

Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Firefighters skilled in ignition and holding will be needed to conduct blacklining along the perimeter of the unit.
Final Rating: <i>Low <u>Moderate</u> High</i>	Preparation of the perimeter of the unit with herbicide will reduce the difficulty the ignition crew will have with blacklining operations. Aerial ignition will be conducted by a highly skilled pilot with many years of aerial ignition experience in Guinea grass fuels. Because holding will rely heavily on the use of helicopter bucket operations, the technical difficulty of ignition remains moderate.

12. Interagency Coordination

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Several agencies will be contributing skilled personnel to the burn. The Army is in a period of building trust with other agencies and the public following recent escaped prescribed burns at Makua.
Final Rating: <i>Low <u>Moderate</u> High</i>	Skilled personnel from many agencies will assist with planning and implementation of the burn. If the burn escapes and the Army used this best available weather data and drew on the best available expertise, the Army would limit their exposure to law suits.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Disagreement between the agencies, or finger pointing in after-actions of an escape are very damaging to agency cooperation. However, assistance from available skilled specialists from other agencies in Hawaii, including experts from the National Weather Service, National Park Service, US Forest Service, and the US Fish and Wildlife Service and using skilled ignition and holding personnel from other agencies could increase the likelihood of a successful outcome to the burn.
Final Rating: <i>Low Moderate <u>High</u></i>	Skilled personnel from many agencies will assist with planning and implementation of the burn. If the burn escapes and the Army used this best available weather data and drew on the best available expertise, the Army would limit their exposure to law suits.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Army staff must maintain cooperative agreements and have protocols in place for ordering resources to fill prescribed fire positions.
Final Rating: <i>Low <u>Moderate</u> High</i>	The Army has protocols in place for ordering Army and civilian contract helicopter support, and assistance from Navy Fed Fire Department, PTA firefighters from the Big Island. The National Weather Service has developed a new internet-based spot weather forecast for prescribed burns. Given updated cooperative agreements, US Department of Interior and Agriculture personnel could be available, free of charge, to the Army to fill skilled positions on the prescribed burn.

13. Project Logistics

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Many logistical tasks must be completed ahead of time to ensure that all needed supplies and equipment are on site for the burn. Helicopter fuel must be on site during the burn. No food or overnight accommodations other than tents are available at Makua.
Final Rating: <i>Low <u>Moderate</u> High</i>	Planning and pre-positioning will ensure that logistical needs will be satisfied.
Potential Consequences	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	If any required item is missing, we would need to postpone the burn.
Final Rating: <i>Low <u>Moderate</u> High</i>	If any required supplies are missing, we will postpone the burn.
Technical Difficulty	Rationale
Preliminary Rating: <i><u>Low</u> Moderate High</i>	Planning will mitigate this factor.
Final Rating: <i><u>Low</u> Moderate High</i>	Planning will mitigate this factor. Many logistical tasks will be completed ahead of time to ensure that all supplies and equipment are on site for the burn.

14. Smoke Management

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Paved public road leading to relatively low use beaches adjacent to Makua may be crowded with onlookers. Need to monitor smoke on public road and post speed limits according to visibility. Accidents may occur which are unrelated to prescribed burn's smoke so smoke and visibility monitoring will be necessary to ensure the smoke does not contribute to an accident. Set up temporary prescribed burn signs on public road. Smoke may cause the greatest concern just before sunrise when smoke dispersion and visibility in general is still poor. However, very little traffic is expected in the Makua area so early in the morning. Good daytime dispersion will minimize smoke on road. Residual smoke will be limited due to rapid consumption of grass fuels.
Final Rating: <i>Low <u>Moderate</u> High</i>	Smoke conditions on Farrington Highway will be monitored and traffic will be controlled if necessary if visibility becomes a concern.
Potential Consequences	Rationale

Preliminary Rating: <i><u>Low</u> Moderate High</i>	An accident on the public paved road resulting in injury or private property damage could be blamed on a smoke-related visibility issue. Need to monitor and document smoke and visibility on the highway during the prescribed burn. Need to institute nationally recognized smoke management plan for setting speed limits, controlling traffic with escorts, and closing the road.
Final Rating: <i><u>Low</u> Moderate High</i>	Visibility will be monitored and documented on the public paved road during the prescribed burn per the smoke management section of the plan. Traffic controls, including speed limit restrictions, escorts, and road closure will be applied according to the smoke management section of the plan.
Technical Difficulty	Rationale
Preliminary Rating: <i><u>Low</u> Moderate High</i>	Will need to check weather forecasts and get a spot weather forecast and be vigilant. Smoke from dried vegetation will be minimal.
Final Rating: <i><u>Low</u> Moderate High</i>	Smoke conditions on Farrington Highway will be monitored and traffic will be controlled if necessary if visibility becomes a concern.

ANALYSIS OF OVERALL COMPLEXITY

Hazard Element	Complexity Value		
	L	M	H
1. Potential for escape		x	
2. Number and dependency of activities		x	
3. Off-site values		x	
4. On-site values	x		
5. Fire behavior		x	
6. Management organization		x	
7. Public and political interest			x
8. Fire treatment objectives		x	
9. Constraints		x	
10. Safety			x
11. Ignition procedures/methods		x	
12. Interagency coordination		x	
13. Project logistics		x	
14. Smoke management	x		
Total	2	10	2
Resulting Determination	MODERATE		

SUMMARY COMPLEXITY RATING

SECTION 6B
COMPLEXITY ANALYSIS FOR NORTH LOBE FIREBREAK ROAD

This burn was rated for complexity using the worksheets attached. Exceptions to qualifications requirements below must be approved by the Installation Safety Director.

Type	Complexity	Qualification of Burn Boss
(X) Type 1	High Complexity	RxB1
() Type 2	Moderate Complexity	RxB2
() Type 3	Low Complexity	RxB2
() Type 3	Very Low Complexity (all 42 elements of the Complexity rating are low; no possibility of spread or spotting, only one fuel model involved; no aerial operations, and less than 6 personnel involved)	RxB3

Minimum qualifications determined by prescribed fire complexity are listed below. Exceptions must be approved by the Installation Safety Director.

Position	Type 1 Burn	Type 2 Burn	Type 3 Burn
Agency Administrator	Required	Required	Required
Safety Officer (T1,2,or 3)	Recommended	Optional	Optional
RxM1	Optional	Optional	Optional
RxM2	Not allowed	Optional	Optional
RxB1	Required	Optional	Optional
RxB2	Not allowed	Required	Optional
RxB3	Not allowed	Not allowed	Required
RxI1	Required	Optional	Not applicable
RxI2	Not allowed	Optional	Not applicable

Holding specialist: Holding functions will be managed by personnel qualified at the appropriate ICS wildland fire operations position as required by complexity, assigned resources and operational span of control. For some projects, there may be no holding requirements or the holding duties are assumed by the Burn Boss.

Prescribed Fire Complexity Rating System Guide Worksheet

Project Name: MMR 06-03 (North Lobe of Firebreak Road)

1. Potential for Escape

Risk	Rationale
<p>Preliminary Rating: <i>Low Moderate <u>High</u></i></p>	<p>All targeted burn areas are inside the lobes of the firebreak road. Given a 10 mph wind, spot fires could ignite as far as 500 meters from the burn unit, on the outside of the main firebreak road. Effectiveness of engines and ground personnel is limited to road edges and other areas cleared of UXO. Based on BEHAVE/CONTAIN runs, effective helicopter support will be critical in containing spot fires outside the prescribed burn area.</p>
<p>Final Rating: <i>Low <u>Moderate</u> High</i></p>	<p>Koa haole shrubs are particularly prone to causing spot fires and this shrub grows in the burn units, but the probability of a lit firebrand traveling to the maximum spotting distance is low. Historically, spot fires have occurred within several feet of the firebreak road, not any farther upslope. Ninety five percent of all spot fires are expected to occur within 60 meters of the burn perimeter. However, long range spotting may occur. Although maximum spotting distance increases as wind speed increases, the prescribed 1-hour fuel moisture decreases, and subsequently probability of ignition of a spot fire decreases. The maximum spotting distance, give a 14 mph wind, is 805 meters, but burning is only prescribed for high live herbaceous and 1-hour fuel moistures at such high wind speeds. It is unlikely that firebrand will stay ignited 805 meters and land on receptive fuel, but if it does, the probability of ignition of a spot fire at a 1-hour fuel moisture of 12% is 26 percent. Because spot fires are possible, helicopter suppression support has been prescribed which will limit the size of any spot fire occurring in guinea grass, on a 60% slope with direct upslope winds to between four and 88 acres. The largest spot fire within the forest fuels would be 0.3 acres. The Maximum Manageable Area (MMA) does provide for a potential maximum spot fire size of 88 acres. Although the probability of ignition of a short-range spot fire remains moderate (at 1-hour fuel moisture of 7%, probability of ignition is 53%), the ignition protocols are conservative and the holding forces are adequate.</p> <p>There is approximately a 90 percent greater probability of spot fire occurrence on prescribed burns in the north lobe of the firebreak road, than on burns in the south lobe of the firebreak road, due to the lack of grass mowing/treatment along the inside edge of the firebreak road in the north lobe. Suppression forces are adequate to contain all spot fires occurring during the burn, and escape is not anticipated.</p>
Potential Consequences	Rationale
<p>Preliminary Rating: <i>Low Moderate <u>High</u></i></p>	<p>Federally listed fire-sensitive endangered and threatened plants and animals, and substantial areas of critical habitat are located upslope of the burn unit, outside the main firebreak road.</p>
<p>Final Rating: <i>Low Moderate <u>High</u></i></p>	<p>All personnel will be familiar with the locations of critical resources which could be damaged by fire so that suppression actions can be prioritized in order to better ensure that these resources or the shrub vegetation protecting them are protected from fire.</p>
Technical Difficulty	Rationale

Preliminary Rating: <i>Low Moderate <u>High</u></i>	Ignition is scheduled to be completed when all of the spot weather forecast hourly parameters and fuel moisture conditions are predicted to be in prescription during all hours of the burn. Ignition will not commence until early twilight, approximately 30 minutes prior to sunrise, or whenever fire suppression helicopters are available to commence fire suppression work.
Final Rating: <i>Low Moderate <u>High</u></i>	While the use of engines and helicopters ensures the adequacy of holding operations, the presence of UXO will still limit the effectiveness of ground-based resources off the perimeter roads. A skilled weather observer and/or IMET will be necessary in order to monitor all of the current and expected weather and fuel moisture conditions to better ensure that burning conditions remain within prescribed limits during the burn. This is a relatively large burn unit with relatively narrow perimeter lines. Endangered species occur immediately adjacent and upslope of the burn unit.

2. The Number and Dependency of Activities

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Coordination and cooperation between various parties on the burn will be complicated by the use of personnel from several agencies and fire suppression organizations. Multiple aircraft will be assigned to the burn.
Final Rating: <i>Low <u>Moderate</u> High</i>	This will be mitigated by briefings and ensuring that all resources are able to communicate via a common radio frequency. Multiple aircraft increase the complexity of the burn.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Failure to communicate can be result in an escaped prescribed burn or a fatality. Coordination and a coordinated and timely response will be necessary to prevent spot fires and ensure inefficient response to spot fires.
Final Rating: <i>Low Moderate <u>High</u></i>	Briefings will be thorough and will incorporate coordination and communication.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Continuous coordination and communication is critical to the success of holding and contingency actions.
Final Rating: <i>Low <u>Moderate</u> High</i>	Multiple aircraft increase the complexity of the burn. Air attack may be necessary. Radio, telephone, and internet communications will be established and maintained.

3. Off-Site Values

Risk	Rationale
------	-----------

Preliminary Rating: <i>Low Moderate <u>High</u></i>	Cultural resources, endangered species critical habitat, and endangered species could be threatened by a spot fire.
Final Rating: <i>Low <u>Moderate</u> High</i>	The parameters in this prescription were developed to minimize the risk of loss of off-site values in a spot fire.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	The consequence of damaging critical habitat would be very high if an escape damages habitat. All existing wild individuals of some plant species may be extirpated by a large escaped prescribed burn.
Final Rating: <i>Low Moderate <u>High</u></i>	The Army is implementing stabilization plans for the listed species in the Makua area. Even when listed species in the Makua Action Area are stabilized, many “manage for stability” populations will remain in the vicinity of the burn. Loss of individuals in these target populations due to an escaped prescribed burn would be unacceptable. Loss of listed plants growing outside the Management Units, although not preferable, may occur. Measures will be taken to minimize the potential for spot fire occurrence and to minimize spot fire size. Furthermore, the implementation of grass removal in the vicinity of listed species, as well as landscape scale conversion of grass areas into firebreaks and shaded fuel breaks will ensure that listed species inside the Management Units and critical habitat areas will not be impacted by a spot fire. Burned designated critical habitat areas or forested areas within the Management Units would be restored pursuant to the specifications in the Biological Opinion.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Steep slopes, flammable exotic grass fuels, unexploded ordinance, and multiple aircraft give suppression of spot fires high technical difficulty.
Final Rating: <i>Low Moderate <u>High</u></i>	Technical difficulty of utilization of multiple aircraft to suppress spot fires in heavy grass fuels on steep slopes is high, although our experience suggests that when the grass is green (live herbaceous fuel moisture 100 percent and higher), it may be less difficult. Many factors affecting technical difficulties associated with control of spot fires can not be mitigated, although pre-ignition checks will ensure a high reliability organization operates in the event of a spot fire.

4. On-Site Values

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Fire could threaten certain aspects of archeological and cultural resources within the burn units.
Final Rating: <i><u>Low</u> Moderate High</i>	Grass fuels will be cleared back from around all known archeological resources which could be injured by fire prior to burning.

Potential Consequences	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Fire could threaten certain aspects of archeological and cultural resources within the burn units.
Final Rating: <i><u>Low</u> Moderate High</i>	Grass fuels will be cleared back from around all known archeological resources which could be injured by fire prior to burning.
Technical Difficulty	Rationale
Preliminary Rating: <i><u>Low</u> Moderate High</i>	Grass fuels can be cleared by hand crews using weed eaters.
Final Rating: <i><u>Low</u> Moderate High</i>	Grass fuels can be cleared by hand crews using weed eaters.

5. Fire Behavior

Risk	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Adequate consumption of fuels inside the unit, particularly around the edges and any other area targeted for fuel reduction would require burning under conditions where the potential for a rapidly growing spot fire also exist. Guinea grass burns with approximately three times the flame length as FBPS Fuel Model 3 (tall grass, including sawgrass).
Final Rating: <i>Low <u>Moderate</u> High</i>	In order to take advantage of cooler burning conditions when a spot fire's growth would be slowed by fuel moisture conditions, areas specifically targeted for fuel reduction within the burn units may be browned by herbicide treatment prior to burning and the burn will only be conducted when live herbaceous fuel moisture outside the burn unit is calculated to be 100% or higher at the Makua Range weather station (WIMS 490301). To ensure that herbicide does not drift from the targeted areas to any areas outside the burn units, herbicide will only be applied by skilled pilots on days when wind conditions are conducive to application accuracy. The herbicided grass is highly flammable and will burn with high flame lengths and rates of spread, even under cool burning conditions early in the morning. Guinea grass, even with live fuel moistures over 100% and high dead fuel moistures, is still capable of producing flame lengths over 10 feet and high rates of spread so sufficient suppression force will be required to contain spot fires. Burned grass areas remain hot and inaccessible to firefighters long after the fire front has passed.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Spot fires are a substantial concern at Makua. Maximum spotting distance and spot fire size are minimized by burning under light wind conditions.

Final Rating: <i>Low Moderate <u>High</u></i>	Koa howlie shrubs are particularly prone to causing spot fires and this shrub grows in the burn units. The perimeter firebreak road is narrow enough that flame length may permit the fire to slop over the road if ignition is not conducted appropriately.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Need to mitigate for potential extreme fire behavior by burning under relatively cool burning conditions. Need to protect listed species from fire by managing grass fuels.
Final Rating: <i>Low <u>Moderate</u> High</i>	To better ensure a high reliability organization during the implementation of the prescribed burn, several issues will be dealt with prior to ignition, including hooking up and testing all helicopter water buckets, testing communications, and completing grass control efforts in the vicinity of “manage for stability” populations of listed species in Lower Ohikilolo Management Unit.

6. Management Organization

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Burn requires substantial coordination with National Weather Service fire desk forecasters, military and civilian contract helicopters, Army fire staff, and other Army and interagency fire personnel.
Final Rating: <i>Low <u>Moderate</u> High</i>	Several agencies will participate in the prescribed burn. Highly skilled NWCG – qualified personnel and personnel from other fire agencies with substantial local experience will be assisting with the burn.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Lack of coordination resulting in the lack of a detailed spot weather forecast, poor road maintenance, or the lack of sufficient qualified ignition and holding resources would result in a no-go decision for burning. Poor press coverage would hamper the Army’s credibility and future ability to manage the site successfully.
Final Rating: <i>Low Moderate <u>High</u></i>	Rescheduling the burn due to a no-go decision may require additional herbicide if previously treated areas have greened up. Poor press coverage can be mitigated by working with Public Information Officer.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Substantial coordination will occur prior to and during the burn to ensure that all necessary activities are coordinated.
Final Rating: <i>Low <u>Moderate</u> High</i>	Substantial coordination will occur prior to and during the burn to ensure that all necessary activities are coordinated.

7. Public and Political Interest

Risk	Rationale
-------------	------------------

Preliminary Rating: <i>Low Moderate High</i>	This area is very controversial, and a burn will be controversial. Escapes have occurred in the past, and were major media events.
Final Rating: <i>Low Moderate High</i>	Successful, professionally conducted prescribed burns will result in increased trust in the Army's work at Makua. Regardless of the success of prescribed burns, Army activity in Makua valley is likely to remain a concern to many interest groups.

Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate High</i>	Escaped prescribed burns damage cultural, scenic, aesthetic, and natural resources.
Final Rating: <i>Low Moderate High</i>	Successful, professionally conducted prescribed burns will result in increased trust in the Army's work at Makua. Regardless of the success of prescribed burns, Army activity in Makua valley is likely to remain a concern to many interest groups.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low Moderate High</i>	The Army public relations office can work with the public and media to engender support for the prescribed burn. Prescribed weather and fuel moisture conditions must be substantially limited, and suppression forces must be substantial to ensure that resources are protected.
Final Rating: <i>Low Moderate High</i>	Public relations and coordination of substantial suppression resources are scheduled to ensure that resources are not damaged by the prescribed burn.

8. Fire Treatment Objectives

Risk	Rationale
Preliminary Rating: <i>Low Moderate High</i>	The continuous grass fuel burns readily, however, at high live herbaceous fuel moistures, burns have historically been patchy.
Final Rating: <i>Low Moderate High</i>	Herbicide may be applied to areas which must burn to ensure complete consumption and to further aid in grass fuel reduction on the site.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate High</i>	If we miss burning any targeted burn areas, they can be re-treated with herbicide and burned after three to four weeks.
Final Rating: <i>Low Moderate High</i>	Because all holding forces would be necessary for the second burn, the second burn would approximately double the cost of the burn. The financial costs associated with this burn are substantial.
Technical Difficulty	Rationale

Preliminary Rating: <i>Low <u>Moderate</u> High</i>	It is not difficult to identify dried areas from the air or ground, so the target burn areas will be easy to find. Depending on fuel moisture and weather conditions, it may be moderately difficult to burn the unit.
Final Rating: <i>Low <u>Moderate</u> High</i>	It is not difficult to identify dried areas from the air or ground, so the target burn areas will be easy to find. Depending on fuel moisture and weather conditions, it may be moderately difficult to burn the unit.

9. Constraints

Risk	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Endangered species stabilization, fuelbreaks and firebreaks, and fire suppression contingency force planning, and burn preparation are expensive and require substantial commitments from Army environmental and fire staffs.
Final Rating: <i>Low <u>Moderate</u> High</i>	A spot weather forecast with forecasted weather for each hour during the burn will enable the procurement of the appropriate contingent of air support for suppression of a spot fire to minimize costs. Fuelbreak and firebreak completion will further reduce costs.
Potential Consequences	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	If the objectives are not being met or if weather conditions go out of prescription, we will extinguish and postpone the burn. It will take approximately one hour for the helicopters on site to extinguish the burning edge of the fire, partitioning it from the unburned portion of the burn.
Final Rating: <i>Low <u>Moderate</u> High</i>	If the spot weather forecast called for all weather conditions to be in prescription for the duration of the burn and one hour after ignition, and the fire escapes due to an unexpected weather event, the Army does not bear such a burden of blame for the escape.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Funding, spot weather forecast requests, and resource ordering will be moderately difficult to coordinate.
Final Rating: <i>Low <u>Moderate</u> High</i>	Funding, spot weather forecast requests, and resource ordering will be moderately difficult to coordinate.

10. Safety

Risk	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Unexploded ordinance (UXO) may detonate when it is burned. Air and ground resources are on different radio frequencies. Herbicided grass may be hazardous to firefighter health.
Final Rating: <i>Low Moderate <u>High</u></i>	Firefighters and helicopters must follow standard operating procedures when igniting burn unit and fighting spot fires in order to reduce exposure to unexploded ordinance. Firefighters will be positioned to limit exposure to smoke from herbicided grass.

Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate High</i>	The consequences of a UXO detonation could be hearing loss, trauma, or fatality if a firefighter is in the burst radius.
Final Rating: <i>Low Moderate High</i>	Briefings will be provided to all resources to ensure understanding of the mitigation measures needed to minimize risk associated with UXO and herbicide.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low Moderate High</i>	Substantial mitigation measures need to be instituted in order to reduce firefighter exposure to UXO and herbicide smoke.
Final Rating: <i>Low Moderate High</i>	Standard operating procedures have been developed ahead of time so that all resources can be briefed on limiting exposure to UXO and herbicide smoke. Use of helicopters substantially reduces firefighter exposure to UXO.

11. Ignition Procedures/Methods

Risk	Rationale
Preliminary Rating: <i>Low Moderate High</i>	Technical expertise has been specified by the plan in order to control ignition sequence in order to prevent spot fires. The burn will be cut off when weather parameters hit prescribed limits to ensure that no spot fire is ignited under other than the prescribed conditions. In order to reduce the chance of fire spread if weather parameters go out of prescription, the interior of any large expanses within the burn unit will be ignited to keep it relatively even with the edges. This may require the use of flare guns or aerial ignition in the interior of the burn units.
Final Rating: <i>Low Moderate High</i>	If grass is treated with herbicide it will not be difficult to black line by hand. No ignition of the burn area perimeter will be conducted from the air unless there is an area 60 meters or wider between the burn area and the firebreak road which is either mowed grass with live herbaceous fuel moisture content over 200% or otherwise treated vegetation that is not likely to burn. Aerial ignition will not be conducted immediately adjacent to any perimeter firebreak road until the firebreak road has been blacklined by hand.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate High</i>	The results of a mistake in ignition may be a spot fire and a threat to endangered species.
Final Rating: <i>Low Moderate High</i>	Ignition procedures have been designed to minimize the likelihood of a spot fire, but a spot fire may still occur.
Technical Difficulty	Rationale

Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Firefighters skilled in ignition and holding will be needed to conduct blacklining along the perimeter of the unit.
Final Rating: <i>Low <u>Moderate</u> High</i>	Preparation of the perimeter of the unit with herbicide will reduce the difficulty the ignition crew will have with blacklining operations. Aerial ignition will be conducted by a highly skilled pilot with many years of aerial ignition experience in Guinea grass fuels. Because holding will rely heavily on the use of helicopter bucket operations, the technical difficulty of ignition remains moderate.

12. Interagency Coordination

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Several agencies will be contributing skilled personnel to the burn. The Army is in a period of building trust with other agencies and the public following recent escaped prescribed burns at Makua.
Final Rating: <i>Low <u>Moderate</u> High</i>	Skilled personnel from many agencies will assist with planning and implementation of the burn. If the burn escapes and the Army used this best available weather data and drew on the best available expertise, the Army would limit their exposure to law suits.
Potential Consequences	Rationale
Preliminary Rating: <i>Low Moderate <u>High</u></i>	Disagreement between the agencies, or finger pointing in after-actions of an escape are very damaging to agency cooperation. However, assistance from available skilled specialists from other agencies in Hawaii, including experts from the National Weather Service, National Park Service, US Forest Service, and the US Fish and Wildlife Service and using skilled ignition and holding personnel from other agencies could increase the likelihood of a successful outcome to the burn.
Final Rating: <i>Low Moderate <u>High</u></i>	Skilled personnel from many agencies will assist with planning and implementation of the burn. If the burn escapes and the Army used this best available weather data and drew on the best available expertise, the Army would limit their exposure to law suits.
Technical Difficulty	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Army staff must maintain cooperative agreements and have protocols in place for ordering resources to fill prescribed fire positions.
Final Rating: <i>Low <u>Moderate</u> High</i>	The Army has protocols in place for ordering Army and civilian contract helicopter support, and assistance from Navy Fed Fire Department, PTA firefighters from the Big Island. The National Weather Service has developed a new internet-based spot weather forecast for prescribed burns. Given updated cooperative agreements, US Department of Interior and Agriculture personnel could be available, free of charge, to the Army to fill skilled positions on the prescribed burn.

13. Project Logistics

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Many logistical tasks must be completed ahead of time to ensure that all needed supplies and equipment are on site for the burn. Helicopter fuel must be on site during the burn. No food or overnight accommodations other than tents are available at Makua.
Final Rating: <i>Low <u>Moderate</u> High</i>	Planning and pre-positioning will ensure that logistical needs will be satisfied.
Potential Consequences	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	If any required item is missing, we would need to postpone the burn.
Final Rating: <i>Low <u>Moderate</u> High</i>	If any required supplies are missing, we will postpone the burn.
Technical Difficulty	Rationale
Preliminary Rating: <i><u>Low</u> Moderate High</i>	Planning will mitigate this factor.
Final Rating: <i><u>Low</u> Moderate High</i>	Planning will mitigate this factor. Many logistical tasks will be completed ahead of time to ensure that all supplies and equipment are on site for the burn.

14. Smoke Management

Risk	Rationale
Preliminary Rating: <i>Low <u>Moderate</u> High</i>	Paved public road leading to relatively low use beaches adjacent to Makua may be crowded with onlookers. Need to monitor smoke on public road and post speed limits according to visibility. Accidents may occur which are unrelated to prescribed burn's smoke so smoke and visibility monitoring will be necessary to ensure the smoke does not contribute to an accident. Set up temporary prescribed burn signs on public road. Smoke may cause the greatest concern just before sunrise when smoke dispersion and visibility in general is still poor. However, very little traffic is expected in the Makua area so early in the morning. Good daytime dispersion will minimize smoke on road. Residual smoke will be limited due to rapid consumption of grass fuels.
Final Rating: <i>Low <u>Moderate</u> High</i>	Smoke conditions on Farrington Highway will be monitored and traffic will be controlled if necessary if visibility becomes a concern.

Potential Consequences	Rationale
Preliminary Rating: <u>Low</u> Moderate High	An accident on the public paved road resulting in injury or private property damage could be blamed on a smoke-related visibility issue. Need to monitor and document smoke and visibility on the highway during the prescribed burn. Need to institute nationally recognized smoke management plan for setting speed limits, controlling traffic with escorts, and closing the road.
Final Rating: <u>Low</u> Moderate High	Visibility will be monitored and documented on the public paved road during the prescribed burn per the smoke management section of the plan. Traffic controls, including speed limit restrictions, escorts, and road closure will be applied according to the smoke management section of the plan.
Technical Difficulty	Rationale
Preliminary Rating: <u>Low</u> Moderate High	Will need to check weather forecasts and get a spot weather forecast and be vigilant. Smoke from dried vegetation will be minimal.
Final Rating: <u>Low</u> Moderate High	Smoke conditions on Farrington Highway will be monitored and traffic will be controlled if necessary if visibility becomes a concern.

ANALYSIS OF OVERALL COMPLEXITY – North Lobe Firebreak Road

Hazard Element	Complexity Value		
	L	M	H
1. Potential for escape			X
2. Number and dependency of activities		X	
3. Off-site values			X
4. On-site values	X		
5. Fire behavior			X
6. Management organization		X	
7. Public and political interest			X
8. Fire treatment objectives		X	
9. Constraints		X	
10. Safety			X
11. Ignition procedures/methods		X	
12. Interagency coordination		X	
13. Project logistics		X	
14. Smoke management	X		
Total	2	7	5
Resulting Determination	HIGH		

SECTION 7
COMMUNICATION PLAN (Contact Information Will Be Updated Periodically)

A. Notify by letter

Kenneth Silva	Honolulu Fire	letter: 3375 Koapaka Street, Ste H425, Honolulu, HI 96815 ksilva@honolulu.gov
Glen DeLaura	Federal Fire Dept	letter: 850 Ticonderoga Street, Ste. 106, Pearl Harbor, HI 96860-5102 glenn.delaura@navy.mil 473-5723 cell 306-6756

B. Submit plan and Record of Environmental Consideration (REC)

Dale Kanehisa	DPW, Environmental	
Peter Yuh	DPW, Environmental	
Gary Shiratata	Army Corps of Eng	gary.n.shirakata@ponu1.usace.army.mil
Uyen Tran	Army Corps of Eng	

C. Notify by email confirming burn schedule

Bobby Abad	Federal Fire Dept	668-3420 Robert.abad@navy.mil
Patrice Ashfield	US Fish and Wildlife	792-9400 patrice_ashfield@fws.gov
Bill Bouley	US Army IFSO	656-9540
Dan Brown	Federal Fire Dept	590-7729 browndk@navy.mil
Tommy Casserly	Federal Fire Dept	590-7736 cell Thomas.casserly@navy.mil
Wayne Ching	State Protection	587-4173 wayne.f.ching@hawaii.gov
Pat Costales	Hawaii DNR	973-9787 patrick.g.costales@hawaii.gov
Glen DeLaura	Federal Fire Dept	473-5723 (o) 306-6756 (c) glenn.delaura@navy.mil
Michael Donnelly	US Army PAO	655-9997
Gayland Enriques	Federal Fire Dept	473-0343 (o) 225-5938 (c) gayland.enriques@navy.mil
Alton Exzabe	US Army Arch	656-2878
Sharon Frank	Pacific Helicopters	9-7-808-871-9771 cell 9-7-808-870-2152
Howard Estebrook		479-1492
Tom Hauptman		sharon@pacheli.com
Lawrence Guillermo		request a fuel truck with helicopters
Brad		781 7783
Victor Garo	Army Range Control	655-1404
Joel Godfrey	Army Environmental	656-2879 x 1050
Dawn Greenlee	U.S. Fish & Wildlife	792-9469 (o) dawn.greenlee@fws.gov
Jason Greenlee	Army Fire	656-1331 jason.m.greenlee@us.army.mil
John Highfill	US Army G3	655-8212
Walt Hilgareth	Zapeta Engineering	630-4352 whildreth@zapeng.com
Sammy Houseberg	US Army IFSO	656-3550
Eddie Kaai	US Army DPTM	696-4892
Kevin Kodama	National Weather Serv	973-5276 Consult on drought effects on fire behavior Kevin.kodama@noaa.gov

Jeff Lefebvre	Army Air Quality	656-2878 x 1059
Laurie Lucking	Army Archeology	656-2878 x 1052
Michelle Mansker	DPW, Environmental	656-2878 x 1029
Eric Moller	US Army IFSO	99-433-1810, 1, 441#
Elena Onaga	US Army Attorney	438-2291
Salvadore Petrovia	US Army G3	655-4084
Tommy Piskel	US Army Contractor	655-1597
Jeff Powell	National Weather Serv.	973-5280(fax 973-5281) jeffrey.powell@noaa.gov
Frank Raby	Range Control	655-1990
William Roome	US Army PAO	655-0760
Gary Shirakata	US Army Corps Eng	438-0772
Kenneth Silva	Honolulu Fire	ksilva@honolulu.gov
Ken Torre	Range Control	655-9509
Kendrick Washington	Army Public Relations	656-4221
Peter Yuh	DPW, Environmental	656-2878 x 1051 Consult about REC document

The following email addresses are on my desktop in a word file for emailing messages about the status of a burn:

patrick.g.costales@hawaii.gov; gary.n.shirakata@poh01.usace.army.mil;
Patrice Ashfield@fws.gov; Dawn Greenlee@fws.gov; thomas.casserly@navy.mil;
robert.abad@navy.mil; Godfrey, Joel E CIV USAG HI DPW; sharon@pacheli.com;
wayne.f.ching@hawaii.gov; glenn.delaura@navy.mil; ksilva@honolulu.gov;
browndk@navy.mil; Bouley, William R CIV USA USARPAC USAG HI SAFETY;
whildreth@zapeng.com; jeffrey.powell@noaa.gov; Gayland.enriques@navy.mil;
Kevin.kodama@noaa.gov; Onaga, Elena J CIV DIV L 25 SJA; Garo, Victor Jr CIV USAG
HI DPTM; Petrovia, Salvatore J LTC HHC DIV 25ID G3; Greenlee, Jason M CIV USA
USARPAC USAG HI SAFETY; Torre, Kenneth P CIV USAG HI DPTM; Yuh, Peter CIV
USAG HI DPW; Mansker, Michelle L CIV USAG HI DPW; Lucking, Laurie CIV USAG
HI DPW; Kaai, Eddy CIV USAG HI DPTM; Houseberg, Sammy CIV USA USARPAC
USAG HI SAFETY; Highfill, John D MAJ USA USARPAC DIV 25 BDE 2 CAV 5 14;
Piskel, Thomas P CTR USAG HI DPTM; Ching, Susan N CIV USAG HI DPW RCUH;
Raby, Franklin D USAG HI DPTM; Donnelly, Michael O LTC DIV 25 PAO; Exzabe,
Alton J CTR USAG HI DPW RCUH; Lefebvre, Jeffrey S CIV USAG HI DPW; Roome,
William H 25 ID PAO; Washington, Kendrick CIV DIV 25 PAO;
KatkowM@SHAFTER.ARMY.MIL; Gardin, Stefanie A CIV DIV 25 PAO; Payne,
Shanon A CTR USAG HI DPTM; Borja, Berno S CIV USAG HI DPTM; Lai, Steve C CIV
USAG HI DPTM

C. Notify on day of burn

Honolulu Fire Department	523-4411
State Forestry	587-4173
Dept. of Health, Clean Air Branch	586-4200

RADIO COMMUNICATIONS

Find the radio communication plan in the Incident Action Plan (attached).

An LCES check will be made periodically by the burn boss or his/her designated person. All personnel on the burn will respond with "LCES in place" when the check is called for.

SECTION 8 IGNITION PLAN

1. Briefing

Sand-box drills and briefing schedules will be announced by email. All resources on the burn are required to attend the final briefing. Briefings are mandatory. Everyone involved with the prescribed burn will be briefed prior to implementation. Briefings will cover: objectives, organizational roles and assignments, LCES, ignition patterns and techniques, fire behavior, weather, contingency planning, safety hazards and precautions. Briefings will include graphic aids, such as aerial photos, road maps, etc. Some form of geographic reference, such as maps or copies of aerial photos, will be provided for personal reference to all crew members unless the entire burn area can be seen from every position on the burn.

2. Test Burn

A test burn will be conducted prior to ignition. All of the resources required to be on-site for the prescribed burn will be at the test burn or at least on site, and will be checked in with the staging area manager and/or Operations Section. The test burn may not occur until the assigned helicopters are on-site, tested, and able to fly ½ hour prior to sunrise. The test burn area will be selected during the briefing at an area convenient for extinguishing the burn and with wind direction in consideration. The Burn Boss or Ignition Boss will be present to ensure the test burn is completed properly. Test burn results will be documented, the crew will be provided with a briefing, and job hazard analysis will be included in the briefing. A spot weather forecast will be obtained prior to test burn (required for every day of the burn on Type 1 and T2 burns and recommended for T3). Completion of a test burn will be relayed to all resources.

3. Ignition sequence

A. Type equipment which may be used for ignition

- (x) Drip torches
- (x) Aerial ignition (plastic spheres or aerial torch)
- (x) Motorized torches (ATV, terra torch)
- (x) Other ground-based incendiaries (fuses, flare guns)

C. Ignition Pattern

A lookout will be posted on high ground or other place with a good view of 100% of the burn area.

The Burn Boss will brief the ignition pattern for the burn prior to the test burn, using a sand table, if available.

The following is an example of an ignition pattern that is planned for a small burn at MMR.

“Resources will initially stage at Point D on the map below for the test burn, which will be lit at 0700 on the day of the burn. Helicopters will be warmed up and ready to lift off with buckets, Point D contains a dangerous “dog leg” of fuel that will be burned before onset of the rest of the burn. Firing teams will move from the dog-leg, once completed, northward toward E and then F, continuing to fire cautiously. Army holding teams will follow at prescribed distances, watching for spots over the line. Once F has been reached and the line from D to F is secure, two teams will slowly pull fire along the rim of Gulley A-E. The team starting at D will move slowly toward C. The team starting at F will move slowly toward G. Both teams will make an effort to keep their fires on line across the gully. The D to F road will continue to be patrolled during the entire burn. Once C and G are reached (or at such time as the burn boss elects), firing teams will stop firing and move to Point A. Point A contains another dangerous dog-leg that will be carefully and

slowly burned out before proceeding. Helicopters will wet A-H and A-B on the far side of the firebreak road to ensure against spotting. After helicopters have completed this mission, two firing teams will proceed slowly from A to B and from A to H, again coordinating their movements to avoid any unburned fuels from being left behind that can act as a wick and cause fire running and gaining momentum. Once H and B have been safely reached, the burn boss will decide whether to use the Jet Ranger and plastic sphere dispenser to complete the ignition operations.”

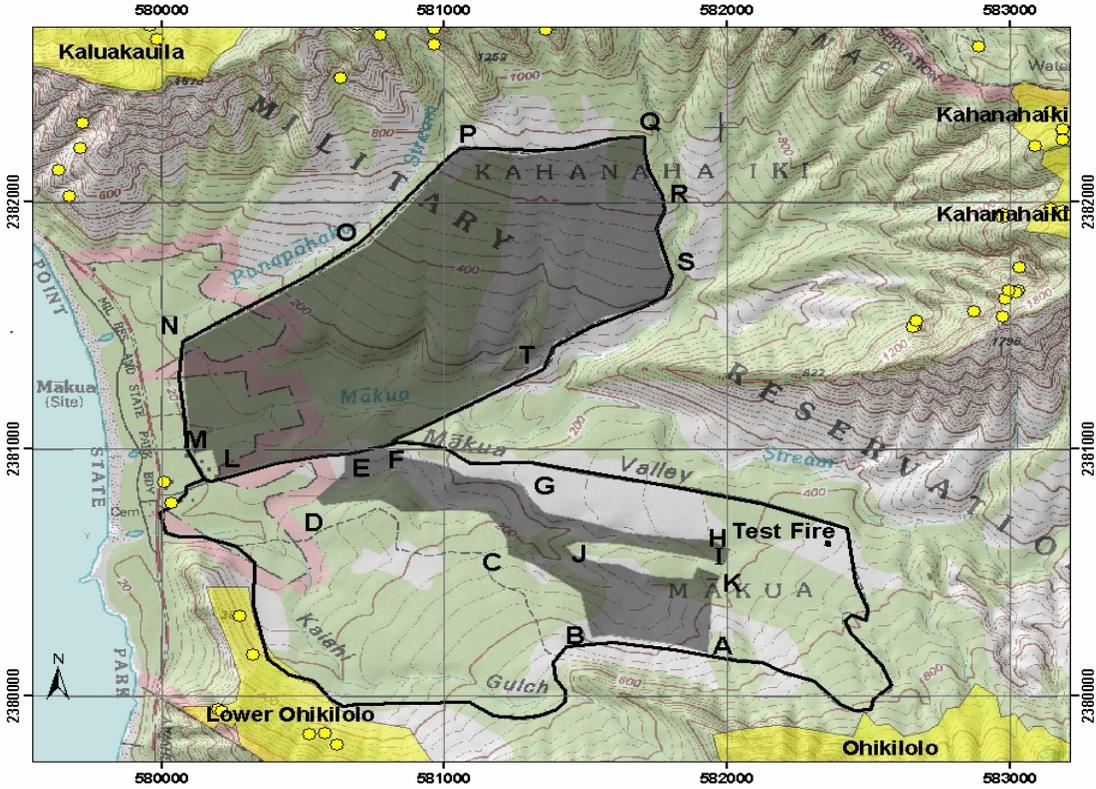


Figure 6: Example of an ignition plan for a small burn (Letters A through H) in the South Lobe of the Firebreak Road.

SECTION 9 HOLDING PLAN

Holding forces are noted in the organization chart. In addition to these personnel and engines, the following equipment will be on hand:

- 4 number of chainsaws
- 4 number of back-pack pumps
- ___ number of folda-tanks
- ___ number of _____
- ___ number of _____

The Burn Boss, Holding Boss, and crew will remain on scene until fire has burned down and threat of spotting or escape no longer exists, or until released by the Burn Boss.

CONTINGENCY PLAN

Two contingencies are anticipated on these burns – an escaped fire and a medical emergency. An escaped fire is defined as fire which has exceeded or is expected to exceed prescribed fire holding and contingency capabilities, prescription elements, or criteria established in the prescribed fire plan triggering the declaration of a wildfire.

A. Arranging for contingency resources for an escaped fire:

The Burn Boss will request availability of contingency resources from the Federal Fire Department in advance, as part of the planning process. If these resources are to be used, channels for communication will be agreed on.

B. Maximum Manageable Area (Figure 7) The Maximum Manageable Area (MMA) does provide for an anticipated potential 88 acre spot fire, which may burn in grass fuels outside the firebreak road. A spot fire burning any area outside of the Maximum Manageable Area, would be considered an escaped prescribed burn. Figure 7 shows the threatened and endangered species, management units, and designated critical habitat areas to be protected from a spot fire.

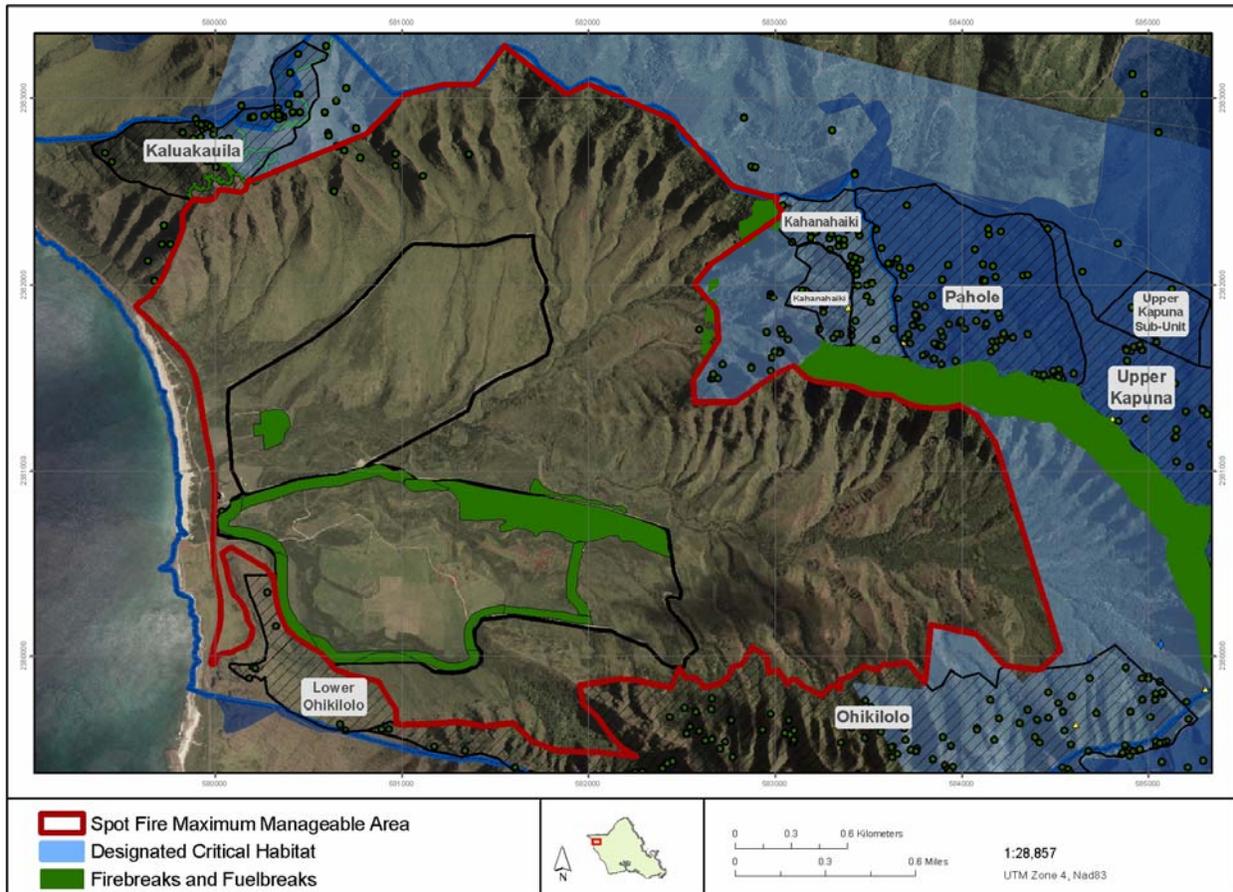


Figure 7: Maximum Manageable Area: The MMA is the area inside the installation which is not within a Management Unit or designated critical habitat. Prevent fire from burning into Rare Species Management Units, cross-hatched areas and shaded designated critical habitat areas. Spot fires up to 88 acres in size burning within the area bounded by the red line (MMA) would not be considered escaped prescribed burns.

C. Spot fires

If the fire spots outside the control lines this does not necessarily indicate an escape. An escape will be declared if the spot moves, or threatens to move, the fire outside the Maximum Manageable Area. If the fire spots across a control line, the following will be implemented:

1. Crew members will notify the holding boss and burn boss by radio.
2. All resources will be notified and should confirm notification.
3. All ignition will stop until the crew evaluates the spot(s).
4. The Burn Boss will review the contingency plan and the criteria for declaring an escape. The Burn Boss will plan or initiate any actions that will better prepare for declaration of an escape (notifying dispatch of a possible problem, moving holding resources, reassigning ignition resources, etc.).
5. If the Burn Boss has not already done this, a staging area for incoming resources should be designated and manned by a person familiar with the burn unit.

D. Notifications to be made if there are problems

1. Notification of spots over control lines:

Personnel witnessing spots will notify the holding boss by radio. All personnel on the fire will hear this news, and the holding boss will confirm that all personnel have been informed. The holding boss will also confirm that the holding crew is en-route to the location of spot and that the first personnel on site do a size up of the spot. The holding boss will confirm that all personnel have received the size up over radio.

2. Escaped fire notification

The burn boss is notified by holding boss or crew members if a spot cannot be contained by the resources on hand. The burn boss will consult with the Fire Manager and Fire Administration and a decision whether to declare an escape will be made. In the event of an escape being declared, the burn boss will notify the crew of a transition of command from the burn boss to an Incident Commander (IC). The burn boss will notify the IOC via telephone (655-8763, 655-8764) for the Incident Commander.

The Incident Commander or his delegated representative will request contingency resources through Federal Fire representatives on site.

Contingency equipment to be ordered if an escape is declared (this equipment will be confirmed on the day of burn):

Table 7. Contingency equipment requested in the event of the declaration of an escape

<u>Equipment</u>	<u>Number</u>	<u>Source</u>	<u>Arrival Delay</u>
T6 engines (150-400 gal)	2	Federal Fire Dept	15 minutes
Tender/tanker	1	Federal Fire Dept	15 minutes
T1 helicopter (700+ gallons)		US Army	90 minutes
T3 Helicopter (100-299 gallons)	Sufficient to meet Containment goals	Contract	
Air attack	1 (if more than 3 helicopters)	Fire 1(HFD)	60 minutes

3. IOC will notify:

The Commander.

4. The burn boss will assist the Incident Commander in expediting the following actions:

Obtain a spot weather forecast; convert organization to suppression organization; ensure IC gives briefing to resources; ensure a staging area and staging area manager is established; confirm to Incident Commander that all notifications were made.

5. Notifications of injury:

The burn boss notifies IOC via telephone and Federal Fire Department via radio or telephone. Burn boss refers to Medical Plan (Section 15); injured person is evacuated.

SPOT FIRE AND FIRE ESCAPE FIRE CHECKLIST

A. Notification of spots over control lines:

- () Time: _____ Personnel witnessing spots notify Holding Boss by radio for all to hear
- () Time: _____ Holding Boss confirms all personnel have been informed
- () Time: _____ Holding Boss confirms that holding crew is en-route to location of spot and that first personnel on site will do a size up
- () Time: _____ Holding Boss confirms that all personnel have received size up over radio

B. Notifications made on the fireline:

- () Time: _____ Burn Boss is notified by crew member of a problem
- () Time: _____ Fire Administrator determines whether to declare an escape
- () Time: _____ Burn Boss notifies crew of change of command to an Incident Commander

C. Notifications made by burn boss:

- () Time: _____ Burn Boss notifies IOC 655-8763, 655-8764
- () Time: _____ Range Control radio
- () Time: _____ Installation Fire and Safety Director radio
- () Time: _____ Installation Fire Chief radio
- () Time: _____ Federal Fire Department 474-2222
- () Time: _____ Honolulu Fire Department 423-4411
- () Time: _____ U.S. Fish and Wildlife 656-2878
- () Time: _____ Division of Forestry 587-4173

D. Records of steps taken kept by burn boss:

- () Time: _____ Obtain a spot weather forecast
- () Time: _____ Burn Boss converts organization to suppression organization
- () Time: _____ IC gives briefing to resources and ensures a staging area is established.
- () Time: _____ Burn boss and/or incident commander confirms that all notifications have been made.

E. Notifications to be made in case of injury:

- () Time: _____ Burn Boss notifies dispatch via channel 1. Dispatch refers to Medical Plan, Section 16
- () Time: _____ Injured person is evacuated by what means _____

F. Medical Emergencies

If there is a medical emergency, the burn boss and safety officer will be notified. Any EMT's on site will respond. All firing operations will cease. Dispatch will be notified and updated. Dispatch will contact life-flight and confirm ETA, if appropriate. A medical plan is contained in this plan with contact numbers.

WILDFIRE CONVERSION

The fire may spot over control lines may not necessarily be considered an escape, unless burns designated critical habitat or a portion of a Management Unit (Maximum Allowable Area) (map attached). Only the Fire Administrator or a designated representative will declare an escape. The burn will be declared an escape:

1. As soon as it is evident that fire is likely to exceed the Maximum Manageable Area, or

2. If contingency resources are requested by the Holding Boss, or
3. If suppression funds are expended, or
4. As soon as it is evident that any of the other following trigger points are about to be reached:

- () _____
- () _____
- () _____

Actions to be Taken When an Escape is Declared:

1. If an escape is declared, all ignition will be stopped, and all forces on hand will take suppression action.
2. There will be no hesitation in notifying local agencies and contingency resources. It is understood that delay may be considered a negligent act. Immediate notifications to involved personnel and agencies, as per the Communication Plan are critical.
3. A transition will take place between the burn boss and an incident commander. The incident commander will be the individual holding the holding boss position on the prescribed burn. The personnel will be notified of this transition by radio, and will acknowledge that information.
4. After sizing up the situation, the incident commander will hold a briefing of all personnel. Depending on the situation, some personnel may be briefed by radio.
5. Records will be initiated by the burn boss of notifications made, persons answering the notifications, actions being implemented, resources being sent, and times of notifications. The following documentation will be initiated for the Wildfire Situation Analysis (WFSA) preparation and other documentation:
 - a. time of escape declaration
 - b. who was notified
 - c. which contingency resources were requested
 - d. which resources confirmed they were on the way
 - e. what times the contingency resources indicated they would arrive
 - f. what times the contingency resources arrived
 - g. document briefing of the contingency resources
 - h. environmental conditions
 - i. fire/weather observations
 - j. actions prior to and after escape (chronology of events)
 - k. unit logs and individual statements
 - l. weather forecasts
 - m. spot weather forecasts (obtain this now, as you are now in suppression mode)
 - n. data from the nearest weather station (to be obtained by dispatch)
6. Notifications of an escape: Consult the Communications Plan for a notification list in the event of an escape.
7. WFSA. A Wildfire Situation Analysis will be prepared in advance, and no more than eight hours after declaration of an escape.

ESCAPED FIRE SITUATION ANALYSIS (EFSA)

Fire Management Area: Makua Range, Oahu

Location: The Makua Range is located on the west side of Oahu on the coastal road past Makaha.

Fire Name: Makua MMR-06-03

Fire Grid Coordinates:

Date:

Land Status: The area is either leased or owned by the U.S. Army

Adjacent Landowners: U.S. Air Force to the North and private to the south.

Fire Management Option(s): Full Protection Management Option. All fires in these designated areas will receive aggressive suppression effort until the fire is declared out. This option is designed for the protection of high natural resource value areas, and cultural and historical sites found within or adjacent to the fire management area.

This information is used as a pre-attack Escaped Fire Situation Analysis (EFSA) to provide guidelines to the Prescribed Burn Manager for the development of a joint EFSA with the Federal Fire Department (FFD), DOFAW, and City and County of Honolulu Fire Department under the Unified Command Situations of the Incident Command System (ICS).

1. EVALUATION CRITERIA (Check those criteria which MUST be met): MUST

- a. Economic:
 - Government FacilitiesX
 - Military Targetry Equipment
 - Road and Trail NetworkX
- b. Environmental:
 - Watershed Influences
 - Threatened and Endangered SpeciesX
 - Wildlife HabitatX
 - Soil Protection
 - Natural Forest ReservesX
- c. Social:
 - Air Quality
 - Shoreline AestheticsX
 - Hunting, Fishing Habitat
 - General Outdoor Recreation (Camping, hiking, etc.).....
 - Firefighter and Public SafetyX
 - Public ConcernsX
- d. Other:
 - Archeological and Cultural ResourcesX
 - Neighboring LandsX

2. ALTERNATIVES

Alternative	A	B	C	D
General Plan of Control (Strategic)	Full fire control of all fires within burn unit(s)	Contain within Makua firebreak roads	Contain within Makua installation boundary	Contain to Waianae Range
Specific Plan	Direct attack of perimeter	Direct/Indirect attack along MMR firebreak roads	Direct/Indirect attack from fuel breaks and along perimeter Modified Suppression Actions	Direct/Indirect attack from fuel breaks and along perimeter Modified Suppression Actions

Probability of Success	97%	90%	75%	50%
Size (Predicted)	250 acres	<1500 acres	<4500 acres	>5000 acres
Estimated Control Time	< 2 hours	< 8 hours	>12 hours	> 24 hours

3. RESOURCES REQUIRED

Alternative	Firefighting and Logistical Resources	Estimated Cost
A	IFSO, Range Division, Aviation Support, Fed Fire	\$5-10K
B	IFSO, Range Division, Aviation Support, Fed Fire	\$10-15K
C	IFSO, Range Division, Aviation Support, Fed Fire, G3, Honolulu Fire Dept, Division of Forestry & Wildlife	>\$15K
D	All Wildland Fire Cooperative Resources	>\$50K

3. SELECTED ALTERNATIVE

- A. Selected Alternative: A then B then C and then D.
- B. Justification: (Document the rationale, criteria, value change, available resources, etc., for selection of this alternative).
 - a. Full suppression of wildfire is the order.
 - b. Direct attack, going indirect when necessary to contain fire at the smallest size possible, in the shortest period of time.
 - c. Human values at risk from modified suppression actions.
 - d. Unified Command with RDH, FFD, HFD, DOFAW for management of the fire incident.
 - e. Pre-attack guidelines are in the Wildland Fire Management Plan, dated March 2000.
 - f. Potential threat and damage to Threatened and Endangered Species habitat areas.
 - g. Native forest will convert to alien-dominated savanna and grassland types.
- C. Public Information Direction: (Keeping public informed of situation)
 - a. Refer to Army Public Affairs Office (PAO).
 - b. IC will designate Information Officer.
 - c. Cooperation with Oahu Civil Defense Center for complex situations.

**SECTION 10
SMOKE MANAGEMENT AND AIR QUALITY**

Air sheds, restricted areas, non-attainment areas, population centers, highways, airports, recreation sites, and other smoke sensitive receptors that could be impacted were identified (Figure 8).

Particulate matter and chemical components of smoke can be hazardous to the public. Maximum allowable concentrations are set by the Environmental Protection Agency and are known as National Ambient Air Quality Standards (NAAQS). Smoke emissions from this prescribed burn will not result in non-attainment of NAAQS on the public highway, beaches, camping areas, or towns in the area. However, if any area in the state has already reached non-attainment or there is a threat of non-attainment from point sources other than the prescribed burn, the State will declare a no-burn day. The burn boss or designated person will call the State of Hawaii Department of Health, Clean Air Branch to ensure that is a permissible burn day for the selected area (as provided in Hawaii Administrative Rules, Section 11-60, 1-55).

Visibility on the paved public road may be impacted by this prescribed burn and nationally accepted mitigation measures will be put in place to ensure safe traffic movement on the road during the burn. A monitor will document visibility on the road every fifteen minutes during the burn. If visibility for road traffic becomes a public safety concern, posted speed limits may be reduced,

The following guidelines will be put in place in the event that a roadway is impacted by smoke so that public safety will not be compromised:

Table 8A. Road Control Guideline for Two Lane, Two Way Road, Day Light Hours

Posted Speed Limit	Minimum Acceptable Visibility
10 mph	56 feet (if less than 56 feet, begin one-way traffic control)
15	100 feet
25	216 feet
35	370 feet
45	566 feet

Table 8B. Road Control Guideline for Two Lane, Two Way Road, Night Time Hours

Posted Speed Limit	Minimum Acceptable Visibility
10 mph	112 feet (if less than 112, begin one-way traffic control)
15	200 feet
25	432 feet
35	740 feet
45	1132 feet

MONITORING

The following monitoring will be done prior to the burn: Photographs of the burn area will be taken from vantage points that are easy to relocate. The location of the camera will be marked on a map.

The following monitoring will be done during the burn: Photographs of the burn area will be taken from the same vantage points.

The following monitoring will be done after the burn: Photographs of the burn area will be taken from the same vantage points.

POST-BURN ACTIVITIES

After burning is completed, any resource damage that occurs will be repaired (water barring, scattering burns, etc.). A checklist is provided in the documentation section, Element 22.

- () Time/Date: _____ Documentation completed and filed
- () Time/Date: _____ Hazard trees extinguished and/or put on ground
- () Time/Date: _____ Roadside culverts cleaned-out, if needed.
- () Time/Date: _____ Fence lines inspected and repaired
- () Time/Date: _____ Water bars installed on hand-lines
- () Time/Date: _____ Soil sterilization work completed, if needed.
- () Time/Date: _____ Visual quality mitigation completed
- () Time/Date: _____ Notify appropriate persons of any adverse impacts
- () Time/Date: _____ Declare fire out and record date on cover sheet

SECTION 11 SAFETY

Personnel: Work/rest guidelines are the same for prescribed burning as for wildfires. A qualified Safety Officer (minimum of Type 3 qualified SOF) will be assigned to all high complexity prescribed fires and on fires in which any one of the final ratings of the three “Factors” of the “Safety Element” in the Complexity Analysis are rated high. The organization chart, responsibilities, and qualifications will be reviewed. The Burn Boss, Holding Boss, Ignition Boss and other key individuals will be identified. If any changes of leadership are made during the burn, this change will be announced and acknowledged by all individuals on the burn over the radio. An Ignition Boss with fire behavior training and experience will be in charge of the firing operation. Fire behavior expertise and qualifications of the Ignition Boss must be consistent with the complexity of the burn (FFT1 for Low Complexity, RxI2 for Moderate Complexity and RxI1 for High Complexity burns).

Safety standards: All wildland fire safety standards and guidelines will be followed (i.e. 10 fire orders, 18 Watch Out Situations, LCES, and Common Denominators of Fire Behavior on Tragedy Fires, Situational Awareness and Risk Management). The risk management process identified in the NSCG Incident Response Pocket Guide (IRPG, PMS 410-1) helps ensure that critical factors and risks associated with prescribed fire operations are considered during decision making. This process will be applied to all prescribed fire planning and operations.

Briefing: At the briefing, unique safety hazards will be described and a Job Hazard Analysis (JHA) will be covered. The burn crew organization will be clearly defined. Lines of authority will be discussed. The importance of following instructions will be stressed. A project briefing before each burning will clarify fire orders, organization responsibilities and backup plans. Safe use and peculiarities of all equipment and firing devices will be covered. The hazardous characteristics of the area to be burned, such as snags, heavy fuel concentrations, poor footing, loose rocks, terrain, expected fire behavior, safe islands, rolling logs, burning in the vicinity of power lines, unnecessary yelling, radiant and convective heat, transportation and proper identifying flammable fuels. LCES will be in place before operations are initiated. LCES will periodically be verified by supervisors during the operation. The hazards of fuel mixtures used in burning will be discussed. Fuel mixtures will never exceed one gallon of gasoline to four gallons of diesel. The crew will be reminded to keep fuel off clothes. If clothing becomes saturated with fuel, change immediately. The crew will be reminded to use gloves when handling fuel. Clean rags to remove fuel from face and hands will be provided. Crew members will be instructed to wash smoke and fuel residue from hands and face whenever possible. Crew members will be reminded to never pour fuel on the ground or throw it onto flames. Crew will be reminded that excess fuel will be returned to the bulk container. Crew members will be warned about inhaling smoke over extended periods of time. Public safety will be planned, including school bus schedules. A decision will be made whether signing and traffic control are needed.

Debriefing: To ensure enhanced safety in operations, a debriefing will be held after every operational period. The debriefing format will be such that it will encourage open communication and follow-up on items to be monitored and improved in the next operational period.

Transport of any product containing chemicals: transportation and use of any product containing chemicals (drip torch fuel, aviation gas, sphere dispensers, fusees, fuel thickener, etc.) must be in compliance with the Occupational Safety and Health Administration’s (OSHA) Hazard Communication Standard, 29 CFR 1910.1200 and Department of Transportation Regulations (49 CFR part 171), and agency specific guidance. Material Safety Data Sheets (MSDS) for hazardous materials used on projects should be consulted in developing the JHA.

Crew dynamics: The burn boss will engage the crew assertively, positively and in an affirmative manner before, during and after the burn execution. The burn boss will ensure that lines of communication are open, and will continue to check lines of communication throughout the burn. The burn boss will brief the crew to make haste slowly. Do not be rushed, but be deliberate and methodical, keeping the safe and successful attainment of resources and operational objectives as a focus. A fresh safety briefing will be held each burning period/shift. Situational awareness will be discussed with the crew, and it will be emphasized that each person is responsible to speak up if comfort levels are exceeded. Situational awareness before and during the burn is critical to successful outcomes. Pay attention to any sense of discomfort with organizational, strategic, tactical, and environmental factors before and during project execution. Analyze, make adjustments, and document appropriately.

Equipment: All personnel will have a map or aerial photo for reference to their location, the location of other resources, escape routes, and check-in points for contingency resources. The map will be marked with location numbers or other indications for reference over the radio. Personnel will wear all Personal Protective Equipment (PPE) and shall meet health, training and physical requirements. PPE shall be the same as that is required for fire fighting and shall be worn by all personnel while implementing or visiting the prescribed burn. Communication equipment will be provided and the Burn Boss will ensure that workers understand its operation. Each person will ensure that his/her equipment is working properly. The crew will be reminded to park and secure vehicles in a safe area away from flames, chocking wheels, if needed.

LCES check: A periodic LCES check will be made on the radio, with all units reporting back that they have LCES in place, and with the RxB recording the time and responses (see Checklists attached).

Safety Officer: A Safety Officer will be assigned (any Type 1, 2, or 3) to a High Complexity prescribed fire.

RISK ASSESSMENT FACTORS

Severity of the hazard (Expected consequence of an event in terms of degree of injury, property damage, or other mission/task impairment.):

Catastrophic - Death or permanent total disability, system loss, major property damage.

Critical - Injury resulting in permanent partial disability or temporary total disability in excess of 3 months, major system damage, significant property damage.

Marginal - Minor injury, lost workday accident, or compensable injury or illness; minor system damage; minor property damage.

Negligible - Injury resulting in first aid or minor supportive medical treatment, minor system impairment.

Probability of an accident (The likelihood that an event will occur.):

Frequent - Continuously experienced. Likely to occur frequently in life of system, item, facility, etc.

Probable - Will occur frequently. Will occur several times in life of item.

Occasional - Will occur several times. Likely to occur sometime in life of item.

Remote - Unlikely, but can reasonably be expected to occur. Unlikely but possible to occur in life of item.

Improbable - Unlikely to occur, but possible. So unlikely, it can be assumed occurrence may not be experienced.

RISK ASSESSMENT MATRIX

SEVERITY	PROBABILITY OF AN ACCIDENT				
	(E = Extremely High H=HIGH M=MODERATE L=LOW)				
	<i>Frequent</i>	<i>Probable</i>	<i>Occasional</i>	<i>Remote</i>	<i>Improbable</i>
<i>Catastrophic</i>	E	E	H	H	M
<i>Critical</i>	E	H	H	M	L
<i>Marginal</i>	H	M	M	L	L
<i>Negligible</i>	M	L	L	L	L

BLOCK	WORKSHEET INSTRUCTIONS (See FM 100-14 for details)
A-D	Self explanatory
E	Identify tasks related to the mission or task in block B
F	Identify hazards by reviewing factors (METT-T) for the mission or task
G	Assess hazards using risk assessment factors and risk matrix above
H	Develop one or more controls for each hazard to eliminate or reduce risks
I	Determine residual risk assessment for each hazard not eliminated
J	Enter implemented controls. Decide how each control will be in effect or communicated to the personnel who will make it happen. (Written or verbal; SOP, rehearsals, etc.)
K	Select highest residual risk level, which becomes the overall risk level
L-M	Self explanatory
	Supervise and Evaluate – Implement monitoring and reassessment actions as the situation/condition changes. Determine if controls are adequate. Improve, if necessary. Develop and share lessons learned.

**25th INFANTRY DIVISION (LIGHT) and
US ARMY HAWAII**



RISK MANAGEMENT CARD

Reference: FM 100-14, April 98

- 1. IDENTIFY HAZARDS** - Identify hazards or factors that may adversely affect task accomplishment
- 2. ASSESS HAZARDS** - Determine extent of severity and potential
- 3. MAKE RISK DECISION AND DEVELOP CONTROLS** - Reduce risk to task essentials and establish control measures
- 4. IMPLEMENT CONTROLS** - Perform, conduct, etc. control measures
- 5. SUPERVISE** - Validate and ensure control measures are effective and followed

KEY DEFINITIONS

HAZARD - Actual or potential condition with the potential of causing injury to personnel, damage to equipment, or structures, loss of material, or reduction of availability to perform a prescribed function.

RISK – chance of hazard or bad consequence expression of possible loss over a specific period of time or number of operational cycles.

RISK ASSESSMENT – Identification and assessment of hazards; steps 1 and 2 of the Risk Management Process.

RESIDUAL RISK – Level of risk remaining after controls have been identified and selected for hazards that may result in loss.

DECISION FOR RESIDUAL RISK

EXTREMELY HIGH - MACOM Commander

HIGH - Corps/Division/Installation Commander

MODERATE & LOW - Delegated to Appropriate Levels

A. Receipt of mission or task: 1 August 2006		B. Mission or Task: MMR Prescribed Burn		C. DTG prepared: 16 August 2006	
D. Risk assessment prepared by: GS-11, Greenlee, Fire Management Officer, IFSO					
E. Task	F. Identify Hazards	G. Assess Hazards	H. Develop Controls	I. Determine Residual Risks	J. Implement controls
Prescribed Burning	1. Unexploded Ordnance (UXO) Presence	High	<p>Everyone will stay a minimum of 300 meters away from any open flame and/or blackened area for 24 hours or until authorized by the Safety Office.</p> <p>Personnel who enter High Hazard Areas (HHA) will comply with the following:</p> <ul style="list-style-type: none"> - Be trained in UXO recognition and have current CPR and first aid training. - Never touch UXO or unidentified objects. - Wear flack vest and helmet if UXO present 	Moderate	AR 385-63, EOD SOP, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan (Installation Fire and Safety Office will provide safety oversight of controls.)
K. Determine overall mission/task risk level after controls are implemented					
LOW (L)		MODERATE (M)		HIGH (H)	
				EXTREMELY HIGH (E)	
L. Determine approval level: L = 1 ST LEVEL ABOVE PREPARER M = 2 ND LEVEL ABOVE PREPARER H = DIVISION COMMANDER E = MACOM COMMANDER			M. Approval: (Signature on last page) COLONEL HOWARD J. KILLIAN, Commander, USAG-HI		

A. Receipt of mission or task: 1 August 2006		B. Mission or Task: MMR Prescribed Burn		C. DTG prepared: 16 August 2006	
D. Risk assessment prepared by: GS-11, Greenlee, Fire Management Officer, IFSO					
E. Task	F. Identify Hazards	G. Assess Hazards	H. Develop Controls	I. Determine Residual Risks	J. Implement controls
Prescribed Burning	1. Unexploded Ordnance (UXO) Presence (Cont.)	High	- Keep to the black when it is safe to do so – it is easier to identify UXO. - Not key radios within 15 meters of known UXO Conditions of roads, trails, and paths will be assessed and briefed prior to any movement	Moderate	AR 385-63, AR 385-10, CFR 1910.132-138, EOD SOP, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan (Installation Fire and Safety Office will provide safety oversight of controls.)
	2. Terrain	High	Stay on the alert for loose soil and vegetation. Movement through tall grass should be avoided. If movement must go through tall grass the area will be surfaced cleared by EOD.	Moderate	AR 385-63, AR 385-10, CFR 1910.132-138 SOPs, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan, and Briefings (Installation Fire and Safety Office will provide safety oversight of controls.)
K. Determine overall mission/task risk level after controls are implemented					
LOW (L)		MODERATE (M)		HIGH (H)	
				EXTREMELY HIGH (E)	
L. Determine approval level: L = 1 ST LEVEL ABOVE PREPARER M = 2 ND LEVEL ABOVE PREPARER H = DIVISION COMMANDER E = MACOM COMMANDER			M. Approval: (Signature on last page) COLONEL HOWARD J. KILLIAN, Commander, USAG-HI		

A. Receipt of mission or task: 1 August 2006	B. Mission or Task: MMR Prescribed Burn	C. DTG prepared: 16 August 2006
--	---	---

D. Risk assessment prepared by: GS-11, Greenlee, Fire Management Officer, IFSO

E. Task	F. Identify Hazards	G. Assess Hazards	H. Develop Controls	I. Determine Residual Risks	J. Implement controls
Prescribed Burning	3. Weather	High	<p>During days of hot temperatures personnel will properly hydrate before, during, and after operations also implement work/rest plan.</p> <p>If weather affects visibility, personnel will not enter HHA.</p> <p>When rain is a possibility, personnel will take appropriate rain gear with them and wear it when appropriate.</p> <p>Avoid areas where rain has created mud or standing water.</p> <p>Avoid streambeds and low lying areas known for flash flooding during times of heavy rain.</p>	Moderate	SOPs, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan, and Prescribed Burn Plan (Installation Fire and Safety Office will provide safety oversight of controls.)

K. Determine overall mission/task risk level after controls are implemented

LOW (L) MODERATE (M) HIGH (H) EXTREMELY HIGH (E)

<p>L. Determine approval level:</p> <p>L = 1ST LEVEL ABOVE PREPARER M = 2ND LEVEL ABOVE PREPARER</p> <p>H = DIVISION COMMANDER E = MACOM COMMANDER</p>	<p>M. Approval:</p> <p>(Signature on last page)</p> <p>COLONEL HOWARD J. KILLIAN, Commander, USAG-HI</p>
---	--

A. Receipt of mission or task: 1 August 2006		B. Mission or Task: MMR Prescribed Burn		C. DTG prepared: 16 August 2006	
D. Risk assessment prepared by: GS-11, Greenlee, Fire Management Officer, IFSO					
E. Task	F. Identify Hazards	G. Assess Hazards	H. Develop Controls	I. Determine Residual Risks	J. Implement controls
Prescribed Burning	3. Weather (Cont.)	High	Monitor weather conditions with hand held equipment, RAWS, local forecasts, and spot weather forecasts by National Weather Service. Stay within prescription. Post a lookout. Drivers will be properly licensed and will PMCS vehicles prior to daily operations.	Moderate Low	AR 385-63, EOD SOP, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan, and Prescribed Burn Plan, Fluid Replacement Guidelines for Warm-Weather Training (Installation Fire and Safety Office will provide safety oversight of controls.) AR 385-55, AR 600-55, SOPs, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan (Installation Fire and Safety Office will provide safety oversight of controls.)
	4. Vehicle Movement	Moderate	Vehicles will only be operated on existing roads/trails and will not be operated in areas that have not been surfaced cleared. Ground guides will be used when backing vehicle and in areas of limited visibility.		
K. Determine overall mission/task risk level after controls are implemented					
LOW (L)		MODERATE (M)		HIGH (H)	
EXTREMELY HIGH (E)					
L. Determine approval level: L = 1 ST LEVEL ABOVE PREPARER M = 2 ND LEVEL ABOVE PREPARER H = DIVISION COMMANDER E = MACOM COMMANDER			M. Approval (Signature on last page) COLONEL HOWARD J. KILLIAN, Commander, USAG-HI		

A. Receipt of mission or task: 1 August 2006		B. Mission or Task: MMR Prescribed Burn		C. DTG prepared: 16 August 2006	
D. Risk assessment prepared by: GS-11, Greenlee, Fire Management Officer, IFSO					
E. Task	F. Identify Hazards	G. Assess Hazards	H. Develop Controls	I. Determine Residual Risks	J. Implement controls
Prescribed Burning	4. Vehicle Movement (Cont.)	Moderate	Vehicles will not be operated in areas that exceed the drivers experience level. (Aircraft) Pilots will be briefed and take all directions from the IC or Flight Ops Officer (within the Incident Command Team) and will maintain radio communications at all times. Escape route and safety zones will be briefed. Weather and fire conditions will be closely monitored by a designated lookout.	Low	AR 385-55, AR 600-55, SOPs, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan (Installation Fire and Safety Office will provide safety oversight of controls.) AR 385-10, CFR 1910.132-138, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan, and Prescribed Burn Plan (Installation Fire and Safety Office will provide safety oversight of controls.)
	5. Fire suppression	High	Aerial buckets will be used for suppression in hazardous areas.		
K. Determine overall mission/task risk level after controls are implemented					
LOW (L)		MODERATE (M)	HIGH (H)	EXTREMELY HIGH (E)	
L. Determine approval level: L = 1 ST LEVEL ABOVE PREPARER M = 2 ND LEVEL ABOVE PREPARER H = DIVISION COMMANDER E = MACOM COMMANDER			M. Approval (Signature on last page) COLONEL HOWARD J. KILLIAN, Commander, USAG-HI		

A. Receipt of mission or task: 1 August 2006		B. Mission or Task: MMR Prescribed Burn		C. DTG prepared: 16 August 2006	
D. Risk assessment prepared by: GS-11, Greenlee, Fire Management Officer, IFSO					
E. Task	F. Identify Hazards	G. Assess Hazards	G. Develop Controls	I. Determine Residual Risks	J. Implement controls
Prescribed Burning	5. Fire suppression (cont)	High	<p>Chainsaws will be operated only by qualified personnel. Saw operator and swamper will wear chaps and ear protection.</p> <p>A briefing will be held at the start of every shift.</p> <p>A spot weather forecast will be ordered each day until fire is 100% contained and afterward at IC's discretion.</p> <p>Only trained, pack-tested, personnel will be in the fire area unless IC approves of person, such as GPS personnel, etc.</p> <p>The Incident Commander will have communications with everyone on the fireline.</p>	Moderate	AR 385-10, CFR 1910.132-138, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan, and Prescribed Burn Plan (Installation Fire and Safety Office will provide safety oversight of controls.)
K. Determine overall mission/task risk level after controls are implemented					
LOW (L)		MODERATE (M)		HIGH (H)	
				EXTREMELY HIGH (E)	
L. Determine approval level: L = 1 ST LEVEL ABOVE PREPARER M = 2 ND LEVEL ABOVE PREPARER H = DIVISION COMMANDER E = MACOM COMMANDER			M. Approval: (Signature on last page) COLONEL HOWARD J. KILLIAN, Commander, USAG-HI		

A. Receipt of mission or task: 1 August 2006		B. Mission or Task: MMR Prescribed Burn		C. DTG prepared: 16 August 2006	
D. Risk assessment prepared by: GS-11, Greenlee, Fire Management Officer, IFSO					
E. Task	F. Identify Hazards	G. Assess Hazards	H. Develop Controls	I. Determine Residual Risks	J. Implement controls
	6. Aerial Ignition (Plastic sphere dispenser operation) Possible Malfunction (cont) 7. Incident Command System (ICS) Lack of Command and Control	High High	If malfunction cannot be corrected in the air the pilot will land. If a fire occurs in the machine that the operator can not extinguish, the pilot will be notified and the machine will be jettisoned. Identify qualified ICS personnel by position and name. If command changes, announce change by name on radio and obtain confirmation from everyone on fireline and camp.	Moderate Moderate	Interagency Aerial Ignition Guide (April 2001), AR 385-10, CFR 1910.132-138 (Installation Fire and Safety Office will provide safety oversight of controls.) NFPA 1561, Prescribed Burn Plan, USARHAW Wildland Fire Management Plan (Installation Fire and Safety Office will provide safety oversight of controls.)
K. Determine overall mission/task risk level after controls are implemented					
LOW (L)		MODERATE (M)		HIGH (H)	
				EXTREMELY HIGH (E)	
L. Determine approval level: L = 1 ST LEVEL ABOVE PREPARER M = 2 ND LEVEL ABOVE PREPARER H = DIVISION COMMANDER E = MACOM COMMANDER			M. Approval: COLONEL HOWARD J. KILLIAN, Commander, USAG-HI		

FS-6700-7 (11/99)			
US ARMY, HAWAII	1. WORK PROJECT/ACTIVITY Aerial Ignition – Plastic Sphere Dispenser (PSD)	2. LOCATION Various	3. UNIT R8
JOB HAZARD ANALYSIS (JHA)	4. NAME OF ANALYST J. Finley, US Forest Service	5. JOB TITLE HOS	6. DATE PREPARED 11/25/05
7. TASKS/PROCEDURES	8. HAZARDS	9. ABATEMENT ACTIONS Engineering Controls * Substitution * Administrative Controls * PPE	
*Travel to, from and on project	Motor vehicle accidents. Slippery road surfaces. Narrow roadways. Weather/darkness/smoke	Drive defensively. Use seat belts. Identify road conditions in briefing. Post road guards when needed. Use backers and chock vehicles. Have vehicles facing out. Maintain communications. Notify law enforcement when necessary	
*Qualifications for assigned position	Lack of experience, injuries, accidents	Ensure all personnel involved in operation have maintained currency and are qualified. Reference FSH 5109.16 and Pilot/aircraft qualification card.	
*Briefing	Inadequate briefing done, personnel absent from formal briefing.	Provide project briefing prior to activities with all personnel to clarify objectives, organizational responsibilities, communications, hazards, weather, expected fire behavior. Communications/flight following verified. Flight crew to brief on PSD operations – Reference Aerial Ignition Guide and PSD training document.	
*Preflight equipment – Helicopter/Plastic Sphere Dispenser	Manager to ensure helicopter pilot has completed preflight. PSD operator to ensure ignition device is inspected and secure.	Pilot has completed helicopter preflight and load calculation form prior to operations. PSD bench tested and installed in the aircraft and is operational.	
*Injuries due to heavy lifting	PSD is in shipping box and is difficult	Work area should be clear of obstacles. Forethought given to proper lifting/bending techniques. Use help	

	to remove. Placement in helicopter lends itself to awkward bending/reaching	if available. Prepare for the operation by performing stretching/bending exercises.
Personal Protective Equipment (PPE)	Injuries consistent with crushing/pinching/falling/burns	Always wear required PPE and ensure others wear it also. Reference Interagency Helicopter Operations Guide (IHOG) or Aviation Life Support Equipment (ALSE)
*Helibase/Helispot Operations	Accidents or incidents	Ensure that all landing areas meet IHOG requirements – safety circle/support equipment/fire extinguisher/signs. Allow only authorized personnel on-site.
*Hazardous Materials (haz-mat)	Injuries/burns. Ingestion-Inhalation of chemicals	Identify and mitigate any possible haz-mat problems utilizing “Transportation of Hazardous Materials Guide”. Practise safe work ethics. Avoid mixing of any on-site chemicals.
*First Aid	Injuries	Notify dispatch of any threatening injury and treat accordingly. Burn plan/Helicopter Operations plan should have other pertinent information. Remain within the scope of your training.
*Communications	Poor communications, faulty equipment	Perform radio checks with all concerned parties. Identify emergency procedures beforehand. Ensure additional hand-held batteries available to landing area personnel.
*Incidents/accidents	Various	Discuss incident/accident possibility and emergency procedures in your briefings. Communicate problems with Dispatch, activate crash-rescue plan. Ensure your safety prior to any action. <i>“Sometimes the only action you should take is notifying dispatch that an accident has occurred”</i> - SAFECOM to be completed for all incidents/accidents (as soon as possible)
*Operations	Various	Follow procedures lined out in Aerial Ignition Guide and PSD training manual for general operations and machine malfunction.

*Feeling the need for speed	Mistakes made	Do not get moving so fast that your actions overrun your ability to cope. Avoid mistakes, do not hurry, Prescribed fire is not an emergency. If something happens, inform those around you and follow procedure. Maintain required currency training.
------------------------------------	----------------------	--

**SECTION 12
FUNDING**

A. Total estimated cost: \$35,000 to \$55,000 per burn, depending on whether the first attempt is successful (see attached worksheets).

B. Source of Funds

- (x) Wildland Fire Management funds
- (x) Transformation, G-7 funds

Worksheet for Estimating Costs of burn

Narrative: Army and Federal Fire crews will be engaged in the burn for a 6 hour period, plus patrol for four days

Fill in yellow squares as examples show

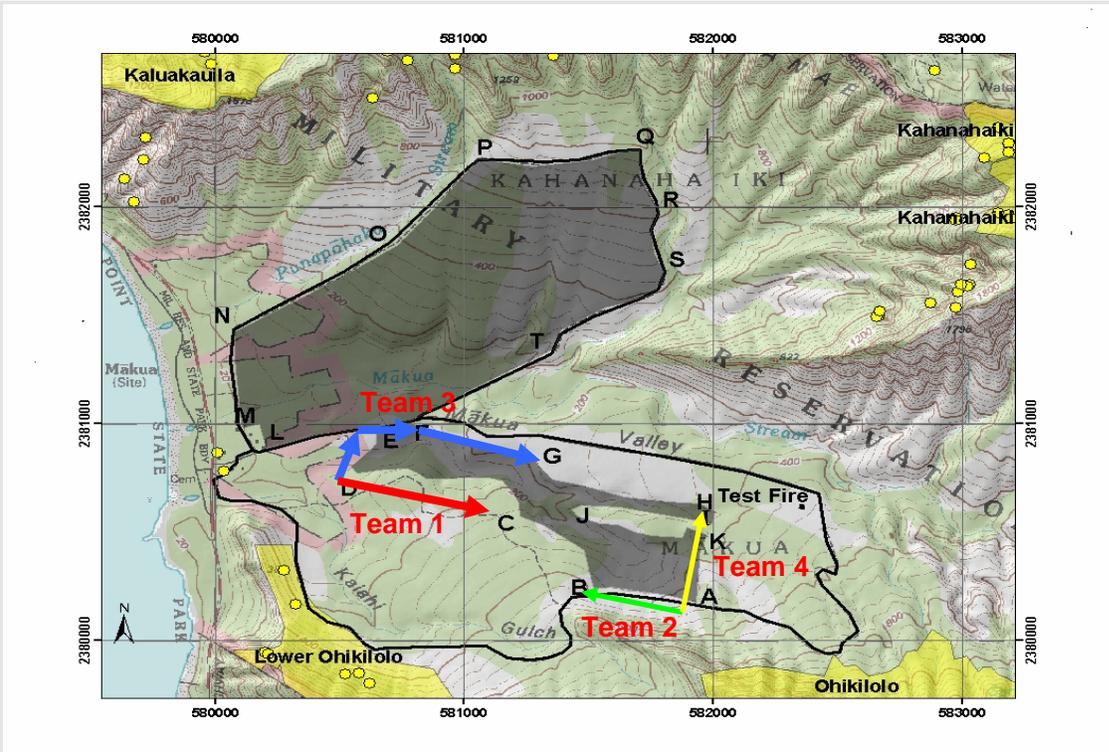
Excel calculates the values in blue

Burn Name:	MMR 06-02	Date:	27-Sep	Burn Boss:	Jason Greenlee					
GSA Rental	Type Equipment	Hourly Rate (1)	Hours Used							
	Army T4 engine	\$6.63	14		\$92.82					
	Army T4 engine	\$6.63	14		\$92.82					
	Army T4 engine	\$6.63	6		\$39.78					
	Army Crew cab	\$3.30	14		\$46.20					
	Army Crew cab	\$3.30	14		\$46.20					
	Army Crew cab	\$3.30	14		\$46.20					
	Army Tender	\$6.63	6		\$39.78					
	Fed Fire Brush Engine	\$8.00	6		\$48.00					
	Fed Fire Tender	\$6.63	6		\$39.78					
				Equipment Sub-total	\$491.58					
Salaries	Person's Name	Hourly Rate	Overtime Rate	Hours Prep & Monitoring	Hours on Burn Day	Hours Patrol and Mop Up	Hours Basic Time	Hours Overtime	Total Hours	Total Cost
	Federal Fire GS-6	\$16.83	\$25.25	0.00	8.00	0.00	8.00	0.00	8.00	\$134.64
	Federal Fire GS-7	\$18.69	\$28.04	0.00	8.00	0.00	8.00	0.00	8.00	\$149.52
	Federal Fire GS-8	\$20.70	\$31.05	0.00	8.00	0.00	8.00	0.00	8.00	\$165.60
	Federal Fire GS-9	\$22.87	\$34.31	0.00	8.00	0.00	8.00	0.00	8.00	\$182.96
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	8.00	29.49	16.00	32.00	\$721.58
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	8.00	16.00	16.00	32.00	\$539.60
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-4/1	\$13.49	\$20.24	0.00	8.00	0.00	8.00	16.00	24.00	\$431.68
	Army Fire GS-5/1	\$15.09	\$22.64	0.00	8.00	0.00	8.00	16.00	24.00	\$482.88
	Army Fire GS-9/1	\$22.87	\$34.31	0.00	8.00	0.00	8.00	16.00	24.00	\$731.84
	GS-11/7 Fire Mgt Off	\$33.20	\$49.80	0.00	8.00	0.00	8.00	16.00	24.00	\$1,062.40
	GS-13/1 Fire Chief	\$39.43	\$59.15	0.00	8.00	0.00	8.00	0.00	8.00	\$315.44
	GS-11/5 Safety Officer	\$31.35	\$47.03	0.00	8.00	0.00	8.00	16.00	24.00	\$1,003.20
	GS 13/10 Rx Manager	\$51.26	\$76.89	0.00	8.00	0.00	8.00	16.00	24.00	\$1,640.32
									Salaries Sub-total	\$10,151.74
Equipment Expenses	Type Equipment	Type Expense	Rate/mile(1)	Miles						
	Army T3000	transportation	rate/mile	0		\$6,000.00				
	other					\$0.00				
					Equipment Sub-total	\$6,000.00				
PTA Crew	Travel					\$3,010.00				
	Lodging	Rooms	Nights	Rate per Room		\$0.00				
		0	0	\$0.00		\$0.00				
					Lodging Sub-total	\$3,010.00				
Contract Helicopters	Type Equipment	Hours	Hourly Rate							
	Pacific Hughes 500	6	\$800.00			\$4,800.00				
	Pacific Ranger 500	6	\$950.00			\$5,700.00				
	K&S Hughes 500	6	\$775.00			\$4,650.00				
	K&S Bell 407	6	\$1,450.00			\$8,700.00				
	K&S Bell 407	6	\$1,450.00			\$8,700.00				
	Windward Hughes 500	6	\$1,000.00			\$6,000.00				
				Contracts Sub-total		\$38,550.00				
Army Helicopters	Type Equipment	Hours	Hourly Rate							
(includes crew)	Blackhawk	0	\$2,000.00			\$0.00				
	Blackhawk	0	\$2,000.00			\$0.00				
				Army Sub-total		\$0.00				
National Guard Helicopters	Type Equipment	Hours	Hourly Rate							
(includes crew)	Blackhawk	0	\$2,800.00			\$0.00				
	Chinook	0	\$7,500.00			\$0.00				
				Nat Guard Sub-total		\$0.00				
Supplies	Item Name	Price/Item	Number Units							
	Ping Pong Balls	\$0.15	0			\$0.00				
	Glycol	\$2.00	10			\$0.00				
	Fuel	\$2.09	10			\$0.00				
	Meals	\$5.00	180			\$900.00				
	Supplies					\$7,287.00				
	Rental of Lift					\$500.00				
				Supplies Sub-total		\$8,687.00				
Herbicide Spraying	Acres Sprayed	Cost/ac								
Spraying	78	35				\$2,730.00				
Mixing						\$1,970.00				
				Spraying Sub-total		\$4,700.00				
				Total Cost (including salaries & GSA vehicle rental)		\$71,590.32				
				Hard Money Cost (without salaries & GSA vehicle rental)		\$60,947.00				
Acres Burned	78			Total Cost/Acre (including salaries & GSA vehicle rental)		\$917.82				
				Total Cost/Acre (without salaries & GSA vehicle rental)		\$781.37				

Example of an Incident Action Plan – Individual IAPs for each prescribed burn will vary.

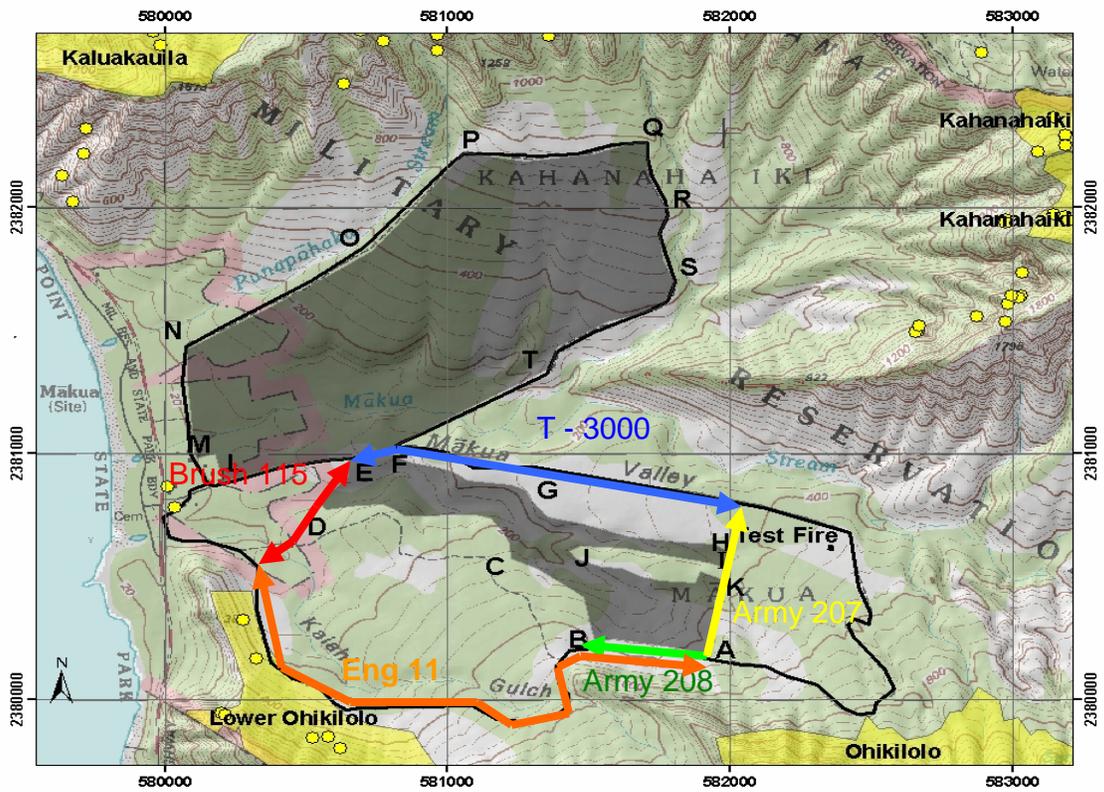
INCIDENT BRIEFING

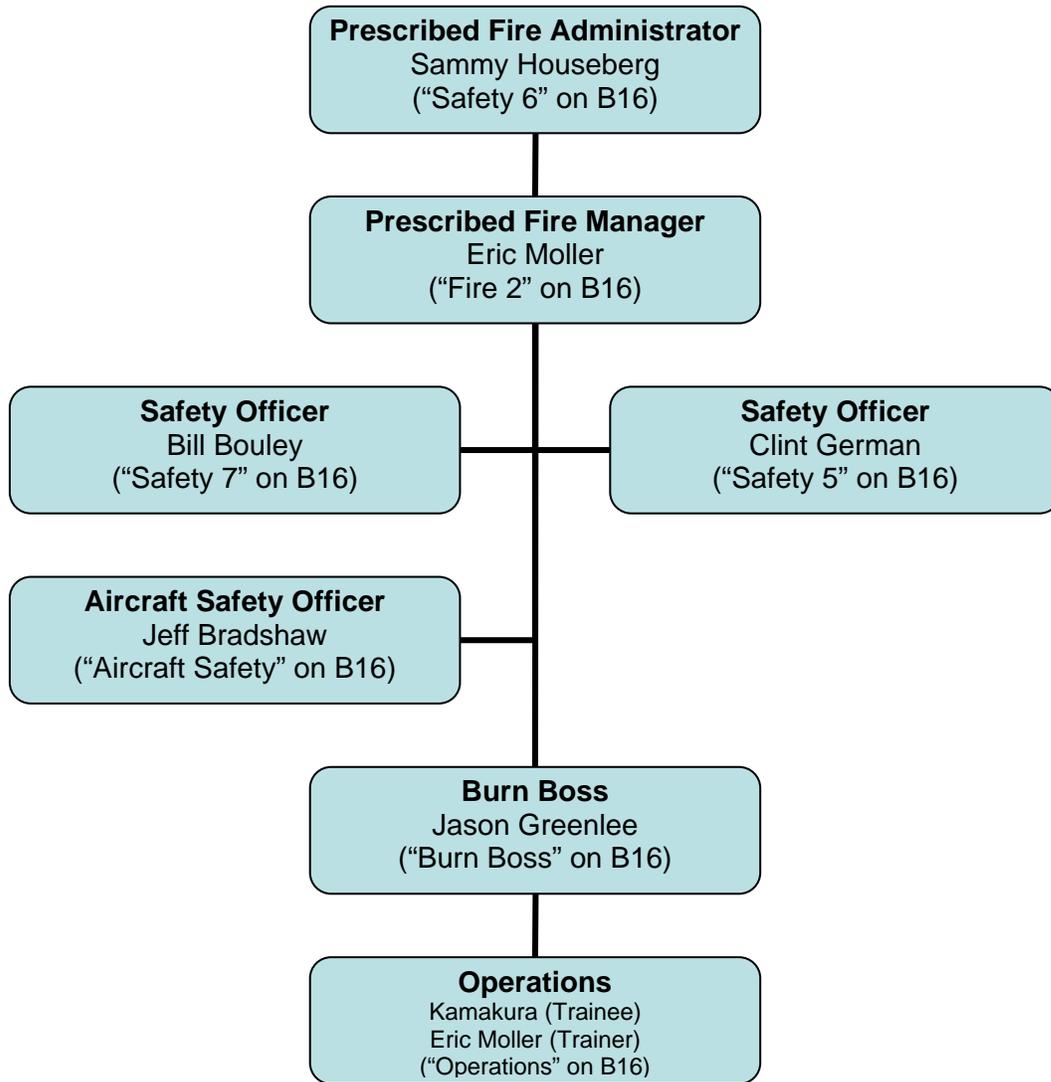
4. Map Sketch

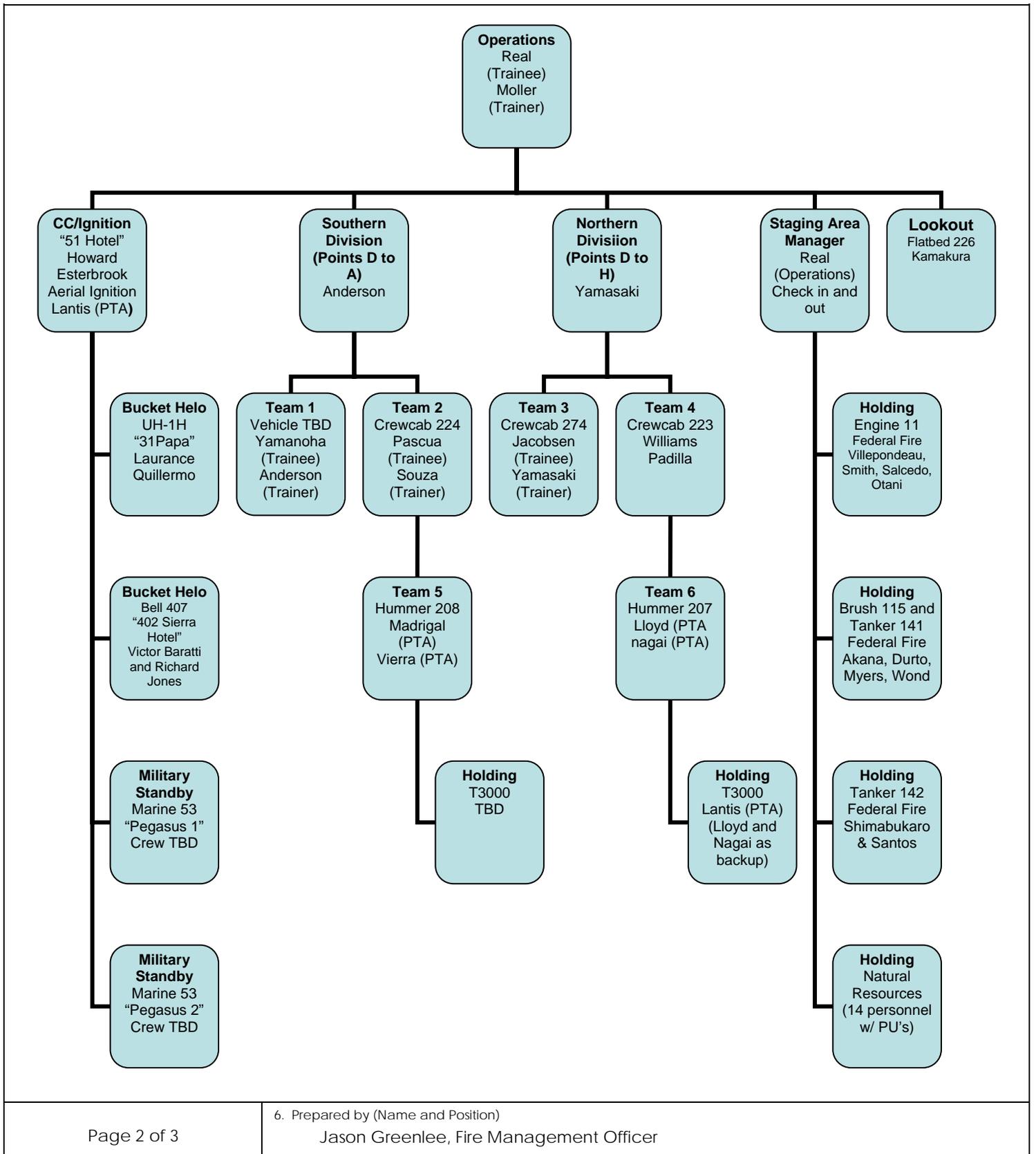


Plan A: Wind from East: The wind pattern has been from the East all day for the last few days. If wind is moving from the east after briefing, Army resources, the T3000, and Brush 115 will report to **Point D for the test burn**. Engine 11 will stage at below Lower Olikilolo. The Army Environmental team may post themselves at the lookout above point B or below Lower Olikilolo with Engine 11. During and after the test burn, the T3000 will post at point E. Brush 115 shall pre-treat the fuel on the outside of the fireline at point D. Team 1 (vehicle TBD) will fire from D to B and Team 3 (with unit 274) will fire from points D to F. Team 1 cannot walk D to B, so they will be using a flare gun to ignite from D to B. If Team 1 is not successful with the flare gun, the ignition helicopter may be used to light D to B. Special care will be taken from E to F, as the fuels on both sides of the road are close. There is also dry fuel on the outside of the firebreak at point D and from points H to A, so ignite with care. Brush 115 should patrol weak areas frequently. Once F has been reached and the line from D to F is secure, the two teams will slowly pull fire along the rim from D to B and F to H. Teams will try to stay up with each other moving up the sides of the gully. The D to F road will continue to be patrolled during the entire burn by Brush 115. The T3000 may be moved from E and patrol from E to H, depending on wind strength and direction. Once C and G are reached (or at such time as the burn boss elects), firing teams 2 (with unit 224 and hummer 208 supporting) and 4 (with unit 223 and hummer 207 supporting) will move to Point A. Point A contains a dangerous dog-leg that will be carefully and slowly burned out before proceeding. Team 2 will burn from points A to B, and Team 4 will burn from A to H. The UH-1H will support this phase of the operation by wetting A-H and A-B on the far side of the firebreak road. Sequences for the last phases of the burn, which is to complete the perimeter and interior burning, will depend on progress on the perimeter and ability of the fire to move into the interior without assistance.

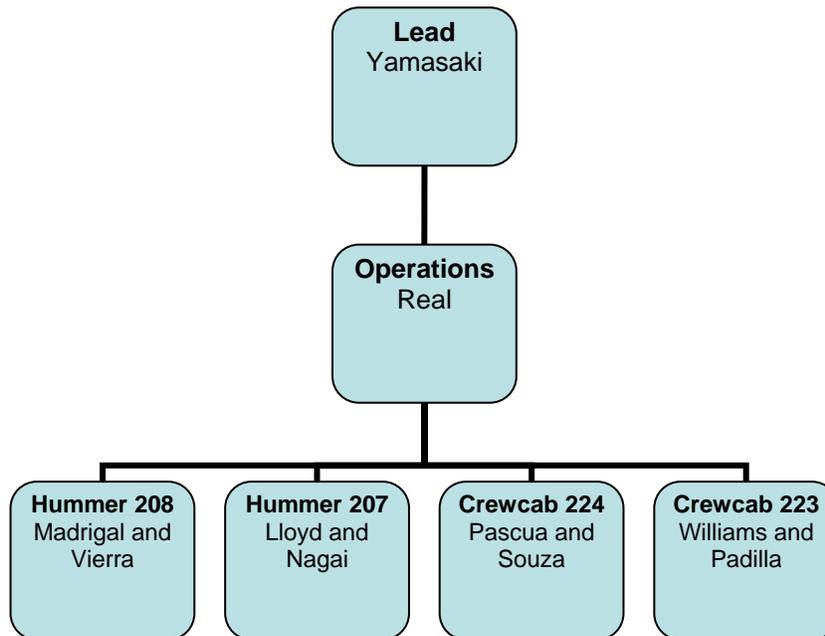
Plan B: Wind from West: It is possible that we could get a wind from the west during the burn. If so, the burn sequence is reversed. The Army's crewcabs and Hummers and Brush 115 will stage at point A. Engine 11 and Army Environmental crew will stage below the rare species habitat on the road below Lower Ohikilolo for the **test burn at point A**. The T3000 will be manned by Federal Fire personnel (TBD) will stage at H. A hose lay has been put down from A to H to be connected Brush 115. Team 2 (unit 224), with Hummer 208, will start lighting from points A to B and Team 4 (unit 223), with Hummer 207, will start at the same time from points A to H. On successful completion of this burn-out, Teams 1 and 3 will start a burnout from Points D to F (Hummer 274). Teams 2 and 4 will stay with Hummers 207 and 208 to monitor points B to H. The T3000 will patrol from H to F. Team 1 will start the west burn-out moving from D to B and Team 3 will burn from D to F. Team 1 cannot walk D to B, so they will be using a flare gun to ignite from D to B. Or the ignition helicopter may be used to light D to B if Team 1 is unsuccessful.



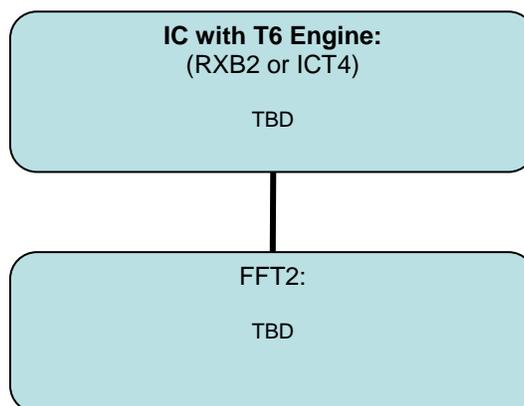




MOP UP ORGANIZATION



PATROL ORGANIZATION



6. Resources Summary				
Resources Ordered	Resource Identification	ETA	On Scene	Location/Assignment
2 Army brush engines	Army 207 and 208	0600		Ignition/holding/lookouts
10 person Army handcrew plus 3 crewcabs	Army wildfire crew	0600		Ignition/holding/lookouts
The following from Federal Fire: 1 Type 6 brush engine, 1 Type 4 fire engine, and 2 tankers	Brush 115, Engine 11, Tanker 141, Tanker 142	0600		Holding
Pacific Bell Ranger 206 Howard Estebrook	"51Hotel"	0700		Command and aerial ignition operations
Pacific Hughes UH-1H Laurance Quillermo	"31 Papa"	0700		Holding
K&S Bell 407 Victor Baratti and Richard Jones	"402 Sierra Hotel"	0700		Holding
Natural Resources hand crew (4)	"Kilo", "Romeo", "Foxtrot" and "Hotel"	0600		Holding
Pacific Helicopters fuel tender	"Fuel tender"	0600		Helicopter fueling
2 Marine 53 helicopters (on standby at MC base)	"Pegasus 1" and "Pegasus 2"	0600		Holding/contingency
3 Army safety officers	"Safety 5" "Air Safety" "Safety 7"	0600		Safety
PTA personnel (5 +Chief Moller)	Various call signs – see commo plan attached	0600		Ignition/Holding
7. Summary of Current Actions				
<p>0600, personnel arrive, check in with Operations, and prepare equipment for burn 0700, briefing at Command Post 0700, Helicopters arrive, pilots briefed, Pacific Helicopters UH-1H may apply retardant to any areas indicated by burn boss 0730, preparation and final checks of equipment, pre-position holding resources. 0730, ready to ignite test burn at D or A (to be determined at briefing). 0730, ignition begins 0830-0900, new Fed Fire shift arrives for transition, operations gives new shift briefing 1300, ignition ends, patrol and mop-up begins.</p>				
Page 1 of 1	Prepared by: Jason Greenlee, RxB2, Fire Management Officer			

MEDICAL PLAN	1. Incident Name Makua Burn	2. Date Prepared October 20, 2006	3. Time Prepared 1600	4. Operational Period				
5. Incident Medical Aid Station								
Medical Aid Stations	Location			Paramedics				
				Yes	No			
On site first aid	On site			x				
Waianae Comprehensive Health Cnt.	86-260 Farrington Highway Waianae 696-1499			x				
City and County of Honolulu	Waianae Comprehensive Health Cnt.					x		
				<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>			
6. Transportation								
A. Ambulance Services								
Name	Address		Phone	Paramedics				
				Yes	No			
Waianae Fire Dept	Farrington Highway Waianae		911	x	<input type="checkbox"/>			
					<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>			
B. Incident Ambulances								
Name	Location			Paramedics				
				Yes	No			
None on scene	N/A			N/A	<input type="checkbox"/>			
7. Hospitals								
Name	Address	Travel Time		Phone	Helipad		Burn Center	
		Air	Grnd		Yes	No	Yes	No
					X	<input type="checkbox"/>	<input type="checkbox"/>	X
St. Francis West	91-2141 ft. Weaver Road	15	25	547-6011	X	<input type="checkbox"/>	<input type="checkbox"/>	X
Struab	King Street, Honolulu	15	30	522-4000	X	<input type="checkbox"/>	x	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Medical Emergency Procedures								
No ambulance on site. Treatment on site at Command Post for minor injuries by firefighter/EMTs. Immediately call 911 for any serious or life-threatening emergencies and ambulatory transport. MEDEVAC available through Range Control Dispatch Center.								

Final Operational Briefing

To be completed by the Burn Boss at the burn site prior to beginning of each shift or when the hazards change due to a change in work site location or other conditions.

<p>Names, introductions, fill in organization chart</p> <p>Commander’s Intent (Mr. Houseberg)</p> <p>Boundary locations/types</p> <p>Fuels, slopes, aspects near boundaries that would contribute to escape of fire Terrain influences</p> <p>Expected weather</p> <p>Expected fire behavior</p> <p>Organization</p> <ul style="list-style-type: none"> - responsibilities, qualifications. - Specific tactical assignments <p>Communications for the burn and for an escape</p> <ul style="list-style-type: none"> - Use channel B16 - Radio test - If you see a spot, notify burn boss - Air/ground radios with lookouts (1), Jeff (1), range (1), PSDO operator (1). Chargers are available. <p>Water/retardant drops completed</p> <p>Areas to exclude from the burn</p> <ul style="list-style-type: none"> - Rare and endangered species - Maps, control points, Maximum Allowable Area <p>Tactics/firing/hold/patrol</p> <p>GO SLOW WITH IGNITION</p> <p>Logistics – transportation, supplies, and equipment</p> <p>Lookouts</p> <ul style="list-style-type: none"> - LCES radio checks each hour - Weather recorded - record radio trans with time - Record fire rate of spread - Record helicopter productivity if available - A person to check the amount and direction of smoke <p>Equipment</p> <ul style="list-style-type: none"> - in place/checked/fired up? - Locations for water re-supply - forklift/retardant operation - Give shelters to helicopter crew - Keys in rigs - Shift change for Fed Fire at 0900 - notify Ops when you move your vehicles <p>Mitigation of risks and hazards</p> <ul style="list-style-type: none"> - Special considerations, hazards and risks (read at least one JHA) 	<p>CHECK IN/OUT WITH STAGING MGR</p> <p>Safety</p> <ul style="list-style-type: none"> - Explosives (Bill) - Pigs - LCES CHECKS <p>Do not abuse range control</p> <ul style="list-style-type: none"> Sign in and out each day Use portapoties Don’t go into office <p>Helicopter plan: CHANGES WITH FUEL/STANDBY</p> <ul style="list-style-type: none"> - Special: Pilot wet which areas for his bucket check - Backup with 53’s - we can’t start until UH-1H test buckets and Tom is in air with bucket - Be sure you always have one hour’s fuel - 2 wind socks are at B and G - Crash kits and extinguishers are available <p>Smoke sensitive targets and mitigate</p> <p>Go through GO-NO-GO list</p> <p>Contingency plans</p> <ul style="list-style-type: none"> - only Mr. Houseberg declares escape - sirens will sound if escape - ENGINES: watch for spots, do not attack - Trigger points for disengagement - What to do if fire spots over line - What to do if fire declared an escape - Escape routes, safety zones - Medivac plan - Resources working nearby - Resources of air support available if needed <p>Everyone comfortable with assignments?</p> <p>Questions or concerns?</p> <p>DOES EVERYBODY HAVE EVERYTHING THEY NEED?</p> <p>Radio check DOES EVERYONE HAVE RADIO?</p>
---	--

Go-No-Go Checklist – required DAILY

- A. Is the Administrator Go-No-Go Pre-Ignition Checklist completed? If NO STOP.
- B. Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If NO proceed with checklist. If YES go to item B.
- C. If YES have appropriate changes been made to the ignition and holding plan and the mop up and patrol lines? If NO STOP.

A. BURNING OPERATIONS

YES or N/A

NO (STOP)

- | | | |
|--|-------|-------|
| 1. Have you checked yesterday's burn area, if applicable? | _____ | _____ |
| 2. Is a copy of the approved plan on site? | _____ | _____ |
| 3. If a substantial time has elapsed since the plan was written, has the plan been reviewed for any needed enhancements to meet objectives or safety requirements? | _____ | _____ |
| 4. If any plan changes have been made, has the Burn Director signed the plan's signature sheet a second time? | _____ | _____ |
| 5. Can the burn be executed according to plan and will it meet management objectives? | _____ | _____ |
| 6. Is the general fire weather forecast favorable? Severe Fire Behavior potential chart checked? | _____ | _____ |
| 7. Has a spot weather forecast been obtained? | _____ | _____ |
| 8. Has all pre-work, i.e. hand lines etc., been completed and have the lines been inspected immediately prior to the burn? | _____ | _____ |
| 9. Has the crew familiarized themselves with the area? | _____ | _____ |
| 10. Are all fire prescription criteria met? | _____ | _____ |
| 11. Has the burn boss checked the Severe Fire Behavior Potential? | _____ | _____ |
| 12. Are all required personnel listed on the plan on site and qualified? Has the burn boss checked the red cards of off-site personnel? | _____ | _____ |
| 13. Are all work capacity tests and red cards up to date? | _____ | _____ |
| 14. Have notifications been made, including dispatch? | _____ | _____ |
| 15. Have warning signs been put out? | _____ | _____ |
| 16. Have all personnel been briefed on objectives, operations and safety? | _____ | _____ |
| 17. Is LCES in place and was it part of the briefing? | _____ | _____ |
| 18. Were JHA's and special hazards discussed as part of the briefing? | _____ | _____ |
| 19. Is all of the required equipment in place and test-started? | _____ | _____ |
| 20. Are sufficient backup resources available for containment of escapes and has the availability of these resources been confirmed today? | _____ | _____ |
| 21. If this is a High Complexity burn, or if one of the safety elements in the Complexity analysis is High, do you have a qualified Safety Officer on the burn? | _____ | _____ |
| 22. Is this a multi-day burn? If so, are briefings, test fires, and go-no-go decisions planned for each day? | _____ | _____ |
| 23. Has a test fire been conducted and documented? | _____ | _____ |
| 24. Are all smoke management requirements met? | _____ | _____ |
| 25. Has a radio check been done? | _____ | _____ |

C. HELICOPTER OPERATIONS:

- | | | |
|--|-------|-------|
| 26. Have all aviation safety requirements been met? | _____ | _____ |
| 27. Have aerial hazards been noted? | _____ | _____ |
| 28. Have pilots been appraised of unavoidable flight hazards? | _____ | _____ |
| 29. Have over-flights been avoided and ground personnel placed away from flight paths? | _____ | _____ |
| 30. Have wind socks and fire equipment been put out at LZ's | _____ | _____ |

IF ALL QUESTIONS HAVE BEEN ANSWERED YES or N/A (Not Applicable), PROCEED

CERTIFIED BY: _____ DATE: _____

TITLE: _____

Test burn and weather observations

	Prescription	General Forecast On Day of Burn	Spot Weather Forecast	Test Fire Conditions	Obs Time:							
DATE/TIME												
FUEL MODELS (FBPS)												
1 HR FUELS %												
10 HR FUELS %												
LIVE FUEL MOISTURE (herb) %												
LIVE FUEL MOISTURE (woody) %												
TEMPERATURE (F)												
RELATIVE HUMIDITY %												
20 ft WIND (mph)												
20 ft WIND DIRECTION												
MIDFLAME WIND SPEED (mph)												
MIDFLAME WIND SPEED DIRECTION												
TRANSPORT WIND SPEED (m/s)												
TRANSPORT W/S DIRECTION												
MIXING HEIGHT (m)												
SMOKE DISPERSION												
BURN INDEX												
IGNITION PROB %												
DAYS SINCE RAIN												
AMOUNT (inches)												
FIRING TECHNIQUE												
IGNITION METHOD												
FLAME LENGTH (ft)												
RATE OF SPREAD (chs/hr)												

INCIDENT RADIO COMMUNICATIONS PLAN		1. Incident Name MMR 06-03	2. Date/Time Prepared 10/20 1502	3. Operational Period Date/Time Dec 6, 2006	
4. Basic Radio Channel Utilization					
Radio Type/Cache	Channel	Function	Frequency/Tone	Assignment	Remarks
ICOM		Hughes UH-1H	122.925	Laurance Quillermo	Call sign "31 Papa"
ICOM		Bell Ranger 206	122.925	Howard Estebrook	Call sign "51 Hotel"
ICOM		Bell Ranger 206	122.925	Victor Baratti and Richard Jones	Call sign "402 Sierra Hotel"
PACMERS	B16	Fire Administrator		Mr. Houseberg	Call sign "Safety 6"
PACMERS	B16	Fire Manager		Eric Moller	Call sign "Fire 1"
PACMERS	B16	Burn Boss		Jason Greenlee	Call sign "Fire 3"
5. Prepared by (Communications Unit)					
Jason Greenlee, Fire Management Officer, GS-11					

INCIDENT RADIO COMMUNICATIONS PLAN	1. Incident Name	2. Date/Time Prepared	3. Operational Period Date/Time
	MMR 06-03	10/20 1502	Dec 6, 2006

4. Basic Radio Channel Utilization

Radio Type/Cache	Channel	Function	Frequency/Tone	Assignment	Remarks
PACMERS	B16	Incident Commander		TBD	Call sign TBD
PACMERS	B16	Fed Fire Brush 115		Akana, Durto, Myers Wond	Call sign TBD
PACMERS	B16	Fed Fire Engine 11		Villepondeau, Smith, Salcedo, Otani	Call sign TBD
PACMERS	B16	Fed Fire Tanker 141		Akana, Durto, Myers, Wond	Call sign TBD
PACMERS	B16	Operations		Robert Real	Call sign "Operations"
PACMERS	B16	Lookout		Brice Kamakura	Call sign "Lookout"
PACMERS	B16	Safety		Clint German	Call sign "Safety 5"

5. Prepared by (Communications Unit)

Jason Greenlee, Fire Management Officer, GS-11

INCIDENT RADIO COMMUNICATIONS PLAN		1. Incident Name MMR 06-03		2. Date/Time Prepared 10/20 1502		3. Operational Period Date/Time Dec 6, 2006	
4. Basic Radio Channel Utilization							
Radio Type/Cache	Channel	Function	Frequency/Tone	Assignment	Remarks		
PACMERS	B16	UXO Safety		Bill Bouley	Call sign "Safety 7"		
PACMERS	B16	Aircraft Safety		Jeff Bradshaw	Call sign "Aircraft Safety"		
PACMERS	B16	Ignition Team 1 w/ vehicle TBD		Kimo Yamanoha	Call sign "Team 1"		
PACMERS	B16	Ignition Team 2 Army w/ Crewcab 224		Calvin Pascua	Call sign "Team 2"		
PACMERS	B16	Ignition Team 3 w/ Crewcab 274		Apu Jacobsen	Call sign "Team 3"		
PACMERS	B16	Ignition Team 4 w/ Crewcab 223		Kenny Williams	Call sign "Team 4"		
ICOM		PSDO Operator	122.925	Mark Lantis	Call sign "PSDO"		

5. Prepared by (Communications Unit) Jason Greenlee, Fire Management Officer, GS-11

INCIDENT RADIO COMMUNICATIONS PLAN		1. Incident Name MMR 06-03	2. Date/Time Prepared 10/20 1502	3. Operational Period Date/Time Dec 6, 2006	
4. Basic Radio Channel Utilization					
Radio Type/Cache	Channel	Function	Frequency/Tone	Assignment	Remarks
ICOM		Marine helicopter	122.925	Contingency	Call sign "Pegasus 1"
ICOM		Marine helicopter	122.925	Contingency	Call sign "Pagasus 2"
PACMERS	B16	Ignition/Holding Hummer 208		Madrigal and Vierra	Call sign "Hummer 208"
PACMERS	B16	Ignition/Holding Hummer 207		Lloyd and Nagai	Call sign "Hummer 207"
PACMERS	B16	T3000		TBD	Call sign "T3000"
PACMERS	B16	Fed Fire Tanker 142		Shimabukaro and Santos	Call sign "Tanker 142"
PACMERS	B16	Army Environmental Team		Daniel Forman, Kapua Kawelo, Joby Roher, Susan Ching	Call signs Kapua "Kilo" Joby "Romeo" Dan "Foxtrot" Susan "Hotel"
5. Prepared by (Communications Unit) Jason Greenlee, Fire Management Officer, GS-11					

PSD Aerial Ignition Preplanning Checklist

Provision	Yes	No	NA
Prescribed Burn Plan approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aviation Safety Plan approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Burn Blocks prepared for aerial ignition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there an aircraft and pilot available/carded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aircraft and fuel truck reserved/scheduled the week before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PSD equipment serviced and ready	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PPE, including fire shelters for all participants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adapters needed/available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extra spheres available/location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Backup/spare PSD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crisis rescue/evacuation equipment ready	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helispots prepared and approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire suppression needs available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enough qualified people available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PSD Operator(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helicopter Manager(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helibase Manager(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parking Tender(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire Protection Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional Reminders			
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 14

Prescribed Fire Plan Technical Review

Burn Name: MMR 06-03

Reviewer: _____ Date: _____

Element¹	Present	Comments
Signature page		
Criteria for review and approval of plans		
Criteria for approval of change		
Burn type (Type 1, 2, or 3)		
Burn unit description		
-location		
-size		
-elevation		
-boundaries		
-topography		
-vegetation type(s)		
Vicinity and unit maps. Detailed maps must be provided which show		
a. project boundary		
b. areas outside the unit which could potentially be affected by an escaped fire (interface, bridges, towers, etc.)		
c. potential hazards		
d. water sources		
e. escape routes and safety zones		

Purpose		
Measurable objectives		
Costs estimate		
Burn organization		
- list of personnel and qualifications		
- organization chart		
- equipment list		
- contingency resources		
Schedule		
Pre-burn or site preparation considerations		
-does plan commit to spot weather forecasts if Moderate Complexity or higher?		
-are test fire procedures described		
-does plan describe signs to be placed, lines to be prepared, permits to be obtained		
Prescription – are all elements present and reasonable?		
Provisions for weather forecasts/checks		
Ignition plan – firing techniques, ignition method, pattern		
Holding plan – number, kind, position of resources		
Water supply		
Fire Escape Contingency Plan		
a. map of Maximum Manageable Area		
b. alternative trigger points for declaring an escape		
c. the plan must state who declares an escape		
c. the plan must specify who is to be notified		
d. the plan must state that the following documentation will be started		
1. time of escape declaration		

2. who was notified		
3. environmental conditions		
4. fire/weather observations		
5. actions prior to and after escape (chronology of events)		
6. unit logs and individual statements		
7. weather forecasts		
8. spot weather forecasts		
9. data from the nearest weather station		
e. what resources will be ordered		
f. what operations will be initiated		
g. how transition of command to an IC will be triggered		
- identifies other possible but unlikely events		
- identifies contingency resources for each event		
Smoke management plan		
- identifies sensitive receptors		
- mitigation strategies		
- map of acceptable smoke drift area		
Communication plan		
- notifications to be made prior to ignition		
- notifications to be made if an escape is declared		
- radio frequencies for burning and for escape		
Inter- and intra-agency cooperation		
Monitoring and evaluation		
- pre-burn - plan should describe		
- burn day - plan should describe		

- post-burn – plan should describe		
Personnel and public safety		
- unique safety hazards		
- LCES will be in place prior to ignition and covered in briefing. Plan must state this.		
- if the burn is classified High Complexity, or if one element of the Safety element of the complexity rating is High, is a Safety Officer assigned?		
- states that a briefing will be given each shift		
Rehabilitation plan – what, who, when		
Documentation that accompanies plan		
- BEHAVE runs provided and checked by qualified persons ²		
- spot weather records ³		
- JHA's must be attached		
- briefing worksheet ⁴		
- signature lines on briefing worksheet		
- go-no-go worksheet		
- signature lines on the go-no-go worksheet		
- worksheet for recording conditions on test burn		
- weather/fire behavior/smoke behavior worksheet ⁵		
- cost worksheet		
- day of burn notification form		
- complexity rating worksheet		

Signed: _____ Date: _____

⁵ Regularly scheduled onsite weather observations are required on site prior to ignition, during implementation and after the burn until declared out on High Complexity burns and are encouraged for Low and Moderate Complexity burns, especially multi-day burns (memorandum 3/2/04, Acting Chief, Branch of Fire Management).

Purpose	X	
Measurable objectives	X	
Costs estimate	X	
Burn organization		
- list of personnel and qualifications	X	
- organization chart	X	
- equipment list	X	
- contingency resources	X	
Schedule	X	
Pre-burn or site preparation considerations		
-does plan commit to spot weather forecasts if Moderate Complexity or higher?	X	
-are test fire procedures described	X	
-does plan describe signs to be placed, lines to be prepared, permits to be obtained	X	
Prescription – are all elements present and reasonable?	X	
Provisions for weather forecasts/checks	X	
Ignition plan – firing techniques, ignition method, pattern	X	
Holding plan – number, kind, position of resources	X	
Water supply	X	
Fire Escape Contingency Plan		
h. map of Maximum Manageable Area	X	
i. alternative trigger points for declaring an escape		
c. the plan must state who declares an escape	X	
j. the plan must specify who is to be notified	X	
k. the plan must state that the following documentation will be started		
1. time of escape declaration	X	

2. who was notified	X	
3. environmental conditions	X	
4. fire/weather observations	X	
5. actions prior to and after escape (chronology of events)	X	
6. unit logs and individual statements	X	
7. weather forecasts	X	
8. spot weather forecasts	X	
9. data from the nearest weather station	X	
l. what resources will be ordered	X	
m. what operations will be initiated	X	
n. how transition of command to an IC will be triggered	X	
- identifies other possible but unlikely events		
- identifies contingency resources for each event		
Smoke management plan		
- identifies sensitive receptors	X	
- mitigation strategies	X	
- map of acceptable smoke drift area		
Communication plan		
- notifications to be made prior to ignition	X	
- notifications to be made if an escape is declared	X	
- radio frequencies for burning and for escape	X	
Inter- and intra-agency cooperation	X	
Monitoring and evaluation		
- pre-burn - plan should describe	X	
- burn day - plan should describe	X	

- post-burn – plan should describe	X	
Personnel and public safety		
- unique safety hazards	X	
- LCES will be in place prior to ignition and covered in briefing. Plan must state this.		
- if the burn is classified High Complexity, or if one element of the Safety element of the complexity rating is High, is a Safety Officer assigned?	n/a	
- states that a briefing will be given each shift	X	
Rehabilitation plan – what, who, when		
Documentation that accompanies plan		
- BEHAVE runs provided and checked by qualified persons ⁶	X	
- spot weather records ⁷	X	
- JHA's must be attached	X	
- briefing worksheet ⁸	X	
- signature lines on briefing worksheet	X	
- go-no-go worksheet	X	
- signature lines on the go-no-go worksheet	X	
- worksheet for recording conditions on test burn	X	
- weather/fire behavior/smoke behavior worksheet ⁹	X	
- cost worksheet	X	
- day of burn notification form	X	
- complexity rating worksheet	X	

Signed: _____ Date: _____

⁹ Regularly scheduled onsite weather observations are required on site prior to ignition, during implementation and after the burn until declared out on High Complexity burns and are encouraged for Low and Moderate Complexity burns, especially multi-day burns (memorandum 3/2/04, Acting Chief, Branch of Fire Management).

RECORD OF ENVIRONMENTAL CONSIDERATION (REC)

TO: Directorate of Public Works
ATTN: Environmental Division (APVG-GWV)
U.S. Army Garrison, Hawaii
Schofield Barracks, HI 96857-5013 (Stop 253)
Phone: 656-2878, ext. 1051, Fax: 656-2878

DATE: 11 December, 2006

FROM: Installation Fire and Safety Office
Attn: Eric Moller, Acting Fire Chief
815 Wright Avenue, Bldg 108
Wheeler AAF, Hawaii

REC CHECKLIST (Check before submitting)	
x	Detailed Project Description
x	Location Map and Plans
x	Date of Proposed Action
x	Reason for Categorical Exclusion
x	Impact Analysis Checklist

1. PROJECT TITLE: Prescribed Burn, Makua Military Reservation

2. DESCRIPTION OF PROPOSED ACTION (*Provide detailed description of the proposed action. Attach location map and site plan, or other information that will help to clearly describe the proposal*):

The Installation Fire and Safety Office will conduct prescribed burns at Makua Military
Reservation scheduled between October, 2007, to May, 2037, depending on weather.
Execution of this prescribed burn is required to reduce fuel hazards subject to potential wildfires,
enhance ground visibility essential to conduct UXO surface clearance, and provide excellent ground
visibility essential prior to conducting required cultural surveys. Helicopters will be used for herbicide
and ignition operations. See attached Prescribed Burn Plan for detailed description of proposed
action.

3. DATE OR DURATION OF PROPOSED ACTION: October, 2007 to May, 2037

4. IT HAS BEEN DETERMINED THAT THIS ACTION (*Choose one*):

a. Is adequately covered in the following EA/EIS (*Provide title and date of document*):

Prescribed Burn at Makua Military Reservation, Island of Oahu, August 2002

b. Is categorically excluded under Appendix B, Section II, paragraph _____ of 32 CFR Part 651 for the following reason (*See 32 CFR Part 651, Environmental Analysis of Army Actions, 29 Mar 02*):

5. POTENTIAL IMPACTS ON THE QUALITY OF THE ENVIRONMENT HAVE BEEN CONSIDERED AND ARE DOCUMENTED ON THE ATTACHED ENVIRONMENTAL CHEKLIST (*Complete Environmental Impact Analysis Checklist*). IT HAS BEEN CONCLUDED THAT THIS ACTION IS NOT SEGMENTED AND NO EXTRAORDINARY CIRCUMSTANCES EXIST THAT WOULD PRECULDE THE USE OF THE APPLICABLE CATEGORICAL EXCLUSION IDENTIFIED IN PARAGRAPH 4.b. ABOVE (*See Section 651.29 of 32 CFR, Part 651*).

6. THIS REC DOES NOT RELIEVE THE PROPONENT FROM COMPLIANCE WITH OTHER APPLICABLE FEDERAL, STATE AND LOCAL ENVIRONMENTAL LAWS AND REGULATIONS; I.E. NATIONAL HISTORIC PRESERVATION ACT, ENDANGERED SPECIES ACT, CLEAN WATER ACT, ETC. (*Contact DPW Environmental Division for assistance on requirements*).

7. THIS ACTION HAS BEEN COORDINATED WITH THE FOLLOWING OFFICES/AGENCIES:

DPW Environmental Natural Resources, Cultural, Conservation, and Compliance Branch; Fire & Safety Office; G3/DPTM Range Division; G7 Transformation; Public Affairs Office; Federal Fire Department.

SUBMITTED BY THE PROPONENT:



11 December, 2006

Jason Greenlee, Fire Management Officer

656-1331/656-3740

REVIEW AND CONCURRENCES (*For Environmental Division use*):

	YES	WITH CMNT	NO	
<input type="checkbox"/> _____ (Natural Resources Program)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ (Date)
<input type="checkbox"/> _____ (Cultural Resources Program)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ (Date)
<input type="checkbox"/> _____ (Installation Restoration Program)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ (Date)
<input type="checkbox"/> _____ (Water Quality Program)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ (Date)
<input type="checkbox"/> _____ (Air Quality Program)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ (Date)
<input type="checkbox"/> _____ (Toxic Substances Control Act Program)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ (Date)
<input type="checkbox"/> _____ (Other environmental staff as required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ (Date)

APPROVED BY:

(Environmental Coordinator)

(Date)

PROPOSED ACTION: _____

ENVIRONMENTAL IMPACT ANALYSIS *(Consider both construction and operational impacts. Any "YES" or "MAY" answers need to be explained in the "Discussion" section at the end of this checklist.)*

	YES	NO	MAY
1. <u>AIR QUALITY</u>			
a. Will the proposal cause air emissions such as smoke, dust, suspended particles, or air pollutants during construction or operations?	X	<input type="checkbox"/>	<input type="checkbox"/>
2. <u>WATER QUALITY</u>			
a. Is there potential for accidental spills of hazardous or toxic substances?	<input type="checkbox"/>	X	<input type="checkbox"/>
3. <u>TOPOGRAPHY AND SOILS</u>			
a. Will there be alterations to topography, i.e. site grading that could potentially increase soil erosion?	<input type="checkbox"/>	X	<input type="checkbox"/>
b. Will the construction area involve disturbance of one acre or more?	<input type="checkbox"/>	X	<input type="checkbox"/>
4. <u>NATURAL RESOURCES</u>			
a. Will the proposal affect undeveloped areas, endangered or threatened species, or plant or animal critical habitat?	<input type="checkbox"/>	<input type="checkbox"/>	X
5. <u>ARCHAEOLOGICAL/HISTORIC RESOURCES</u>			
a. Will the proposal alter or destroy any archeological sites or buildings that are over 50 years old?	<input type="checkbox"/>	X	<input type="checkbox"/>
b. Will the proposal require any excavation, trenching, or grading activity?	<input type="checkbox"/>	X	<input type="checkbox"/>
6. <u>LAND USE</u>			
a. Will the proposal alter the present land use of an area?	<input type="checkbox"/>	X	<input type="checkbox"/>
7. <u>HAZARDOUS MATERIALS/WASTE OR TOXIC SUBSTANCES DISPOSAL</u>			
a. Will the proposal result in alteration or disposal of existing facilities?	<input type="checkbox"/>	X	<input type="checkbox"/>
b. Will the proposal result in the use, treatment, storage, and/or disposal of hazardous materials or wastes?	<input type="checkbox"/>	X	<input type="checkbox"/>
8. <u>NOISE ENVIRONMENT</u>			
a. Will there be any changes to the numbers, types, and operations of aircraft, vehicles, or weapon systems that could effect noise levels?	<input type="checkbox"/>	X	<input type="checkbox"/>
9. <u>TRAFFIC</u>			
a. Will the proposal generate or increase vehicular traffic?	<input type="checkbox"/>	X	<input type="checkbox"/>
b. Will there be a requirement to construct, reroute or alter roadways?	<input type="checkbox"/>	X	<input type="checkbox"/>
10. <u>UTILITIES SYSTEMS</u>			

SECTION 23 Attainment of Objectives

Objective (check one or more)

Measure of success (check Yes or No at completion of burn)

- Protect life and property during and after the burn

No one is injured, no tribal or private property is damaged, all the burn equipment is accounted for in good condition, after the burn no damage to archeological sites or other cultural resources.

Successful? Yes No

- Reintroduce fire to the ecosystem

"Successful" if burn occurs or "unsuccessful" if burn does not occur.

Successful? Yes No

- Reduce fuel load

Measure or estimate fuel load before and after burn. Indicate what the acceptable % overstory mortality would be.

Successful? Yes No

- Reduce ladder fuel

Estimate height of understory fuel before and after burn.

Successful? Yes No

- Break up fuel

Estimate cover of fuel cover before and after the burn.

Successful? Yes No

- Provide seedbed

Indicate percentage of ground burned that is desired and estimate amount of cover achieved by the burn.

Successful? Yes No

- WUI - reduce fuel around homes

Estimate height or distance of hazard before and after burn. Take photos.

Successful? Yes No

- WUI - maintain fuelbreak

Estimate acres of fuel break burned versus target.

Successful? Yes No

- Monitoring

Measurable success would be that the forms attached to the burn plan are completed and properly filed.

Successful? Yes No

- Smoke management

Manage smoke emissions through best available mitigation measures. Measurable success will be both the lack of complaints and the lack of observed smoke impacting sites to be avoided.

Successful? Yes No

- Other _____

Indicate a measure of success that can be quantified.

Successful? Yes

Appendix E: Primary Threats to Threatened and Endangered Plants Discussed in this Biological Opinion

PLANT SPECIES	Location Multi-islands	Threats																			
		Cattle	Deer (axis and black-tailed)	Goats	Pigs	Sheep	Rodents	Black Twig Borer	Chinese Rose Beetle	Two-spotted Leaf Hopper	Scale Insects	Slugs & Snails	Non-native Invasive Plants	Loss of Pollinators	Low Numbers of Individuals	Habitat Loss	Natural Disasters	Wildland Fire	Human Activity	Collection	Disease
<i>Abutilon sandwicense</i>								•	•								•	•			
<i>Alectryon macrococcus</i>	•			•	•		•	•				•	•	•			•	•	•		
<i>Bonamia menziesii</i>	•	•	•	•	•							•					•	•			
<i>Cenchrus agrimonioides</i>	•	•	•	•	•		•					•					•	•			
<i>Centaurium sebaeoides</i>	•	•										•					•	•			
<i>Chamaesyce celastroides</i>				•	•		•	•	•		•	•					•	•			
<i>Chamaesyce herbstii</i>				•	•		•	•	•		•	•				•	•	•			
<i>Ctenitis squamigera</i>	•		•	•	•							•		•			•	•			
<i>Cyanea grimesiana</i>				•	•		•	•	•		•	•	•	•		•	•	•			
<i>Cyanea longiflora</i>				•	•		•	•	•		•	•	•	•		•	•	•			
<i>Cyanea superba</i>				•	•		•	•	•		•	•	•	•		•	•	•			
<i>Cyrtandra dentata</i>				•	•		•	•	•		•	•	•	•		•	•	•			
<i>Delissea subcordata</i>				•	•		•				•	•	•	•		•	•	•			
<i>Diellia falcata</i>				•	•					•		•			•		•	•			
<i>Dubautia herbstobatae</i>				•	•							•				•	•	•			
<i>Euphorbia haeleeleana</i>	•		•	•	•		•					•		•		•	•	•			
<i>Flueggea neowawraea</i>	•	•		•	•		•	•				•		•		•	•	•			
<i>Gouania vitifolia</i>					•		•					•		•			•	•			
<i>Hedyotis degeneri</i>				•	•							•		•		•	•				
<i>Hedyotis parvula</i>				•	•							•		•		•	•				
<i>Hesperomannia arbuscula</i>	•		•	•	•		•	•				•		•		•	•	•			
<i>Hibiscus brackenridgei</i>	•	•	•	•	•		•		•			•		•		•	•	•			
<i>Lepidium arbuscula</i>				•								•			•		•	•			
<i>Lobelia niihauensis</i>	•			•			•				•	•					•	•			
<i>Melanthera tenuifolia</i>				•	•		•	•	•		•	•				•	•	•			
<i>Neraudia angulata</i>		•		•	•		•					•		•		•	•	•			
<i>Nototrichium humile</i>	•	•	•	•	•							•					•	•			
<i>Peucedanum sandwicense</i>	•			•								•					•	•			
<i>Phyllostegia kaalaensis</i>					•							•					•	•			
<i>Plantago princeps</i>	•			•	•		•	•	•		•	•				•	•	•			
<i>Pritchardia kaalae</i>				•	•		•					•		•		•	•	•	•	•	•
<i>Sanicula mariversa</i>				•								•					•	•			
<i>Schiedea hookeri</i>				•	•						•	•					•	•			
<i>Schiedea kaalae</i>				•	•						•	•		•			•	•			
<i>Schiedea nuttallii</i>				•	•			•			•	•		•		•	•	•			
<i>Schiedea obovata</i>				•	•						•	•		•		•	•	•		•	
<i>Silene lanceolata</i>	•			•	•	•						•					•	•			
<i>Spermolepis hawaiiensis</i>	•		•	•		•	•	•	•		•	•				•	•	•			
<i>Tetramolopium filiforme</i>				•	•		•	•		•	•	•		•		•	•	•			
<i>Viola chamissoniana</i>				•	•							•		•		•	•	•			