estimated 'ELEVATION' number ticker in PLUS (+) or MINUS (-) HEAD Pressure to 260'
    a. Deselect 'ATTACK' mode (default) as previously selected.
    b. All entries are now in the 'OVERHAUL' mode option that is selected AFTER the fire is contained.
        i. Represents 20/25 GPM (attack) nozzle selection on during 'OVERHAUL' operations with 10 GPM laterals operating every 200' feet.
        ii. .
10. Select "SET" to read Engine Pressures as follows upon 800' hose lay, and 260' Elevation provides the following possible TOTAL Engine Pressures (EP):

a. 20 GPM 'OVERHAUL' nozzle setting with 10 GPM laterals:
    i. Upon three (3) laterals operating: 238 vs. 258 PSI
    ii. Upon two (2) laterals operating: 231 vs. 250 PSI
    iii. Upon one (1) lateral operating: 223 vs. 237 PSI
    iv. Upon zero (0) laterals operating: 218 vs. 224 PSI
b. 25 GPM 'OVERHAUL' nozzle setting with 10 GPM laterals:
    i. Upon three (3) laterals operating: 242 vs. 269 PSI
    ii. Upon two (2) laterals operating: 235 vs. 259 PSI
    iii. Upon one (1) lateral operating: 226 vs. 246 PSI
    iv. Upon zero (0) laterals operating: 221 vs. 231 PSI

v. The KEY concern is when shifting from 'OVERHAUL' mode to ATTACK mode; only the HENWAY methodology ensures the maximum 400 PSI Engine Pressure will NOT be exceeded, as evidenced.

5. Fourth (4th) Hour of Four (4) – Applied Wildland Hydraulics – Part 3
    a. History, development, and use of Wildland Hydraulics Slide Rule
    b. Purpose – Stored in Glove Box in case phone app/tablet electronic version fails for any reason whatsoever.
    c. Components –
        i. Outer shell –
            1. Front with observation window
            2. Back with full instructions and illustrations.
        ii. Inserts
            1. Attack modes
                a. Standard
                b. HENWAY
            2. Overhaul modes
                a. Standard
                b. HENWAY
    d. Procedure – Go to http://HydraulicsSlideRule.com
        i. Video at http://HydraulicsSlideRule.net
        ii. Poster and instructions/example at http://HydraulicsPoster.com
            1. Select 'Standard' or 'HENWAY' ATTACK of 'OVERHAUL' mode.
            2. Pull insert out to hose lay LENGTH (1,100') to display BOTH Engine Pressures (EP) columns at 60 GPM or 75 GPM in WINDOW at front left.
            3. Determine which nozzle is utilized (60 GPM or 75 GPM) – i.e., 75 GPM
            4. Determine the number of Laterals operating – i.e., Five (5)
            5. Read respective Engine Pressure (EP) per conditions – i.e., 248 PSI.
            6. Rotate Dial "A" until RED and ORANGE needles aline with this subtotal of Friction Loss (FL) and Nozzle pressure (NP) at 248 PSI on Guage.
            7. Pinch 'RED DOT' to secure the ORANGE needle at 248 PSI.
            8. Again Rotate Dial "A" (RED needle) until 'HEAD' in feet (Blue hash-marks in 50' ft. increments) lines up with ORANGE needle – i.e., 350' ft.
            9. READ Engine Pressure where RED NEEDLE rests on Guage. – i.e., 400 PSI Engine Pressure (EP).
6. Review, Ten (10) Question Final Exam and Certification – Last 30 minutes of course.
    a. Both the Slide Rule and phone app will be used to complete a short ten-question Wildland Fire Engine Pressure (EP) Exam.
    b. Scenarios will be realistic.

c. Questions will apply to both 'Standard,' and HENWAY hose lay configurations.
d. Questions will address both 'ATTACK' and 'OVERHAUL' modes.
e. Certification will be emailed to all passing students within a two-weeks.

7. If time permits, effort will be made to instruct the http://HandHydraulics.com methodology as a backup procedure in the event a phone app, or slide-rule are not available.
    a. A Driver/Operator's Left-Hand can be used to label each finger:
        i. With a 60 GPM attack nozzle:
            1. "Q" or water flow at 60 GPM, 70 GPM, 80 GPM, 90 GPM, and 100 GPM to represent each flow rate in each section of a 1,000 hose lay.
            2. Upon "M" as the multiplier for 60 GPM attack nozzle is 2.0, 2.5, 3.0, 3.5, 4.0, and 4.5 respectively.
            3. When adding each section as a hose lay is extended in 200-foot increments; only nozzle pressure and HEAD are needed to determine TOTAL Engine Pressure (EP).
        ii. With a 75 GPM attack nozzle:
            1. "Q" or water flow at 75 GPM, 85 GPM, 95 GPM, 105 GPM, and 115 GPM to represent each flow rate in each section of a 1,000 hose lay.
            2. Upon "M" as the multiplier for 75 GPM attack nozzle is 2.5, 3.0, 3.5, 4.0, 4.5, and 5.0, respectively.
            3. When adding each section as a hose lay is extended in 200-foot increments; only nozzle pressure and HEAD are needed to determine TOTAL Engine Pressure (EP).
        iii.
8. If time permits, the effort will be made to instruct the advantages of the world's first https://WaterTenderApp.com to:
    a. Refer to the published Help File to estimate the delivery rate (GPM/LPM) of any water tender based upon the Internation Fire Service Training Association (IFSTA) formula dependent upon:
        i. Tank Size (90% usable capacity)
        ii. Fill rate
        iii. Dump rate
        iv. Distance to water supply
        v. Make and Break and Maneuver time
            1. In that a 2,500 Gallon water tender that fills and dumps at 1,000 GPM that travels 4.0 miles to water source and requires 1 ½ minute Make and Break and Maneuver time is estimated to deliver 101 GPM.
            2. If a water tender takes 24 minutes (ACTUAL) to complete a round trip, oit will deliver 94 GPM.
        vi. The phone app includes a chart to enter up to ten (10) water tenders at different delivery rates.
            1. The data then determines if the 150% of the FIRE FLOW is met.
            2. Which can then determine the minimum portable storage tank capacity to effectively support the resources on-scene.
                a. In a manner to reduce the RISK of UNDER-ORDERING resources that may cause the exhaustion of water before the next delivery is made.
                b. In a manner to reduce the RISK of OVER-ORDERING resources that may cause outside mutual-aid resource jurisdictions from

exhausting their resources (CODE-RED) in the event of a simultaneous incident is experienced equal magnitude.

Please accept this itinerary/lesson plan to instruct the world in areas of SAFETY OPERATIONS never presented in such detail with tools never before available in Wildland Fire Service history.