

✓
Blackwater
Fire - 1937

ADVANCE SHEET

FUELS, WEATHER AND TOPOGRAPHY (111-21)
(CASE STUDY)


11/17/25

THIS LESSON IS A CASE STUDY OF AN ACTUAL FIRE ON WHICH THE BEHAVIOR OF THE FIRE WAS INFLUENCED ALMOST EQUALLY BY THE BASIC FACTORS OF FUELS, WEATHER AND TOPOGRAPHY.

THE CASE STUDY WILL COMBINE INTO ONE PROBLEM MANY OF THE BASIC ELEMENTS OF FIRE PHYSICS, METEOROLOGY AND FIRE BEHAVIOR WHICH YOU HAVE BEEN STUDYING FOR THE PAST THREE WEEKS.

THERE IS NO SPECIFIC REFERENCE MATERIAL ASSIGNMENT COVERING THIS SUBJECT MATTER. RATHER, IT IS A REVIEW OF ALL REFERENCE ASSIGNMENTS YOU HAVE HAD SO FAR IN THE COURSE. LESSON PLANS AND GROUP PROBLEMS WILL BE HANDED OUT DURING THE COURSE OF THE SUBJECT MATTER PRESENTATION.

PREPARED FOR USE AT THE FIRE BEHAVIOR TRAINING SCHOOL AT ALEXANDRIA,
LOUISIANA, JANUARY - FEBRUARY, 1959.

SUBJECT - FIRE BEHAVIOR - FUELS, WEATHER, TOPOGRAPHY.

LESSON - LABORATORY PROBLEM SHOWING THE INDIVIDUAL AND COMBINED EFFECTS OF
FUELS, WEATHER AND TOPOGRAPHY ON FIRE BEHAVIOR.

TYPE OF LESSON - CASE STUDY AND ANALYSIS OF BLACKWATER FIRE, SHOSHONE
NATIONAL FOREST, WYOMING, AUGUST, 1937. CLASSROOM PROBLEMS.

TIME - FEBRUARY 17, 0800 - 1500

6 - 50 MINUTE PERIODS

5 - 10 MINUTE BREAKS

PLACE - ASSIGNED CLASSROOM, ALEXANDRIA, LOUISIANA.

AIDS NEEDED

MAPS

CHARTS AND GRAPHS SHOWING
WEATHER BUILD-UP

FIRE DANGER READINGS

PHOTOGRAPHS

VIEW-GRAPH

OBJECTIVE - TO TEACH STUDENTS HOW TO RECOGNIZE AND EVALUATE THE EFFECTS
OF FUELS, WEATHER AND TOPOGRAPHY ON FIRE BEHAVIOR.

REFERENCES

1. FIRE BEHAVIOR IN NORTHERN ROCKY MOUNTAIN FORESTS - J. S. BARROWS
2. FOREST FIRE FIGHTING FUNDAMENTALS - U. S. FOREST SERVICE,
STATE OF CALIFORNIA.
3. LOCAL WINDS - U. S. ARMY - SIGNAL CORPS.
4. SAFE PRACTICES UNDER BLOWUP CONDITIONS - U.S.D.A. - FOREST
SERVICE.

FIRE BEHAVIOR

FUELS - WEATHER - TOPOGRAPHY

(AS RELATED TO FIRE BEHAVIOR AND PERSONNEL SAFETY)

CASE STUDY - BLACKWATER FIRE SHOSHONE NATIONAL FOREST - WYOMING

INTRODUCTION

1. LESSON OBJECTIVE - FOR THE PAST THREE AND A HALF WEEKS YOU HAVE BEEN STUDYING ABOUT FIRE PHYSICS, METEOROLOGY AND FIRE BEHAVIOR FUNDAMENTALS. MORE SPECIFICALLY, DURING THE PAST TEN DAYS YOU HAVE STUDIED HOW FUELS, WEATHER AND TOPOGRAPHY INDIVIDUALLY INFLUENCE FIRE BEHAVIOR. LAST THURSDAY, JACK BARROWS DISCUSSED WITH YOU THE COMBINED EFFECTS OF THESE THREE FACTORS ON FIRE BEHAVIOR.

THE OBJECTIVE OF THIS SESSION IS TO STUDY HOW ALL THREE OF THESE BASIC FACTORS COMBINE TO INFLUENCE FIRE BEHAVIOR AND PERSONNEL SAFETY, USING AN ACTUAL FIRE AS A BASIS FOR STUDY.

2. THE BLACKWATER FIRE ON THE SHOSHONE FOREST IN WYOMING WAS CHOSEN AS THE CASE STUDY FIRE IN THIS INSTANCE FOR SEVERAL REASONS:
 - A. ALL THREE FACTORS OF FUEL, WEATHER AND TOPOGRAPHY WERE ALMOST EQUALLY DOMINANT IN THEIR INFLUENCE ON FIRE BEHAVIOR.
 - B. BECAUSE THIS WAS A DISASTER FIRE, IN WHICH 15 PERSONS LOST THEIR LIVES AND SOME 38 OTHERS SUFFERED VARYING DEGREES OF BURNS, IT WAS WELL DOCUMENTED, ESPECIALLY SO FOR A FIRE WHICH OCCURRED OVER 20 YEARS AGO.
 - C. ALSO BECAUSE THIS WAS A DISASTER FIRE IT WILL GIVE THIS GROUP AN OPPORTUNITY TO STUDY AN ACTUAL CASE FROM THE STANDPOINTS OF FIRE BEHAVIOR AND STRATEGY AND TACTICS AS THEY RELATE TO PERSONNEL SAFETY.

D. LIMITED FACTS AVAILABLE TO OVERHEAD PERSONNEL WHICH IS REPRESENTATIVE OF THE PRESENT SITUATION IN MANY AREAS.

DEVELOPMENT

I. FIRE HISTORY - SHOSHONE NATIONAL FOREST

IN GENERAL THE FIRE HISTORY OF THIS FOREST FROM THE FIRST RECORDS IN 1909 UNTIL 1935 WAS LARGELY UNEVENTFUL. DURING THIS PERIOD THERE WAS AN ANNUAL AVERAGE OF LESS THAN SEVEN FIRES PER YEAR FOR AN AVERAGE BURN OF LESS THAN 350 ACRES PER YEAR. THERE WERE ONLY THREE MAJOR BURNS PRIOR TO 1935. THESE OCCURRED IN 1910, 1911 AND 1919, THE SAME DRY YEARS WHICH CAUSED SO MUCH TROUBLE IN REGION 1. A 15,000 ACRE LIGHTNING FIRE OCCURRED IN 1935 IN THE HEART OF THE NORTH ABSAROKA PRIMITIVE AREA ON THIS FOREST.

THE HISTORY OF OCCURRENCE INDICATES THAT FIRE RISK HAS BEEN PRETTY WELL CONFINED IN THE PAST TO THE VICINITY OF THE MAIN VALLEYS AND MAIN ROUTES OF TRAVEL WHERE LITTLE FIRE HAZARD EXISTS. THE MORE DANGEROUS FUELS OCCUR IN THE TRIBUTARIES AND HIGHER BASINS BACK FROM THESE VALLEYS. THE CHIEF RISK IN THESE REMOTE, LARGELY INACCESSIBLE AREAS COMES FROM THE INFREQUENT DRY LIGHTNING STORMS THAT OCCUR. OVER TWO THIRDS OF THIS FOREST IS IN PRIMITIVE AREAS. INACCESSIBILITY AND LACK OF ADEQUATE DETECTION CREATE A REAL PROBLEM IN ACCOMPLISHING EFFECTIVE FIRE CONTROL.

THE TOTAL ELAPSED TIME RECORDS INDICATE THAT OVER ONE-THIRD OF THE FIRES THAT OCCUR ARE NOT ATTACKED FOR OVER 24 HOURS AFTER THEY START. IN YEARS OF FREQUENT SUMMER RAINS, THIS WEAKNESS DOES NOT MAKE MUCH DIFFERENCE. HOWEVER, IT IS EVIDENT THAT THE DOOR IS WIDE OPEN FOR DISASTROUS FIRES WHEN CRITICAL BURNING CONDITIONS EXIST AND WHEN STARTS OCCUR IN INACCESSIBLE AREAS.

OUR CASE FIRE FOR THIS SESSION FALLS IN THIS CATEGORY ALTHOUGH IT STARTED AND BURNED IN A RELATIVELY ACCESSIBLE AREA FOR THIS FOREST.

II. THE BLACKWATER FIRE (1700 ACRES)

A. LOCATION - (SHOW SLIDES 1 AND 2) (LOOKING EAST)

THE BLACKWATER FIRE STARTED FROM A DRY LIGHTNING STORM ON AUGUST 18, 1937. THE POINT OF ORIGIN WAS ABOUT 100 FEET WEST OF BLACKWATER CREEK, IN A HEAVY STAND OF DOUGLAS FIR, AND AT APPROXIMATELY 7,700 FEET IN ELEVATION. THE POINT OF ORIGIN WAS 5 MILES FROM THE CODY-YELLOWSTONE HIGHWAY - 3 MILES BY UNUSED LOGGING ROAD AND 2 MILES BY VERY POOR, UNUSED TRAIL.

B. DISCOVERY - THE FIRE WAS DISCOVERED ALMOST SIMULTANEOUSLY AT 1535, AUGUST 20, (ESTIMATED 48 HOURS ELAPSED TIME, ORIGIN TO DISCOVERY) BY A COOPERATOR AND BY THE ASSISTANT SUPERVISOR WHO WAS ENROUTE BY AIRPLANE TO SCOUT ANOTHER FIRE SEVERAL MILES TO THE NORTH. AT THE TIME OF DISCOVERY, THE FIRE HAD BURNED AN ESTIMATED TWO ACRES ON BOTH SIDES OF BLACKWATER CREEK. THE FIRE WAS QUIET AND THE SMOKE COLUMN WAS MOVING STRAIGHT UP.

C. TOPOGRAPHY AND FUELS - (SHOW SLIDES 3 AND 4)

HEAVILY TIMBERED SLOPES FROM 20 TO 80 PER CENT IN ALL DIRECTIONS FROM POINT OF ORIGIN. LARGE, HEAVILY TIMBERED BASIN TO SOUTH, UP BLACKWATER CREEK. HEAVILY TIMBERED STEEP SLOPES TO EAST, SOUTHEAST AND NORTHEAST RUNNING TO TIMBERLINE, ABOUT 10,500 FEET ELEVATION AND SOME 2 MILES DISTANT. ALSO HEAVILY TIMBERED STEEP SLOPES TO NORTH AND WEST.

AS INDICATED IN SLIDES, BARE RIDGES AND ROCK OUTCROPS BREAK UP HEAVY TIMBER STAND TO SOME EXTENT.

D. WEATHER BUILD-UP - (SLIDE 5)

THE REGION HAD INITIATED THIS YEAR (1937) THE INSTALLATION OF FIRE DANGER STATIONS ON SEVERAL FORESTS THROUGHOUT THE REGION ON AN EXPERIMENTAL BASIS. THE SHOSHONE FOREST HAD TWO OF THESE STATIONS. ONE OF THESE WAS LOCATED AT THE WAPITI CCC CAMP, APPROXIMATELY 5 MILES AIRLINE FROM THE FIRE BUT 2,000 FEET LOWER IN ELEVATION. READINGS WERE TAKEN AT 0800, 1300 AND 1645 DAILY.

THE RECORDS FROM THIS STATION RUN CONTINUOUSLY FROM JULY 21 THROUGH AUGUST 21. ANALYSIS OF THESE RECORDS INDICATES THE FOLLOWING TRENDS:

1. WIND WAS FROM THE WEST OR SOUTHWEST 81% OF THE TIME.
2. AVERAGE VELOCITIES FOR THE PERIOD WERE 4.7 MPH AT 0800, 7.0 MPH AT 1300 AND 7.6 MPH AT 1645.
3. TEMPERATURES RANGED FROM A DAYTIME LOW OF 50° ON AUGUST 3 TO A HIGH OF 94° ON JULY 22.
4. RELATIVE HUMIDITY WAS GENERALLY QUITE LOW FOR THIS AREA THROUGHOUT THE ENTIRE PERIOD AND DROPPED STEADILY DURING THE PERIOD IMMEDIATELY PRECEDING THE FIRE.
5. FUEL STICKS FOLLOWED THE SAME PATTERN AS RELATIVE HUMIDITY REACHING THEIR LOWEST POINT DURING THE PERIOD THE DAY THE FIRE WAS DISCOVERED.

(DISTRIBUTE MASTER LESSON PLAN)

E. INITIAL ACTION - AUGUST 20.

1535 - FIRE REPORTED TO DISTRICT RANGER. RANGER CALLED SEVERAL LODGES ALONG HIGHWAY TO CONFIRM LOCATION.

1550 - RANGER ORDERED 20 MEN THEN AVAILABLE IN WAPITI CCC CAMP.

- 1552 - RANGER LEFT R.S. FOR FIRE. TALKED TO RESORT MANAGER AT BLACKWATER LODGE WHO HAD JUST RETURNED FROM RIDGE ABOVE LODGE WHERE HE COULD SEE BASE OF SMOKE.
- 1605 - ON STRENGTH OF RESORT MANAGER'S REPORT, RANGER ORDERED 50 MORE MEN FROM CCC CAMP AS SOON AS THEY WERE AVAILABLE AND LEFT FOR FIRE ALONE.
- 1615 - ASSISTANT SUPERVISOR SCOUTED FIRE BY AIRCRAFT ABOUT 1545 ON RETURN TRIP AND REPORTED AT 1615 THAT FIRE WAS NOT SPREADING FAST AND SMOKE COLUMN STILL GOING STRAIGHT UP.
- 1710 - RANGER ARRIVED AT FIRE AND STARTED SCOUTING. FIRE SPREADING RAPIDLY AT THIS TIME. (1 HOUR ³⁵ MINUTES)
- 1745 - CCC FOREMAN AND 7 MEN ARRIVED AT FIRE. (1 HOUR 55 MINUTES)
- 1750 - 20 ADDITIONAL CCC MEN ARRIVED AT FIRE. RANGER AT THIS TIME JUDGED FIRE TO BE 150 TO 200 ACRES, RUNNING FAST AND CROWNING IN HEAVY STAND OF OLD GROWTH DOUGLAS FIR.
- 1800 - RANGER SENT MAN TO PHONE CCC CAMP FROM BLACKWATER LODGE FOR 50 ADDITIONAL MEN AND TWO PUMPS.
- 2000 - SUPERVISOR ARRIVED AT FIRE, AFTER REQUESTING 50 MEN FROM YELLOWSTONE PARK TO ARRIVE AT FIRE BY 0330 ON AUGUST 21. FIRE HAD DIED DOWN SOME BY THIS TIME. VERY SMOKY, WITH OCCASIONAL SPOTTY CROWNING. APPROXIMATELY 60 MEN ON FIRE-LINE. EXPECTED, AND ON ORDER, APPROXIMATELY 60 ADDITIONAL MEN PLUS OVERHEAD BY DAYLIGHT.

1535
215

2 HRs 15 min 200 ACRES ± 130 CHAINS WIDE

PROBLEM #1

SITUATION

TIME - 2000, August 20.

SIZE - ESTIMATED 200 ACRES.

WEATHER 8/20 AT WAPITI CCC CAMP. (NOT AVAILABLE AT FIRE)

	WIND DIR.	WIND VELOCITY	TEMP.	REL. HUM.	FUEL STICKS
0800	W	3	52	35	8
1300	W	8	85	13	6
1645	SW	5	82	6	5

NO WEATHER FORECASTING SERVICE BUT NO CHANGE INDICATED.

FUELS - (SLIDES 6 AND 7) - VERY HEAVY OLD GROWTH DOUGLAS FIR. VERY LIMBY WITH MUCH HEAVY FUEL ON GROUND. SAME CONDITION IN ALL DIRECTIONS FROM FIRE. FUEL TYPE IS HH. (BY R-2 STANDARDS AT THAT TIME.)

TOPOGRAPHY - 20-80% SLOPES BROKEN UP BY STEEP SIDE DRAWS, SMALL OPEN PARKS AND ROUGH ROCKY OUTCROPS. APPROXIMATELY 2500 TO 3000 FEET DIFFERENCE IN ELEVATION FROM FIRE TO TIMBERLINE. FIRE AT 2000 ADVANCING SLOWLY WITH OCCASIONAL SPORADIC SHORT RUNS UP 20-30% HEAVILY TIMBERED SLOPE, WITH CONTINUOUS BODY OF TIMBER ON INCREASING SLOPES TO TIMBERLINE, SOME TWO MILES DISTANT.

MANPOWER - ABOUT 60 MEN PLUS 7 EXPERIENCED OVERHEAD ON FIRE BY 2000. ABOUT 60 ADDITIONAL MEN TO ARRIVE BY 0330, 8/21. ALL WITH COMPETENT OVERHEAD. THIS TOTAL OF 120 MEN PLUS OVERHEAD REPRESENTS ALL OF THE MEN AVAILABLE FOR EFFECTIVE WORK BEFORE 1000 ON 8/21. APPROXIMATELY 300 ADDITIONAL CCC MEN COULD BE MADE AVAILABLE TO ARRIVE AT FIRE BETWEEN 1000 AND 1800 ON 8/21.

COMMUNICATION - NONE EXCEPT BY MESSENGER.

YOU ARE THE DISTRICT RANGER AND FIRE BOSS ON THIS FIRE. YOU HAVE SPENT THE PAST TWO HOURS SCOUTING THE FIRE. FROM THE INFORMATION GIVEN ABOVE, ANSWER THE FOLLOWING QUESTIONS:

(SLIDE 8) LOOKING EAST. APPROXIMATELY $2\frac{1}{2}$ " PER MILE. (ON YOUR PICTURE)

1. CALCULATE THE PROBABILITIES AND SHOW ON OBLIQUE PHOTO WHERE YOU EXPECT THIS FIRE WILL BE BY 1000, 8/21. HOW LARGE WILL IT BE? *1000 AC*
HOW MANY CHAINS OF LINE WILL YOU HAVE TO BUILD TO CONTROL BY 1000, *5000H*.
8/21? GIVE BRIEF EXPLANATION OF YOUR REASONS. (.5 CHAINS HELD LINE PER MAN HOUR.) $\frac{870 \text{ MAN HOURS AVAIL}}{2} = 435 \text{ CHAINS OF LINE}$
2. ACCORDING TO YOUR CALCULATIONS, WILL YOU BE ABLE TO CONTROL THIS FIRE BY 1000, 8/21, WITH THE MANPOWER AVAILABLE? *NO*
3. IF NOT, HOW MANY ADDITIONAL MEN WILL YOU NEED TO EFFECT CONTROL?
65 CHAINS SHORT
EXPLAIN YOUR REASONING. *ORDER 300 ADDITIONAL MEN NEXT SHIFT*
4. WHERE ARE THE DANGER POINTS FROM THE STANDPOINT OF (1) FIRE BEHAVIOR, (2) PERSONNEL SAFETY? SHOW ON PICTURE.
5. WHAT ADDITIONAL INFORMATION REGARDING FUELS, WEATHER AND TOPOGRAPHY WOULD HAVE BEEN NECESSARY TO HAVE MORE ACCURATELY PREDICTED WHAT THIS FIRE WOULD DO DURING THE FIRST BURNING PERIOD? LIST.

TRAINEES WILL BE BROKEN UP INTO "BUZZ" SESSION GROUPS AT THIS POINT AND GIVEN ABOUT 50 MINUTES TO ANSWER QUESTIONS IN PROBLEM NO. 1. APPROXIMATELY *30 min* ONE-HOUR ADDITIONAL WILL BE DEVOTED TO THE PRESENTATIONS AND DISCUSSIONS OF THE GROUPS' CONCLUSIONS.

DISTRIBUTE LARGE PHOTOS. #1.

UNTIL *9:00*

STRATTON
MARTIN
JIRSA
SPRAGUE
* JAMES
BRITTON

13.

F. ACTUAL FIRE BEHAVIOR BETWEEN 2000, 8/20 AND 1000, 8/21
(SLIDES 9, 10 AND 11)

FIRE WAS RELATIVELY QUIET BETWEEN 2000 AND 2400. INCREASE IN BURNED AREA WAS NEGLIGIBLE DURING THIS 4-HOUR PERIOD.

2100 - THE RANGER (FIRE BOSS) AND THE SUPERVISOR, IN CONFERENCE ON THE FIRE LINE, ESTIMATED THAT THE FIRE HAD AT THAT TIME COVERED AN AREA OF ABOUT 200 ACRES AND THAT BY THE END OF THE FIRST BURNING PERIOD (1000, 8/21) THE PERIMETER WOULD BE APPROXIMATELY 450 CHAINS, TAKING INTO CONSIDERATION NATURAL OPENINGS, ROCK OUTCROPS, ETC. ABOUT 80 CHAINS OF CONTROL LINE HAD BEEN BUILT AT THE TIME OF THE ESTIMATE AND THE RANGER AND SUPERVISOR JOINTLY ESTIMATED THAT 370 CHAINS ADDITIONAL COULD BE CONSTRUCTED DURING THE REMAINDER OF THE FIRST BURNING PERIOD BY THE MEN ON HAND AND ON ORDER. IT WAS THEIR JOINT OPINION THAT THE FIRE WOULD NOT SPREAD APPRECIABLY DURING THE NIGHT.

2230 - 50 ADDITIONAL MEN ORDERED FROM THE TENSLEEP CCC CAMP, A DISTANCE OF 180 MILES.

0030 - SHORTLY AFTER MIDNIGHT A STRONG WIND CAME UP AND THE FIRE STARTED MOVING RAPIDLY IN A SOUTHEASTERLY DIRECTION UP THE BASIN OF A FORK OF BLACKWATER CREEK. (SHOW COLOR SLIDES)

0130 - 50 ADDITIONAL MEN ORDERED FROM DEEVER CCC CAMP, A DISTANCE OF 96 MILES. ALSO 50 ADDITIONAL LOCALS FROM CODY, APPROXIMATELY 40 MILES.

0215 - NATIONAL PARK SERVICE CREW OF 54 ARRIVE ON FIRE. FED BREAKFAST AND PUT ON LINE ABOUT 0400.

0515 - DECISION MADE TO HOLD LINE ALREADY CONSTRUCTED WITH MEN ON HAND, RATHER THAN TRY TO EXTEND IT.

0700 - RADIO CONTACT ESTABLISHED BY NPS WITH BECKLER RIVER STATION AND MAMMOTH IN YELLOWSTONE PARK.

1000 - BY THIS TIME, FIRE HAD QUIETED CONSIDERABLY BUT DURING THE NIGHT AND EARLY MORNING HAD BURNED OUT MOST OF THE DRAINAGE IN THE FORK OF BLACKWATER CREEK TO THE SOUTHEAST OF THE POINT OF ORIGIN, AS INDICATED ON SLIDES. FIRE WAS APPROXIMATELY 800 ACRES AT THIS TIME.

G. SECOND BURNING PERIOD - 8/21, 1000 TO ABOUT 1800.

(DISTRIBUTE 1ST HANDOUT)

OWEN
JAMES
MORGAN
* BRITTON CHAIRMAN
HEINTZELMAN

PROBLEM #2

SITUATION

TIME - 1000, AUGUST 21

SIZE - ESTIMATED 800 ACRES.

WEATHER - 8/21 AT WAPITI CCC CAMP. (NOT AVAILABLE AT FIRE)

	WIND DIR.	WIND VELOCITY	TEMP.	REL. HUM.	FUEL STICKS
0800	W	3	64	21	7

NO WEATHER FORECASTING SERVICE BUT NO CHANGE INDICATED.

FUELS - SAME AS IN PROBLEM #1. HEAVY, LIMBY, OLD GROWTH DOUGLAS FIR.

FUEL TYPE - HH.

TOPOGRAPHY - SAME AS IN PROBLEM #1 ONLY STEEPER AND ROUGHER. TOP EDGE OF FIRE NOW NEAR TIMBERLINE IN SPOTS. 40-80% SLOPES BROKEN BY NUMEROUS ROUGH, DEEP SIDE DRAWS AND NARROW, SHARP RIDGES. INCREASING STEEP SLOPES TO TIMBERLINE WHICH IS WITHIN ABOUT $\frac{1}{4}$ MILE EXCEPT IN MAIN DRAW WHERE IT IS YET APPROXIMATELY $\frac{3}{4}$ MILE.

MANPOWER - ABOUT 130 MEN PLUS OVERHEAD ON FIRE AT 1000. 100 ADDITIONAL DUE TO ARRIVE AT 1200. ALL WITH COMPETENT OVERHEAD. THIS TOTAL OF 230 MEN PLUS OVERHEAD ARE ALL THAT WILL BE AVAILABLE FOR EFFECTIVE WORK BEFORE 1800 ON 8/21. APPROXIMATELY 250 ADDITIONAL MEN AVAILABLE BY 0600 ON 8/22.

HELD LINE AT 1000, 8/21 (SHOW SLIDE #11)

LINE ON SOUTHWEST SIDE OF FIRE COMPLETED AND TIED IN TO NATURAL OPENINGS ON RIDGE. SEE PHOTO.

LINE FROM ORIGIN UP TRAIL RIDGE COMPLETED TO POINT WHERE FIRE SPOTTED OVER ON NORTH SIDE OF TRAIL RIDGE. SEE PHOTO. NO LINE BEYOND THIS POINT OR

AROUND THE EAST END OR HEAD OF THE FIRE. ALL KNOWN SPOTS OUTSIDE OF HELD LINE HAVE BEEN HANDLED.

YOU ARE THE DISTRICT RANGER AND FIRE BOSS, AT 1000, 8/21. FROM THE INFORMATION GIVEN ABOVE, ANSWER THE FOLLOWING QUESTIONS:

1. DETERMINE AND LIST IN PRIORITY THE MAJOR DECISIONS YOU MUST MAKE IN PLANNING CONTROL OF THIS FIRE DURING THIS BURNING PERIOD.
2. PREDICT AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE, HOW THIS FIRE IS LIKELY TO BEHAVE BETWEEN 1000 AND 1800. SHOW ON PHOTO.
3. WHERE AND APPROXIMATELY WHEN IS BLOW-UP, IF ANY, LIKELY TO OCCUR? SHOW ON PHOTO.
4. WHERE ARE CRITICAL AREAS FROM STANDPOINT OF PERSONNEL SAFETY? WHAT WOULD BE YOUR PLANS TO SAFEGUARD THE CREW MEMBERS? WHERE DO YOU THINK THE DISASTER OCCURRED? WHY? SHOW ON PHOTO.

(DISTRIBUTE LARGE PHOTOS)

BUZZ SESSION

H. ACTUAL FIRE BEHAVIOR BETWEEN 1000, 8/21 AND UNTIL ABOUT 1800, 8/21.

1000 - SHOW SLIDE #12. (PICTURE TAKEN AT 1000) LINE CONSTRUCTION HAD BEEN STARTED PREVIOUS TO 1000 TO THE NORTHEAST OF TRAIL RIDGE TO CORRAL THE FIRE WHICH HAD SLOPPED OVER TO NORTH SIDE OF TRAIL RIDGE AND WAS BACKING SLOWLY DOWN THE HILL. BECAUSE OF A SHORTAGE OF REINFORCEMENTS THIS LINE WAS TEMPORARILY ABANDONED IN FAVOR OF CONCENTRATING ON HOLDING THE LINE ALREADY CONSTRUCTED, AND HANDLING SPOT FIRES.

THE FIRE WAS QUIET AT 1000. ALL CONSTRUCTED LINE WAS HOLDING. THE ONLY SECTOR CONSIDERED CRITICAL WAS ON THE NORTH SLOPE OF TRAIL RIDGE WHERE LINE WAS NOT COMPLETED.

1100 - REINFORCEMENT CREW OF NINE MEN AND FOREMAN ARRIVED AT THIS POINT AND WERE STARTED ON LINE CONSTRUCTION ON THE NORTH SIDE OF TRAIL RIDGE.

1300 - FIRE DANGER READINGS AT WAPITI CCC CAMP AT THIS HOUR AS FOLLOWS:
(THIS INFORMATION NOT AVAILABLE AT SCENE OF FIRE.)

	WIND DIR.	WIND VELOCITY	TEMP.	REL. HUM.	FUEL STICKS
1300	SW	8	90	6	5

1330 - RANGER CLAYTON INSTRUCTED BY SUPERVISOR TO TAKE CHARGE OF ADVANCE SECTOR EAST AND NORTH OF TRAIL RIDGE.

1330 - ASSISTANT SUPERVISOR RETURNED TO CODY FROM PLANE RECONAISSANCE OF FIRE. FIRE QUIET FOR THE MOST PART. QUITE HOT ON NORTH SLOPE OF TRAIL RIDGE ABOVE LINE CONSTRUCTION. SAW SOME SPOT FIRES OVER DIVIDE AT THE HEAD OF BLIND CREEK. ALSO TWO OR THREE SPOTS BELOW OR VERY CLOSE TO LINE CONSTRUCTION.

FIFTY MEN SENT TO RELIEVE CREW ON LONG SOUTHWEST LINE, WITH INSTRUCTIONS TO CONSTRUCT NEW LINE FROM THE END OF THE EXISTING LINE.

RANGER POST WITH 50 MEN UP TRAIL RIDGE TO RELIEVE ONE HOLDING CREW, AND TO EXTEND AND COMPLETE LINE TO NORTHEAST UNDER TRAIL RIDGE.

1400 - 1430 - RANGER POST'S CREW WERE ABLE TO SEE ALMOST THE ENTIRE BASIN INTO WHICH THEY WERE GOING FROM THE ACCESS TRAIL. POST AND THE CREW LEADERS PARTICULARLY WATCHED FOR SPOTS BELOW THE LINE WHICH WAS UNDER CONSTRUCTION AND WHICH THEY WERE GOING TO EXTEND. THEY SAW NO EVIDENCE OF SPOTS AT THIS TIME.

1445 - CLAYTON'S CREW STARTED LINE CONSTRUCTION BEYOND NINE MAN CREW WHO HAD STARTED WORK ON THIS LINE AT 1100. FIRE VERY QUIET AT THIS TIME AND LINE WAS BEING CONSTRUCTED AT FIRE EDGE FOR THE MOST PART.

1500 - LINE CONSTRUCTION PROCEEDING IN ORDERLY FASHION, AND QUITE RAPIDLY. FIRE QUIET.

1515 - RANGER POST RECEIVED NOTE FROM CLAYTON ASKING FOR HELP TO HANDLE SPOT FIRE IN "HOLE". POST HAD ALREADY SEEN SPOT AND CLIMBED RIDGE TO OBSERVE.

1530 - A SUDDEN STRONG, GUSTY SW WIND AT THIS TIME CAUSED SPOT FIRE TO CROWN AND SPREAD RAPIDLY FIRST IN A NORTHEASTERLY AND THEN SUDDENLY IN AN EASTERLY DIRECTION, DIRECTLY TOWARD LINE CONSTRUCTION CREW.

POST CALLED HIS CREW OFF THE LINE AND URGED THEM TO HURRY NORTH-EAST, TOWARD TIMBERLINE, THE ONLY AVENUE OF ESCAPE LEFT.

1545 - SLIDE 13. APPROXIMATE TIME CLAYTON AND CREW TRAPPED.

1555 - 1630 - SLIDES 14 THROUGH 19. ALL TAKEN FROM A POINT NORTH AND WEST OF THE FIRE. (PICTURES TAKEN AT 5 MINUTE INTERVALS.)

1600 - APPROXIMATE TIME POST'S CREW (42 MEN TOTAL) ARRIVED AT POST'S POINT.

1645 - FIRE DANGER READINGS AT WAPITI CCC CAMP AT THIS HOUR AS FOLLOWS (THIS INFORMATION NOT AVAILABLE AT FIRE.) (SHOW SLIDE #5)

	WIND DIR.	WIND VELOCITY	TEMP.	REL. HUM.	FUEL STICKS
1645	W	4	88	9	5

SLIDES 20 AND 21 - SHOWING AREA BURNED IN BLOW-UP AND KEY POINTS.

SLIDES 22, 23 AND 24 - SHOWING CLOSE-UPS OF AREA BURNED IN "BLOW-UP".

SLIDES 25 THROUGH 30 - SHOWING FATAL GULCH AND IMMEDIATE ADJACENT AREA.

SLIDES 31 THROUGH 34 - SHOWING POST'S POINT AND ADJACENT BURN.

SLIDE 35 - VERTICAL AERIAL SHOWING ALL KEY POINTS.

(DISTRIBUTE 2ND HANDOUT)

MAIN FACTORS WHICH CONTRIBUTED TO THE BLOW-UP WHICH LED TO THE DISASTER.

1. SPOT FIRE $\frac{1}{2}$ MILE FROM CLAYTON CREW.
2. TIMBER ABOVE NEWLY CONSTRUCTED LINE HAD NOT CROWNED.
 - A. SUDDEN WIND CAUSED THIS AREA TO CROWN AND SUCK SPOT FIRE UPHILL MORE RAPIDLY.
 - B. NO "BURNED AREA" ESCAPE ROUTE.
3. CONSIDERABLE UNBURNED SURFACE FUEL ABOVE LINE BECAUSE OF SPOT FIRES AND UNEVEN BURNED EDGES.

4. NATURE OF FUEL IN THIS DRAINAGE.

5. 20 TO 60% SLOPES.

I. CREW BEHAVIOR

READ EXCERPTS FROM RANGER POST'S STATEMENT TO ILLUSTRATE HOW CREW BEHAVED DURING EMERGENCY.

J. BRIEF SUMMARY OF SUBSEQUENT ACTION

FIRE MADE NO FURTHER MAJOR RUNS FOLLOWING THE "BLOW-UP" ON 8/21. SUPPRESSION ACTION FOLLOWING EMERGENCY SEARCH AND RESCUE MISSIONS WAS NORMAL. FIRE DECLARED UNDER CONTROL AT 1415 ON 8/24.

ADDITIONAL GENERAL QUESTIONS

1. IF THE SAME FIRE OCCURRED THIS SUMMER, WOULD WE HAVE ENOUGH ADDITIONAL INFORMATION AVAILABLE TO HAVE PREVENTED THIS DISASTER?
2. ARE OUR TOP OVERHEAD, GENERALLY SPEAKING, QUALIFIED TO PROPERLY USE THIS INFORMATION?
3. ASSUMING YOU ARE THE DISTRICT RANGER AND FIRE BOSS ON THIS FIRE IN 1958, AND HAVE ALL MODERN FACILITIES AVAILABLE, WHAT ACTION WOULD YOU HAVE TAKEN TO CONTROL THIS FIRE: (EXPLAIN ACTION)
 - (A) FIRST BURNING PERIOD.
 - (B) SECOND BURNING PERIOD.
4. SLIDE #35
 - (A) DO YOU NOTICE ANYTHING SIGNIFICANT IN THE RELATIONSHIP BETWEEN THE LOCATION OF THE SPOT-FIRE AND THE SPOT WHERE THE MEN WERE TRAPPED?
 - MANN GULCH - R-1
 - RATTLESNAKE - R-5
 - INAJA - R-5
 - (1) IS THIS FACT SIGNIFICANT?
 - (2) DOES IT INDICATE A WEAKNESS IN OUR ORGANIZATION? STRATEGY? ACTION PLANS?

SUMMARY

THE BLACKWATER FIRE ILLUSTRATES THE EFFECTS ON FIRE BEHAVIOR OF AN ALMOST EQUAL COMBINATION OF FUELS, WEATHER AND TOPOGRAPHY. THE FACT THAT THESE FACTORS COMBINED TO RESULT IN ONE OF THE WORST FIRE TRAGEDIES IN THE HISTORY OF ORGANIZED PROTECTION SERVES TO FURTHER EMPHASIZE ONE OF THE MAIN REASONS WHY YOU FELLOWS ARE BEING GIVEN THIS COURSE OF TRAINING IN FIRE BEHAVIOR.

IT IS OUR HOPE THAT THROUGH COURSES SUCH AS THIS, WE MAY BE ABLE TO INCREASE OUR KNOWLEDGE OF THE FUNDAMENTAL FACTORS AFFECTING THE BEHAVIOR OF FIRE TO A POINT WHERE WE WILL BE ABLE TO RECOGNIZE POTENTIALLY DANGEROUS SITUATIONS SUCH AS THIS ONE IN TIME TO PREVENT SUCH TRAGIC REOCCURRENCES.