New Holland Prescribed Fire
Escaped Prescribed Fire Review
April 2006

Signature Page

Team Leader: _____ _/s/ Dan L. Morford_____
AFMO-Prescribed Fire Specialist, Dan L Morford

Received by:

_____/s/ Shane Del Grosso_____
Zone Fire Management Officer, Shane Del Grosso

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Unit Fire Management Officer, Art Canterbury

_____ _/s/ Michael J. Bryant_____
Refuge Manager, Michael Bryant

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INTRODUCTION

The New Holland Prescribed Fire was ignited on 4/12/06 at 1130 on the New Holland unit of the Lake Andes WMD. The prescribed fire was declared an escape at approximately 1400, and was controlled by 1600 on the same day. The escape burned an additional 35 acres of private land outside the unit, and resulted in the entrapment of an engine. The entrapment resulted in minor injuries to 2 FWS firefighters and a total loss of the vehicle.

The Fish and Wildlife Regional Office assembled an Interagency Entrapment Investigative Team for the New Holland incident. The interagency team consisted of the following personnel:

Dan Morford (RXB2, RXB1 (T), SOFR, ICT3), Prescribed Fire Specialist, Northern Great Plains, NPS, Leader
Charles 'Chuck' Melvin (Refuge Officer), LE, Fort Niobrara, FWS
Fenn Wimberly (RXB2, ICT3), FMO, Flint Hills NWR, FWS
John Segar (RXB1), National Fuels Specialist, NIFC, FWS

The Regional Office charged the investigation team with reviewing both the escaped prescribed fire and the resulting entrapment, with emphasis of identifying Lessons Learned and recommendations to prevent similar situations in the future. This review is a result of the team's interviews with involved staff, on site investigation, and review of the prescribed fire plan and other pertinent documentation.

BACKGROUND

The New Holland Unit is located is located 15 miles north of the Lake Andes NWR/WMD Headquarters, adjacent to the community of New Holland. The unit is nestled among farm land and CRP with two-way paved roads. Historically the center of the unit has been managed for wetland habitat, but due to reduced water levels the area has become filled with noxious weeds. The current refuge plan is to burn off the unit and allow a cooperator to farm the unit.

On April 12, 2006, at 1130 a pre-burn briefing was conducted for all personnel. At the time of the briefing the SW wind speed was higher than the spot forecast. The Burn Boss contacted the weather service to discuss the situation. The service confirmed the higher SW wind speed but the rest of the spot was viewed accurate. A test fire was initiated in the NE corner at 1230. The prescribed fire progressed along the north and east line with the SW wind. A wind shift to the West occurred approximately one hour after implementation. The backing fire on the west side became a head fire with the W, NW wind and moved quickly to the east. The Burn Boss realized the danger of the head fire in relationship to his crews on the east line. He ordered them to their pre-identified safety zone, which was on the south end in an area of lighter fuel. The head fire jumped the east line which consisted of a two track road with mow and disc lines on each side. The approximate width of the control line was 60 feet. At this point the Burn Boss declared a wild fire, 1400.

The Burn Boss assigned two T6 engines staffed with moderate fitness rated firefighters to hold the prescribed fire southern flank from the east line back to the west in tandem. He assigned one T6 engine staffed by the RXB2 (t)/ENGB and a FFT2 to initial attack the south flank of the wild fire and ordered additional engines from the local VFD. The initial attack T6 engine drove into the black and followed the flanking fire to the east to pinch it off at the stubble corn field. VFD units arrived on scene and were assigned structure protect at the house to the east. The FWS IA T6 engine made several attempts to flank the fire in the black but spots kept popping up behind them. They would circle into the green and come back into the black to suppress the fire behind them. This was attempted several times. The heat from the smoldering grass fuel combined with the time spent on the smoldering fuel began to impact the work of the fire fighter operating the hose. He commanded the driver to move into the green unburned where the ground was cooler. They worked for a short time and realized the fire was advancing faster than thought. The Engine Boss ordered the driver to stop so he could throw the hose on board and get in the cab away from the heat. They were ready to move out the area, but the engine had died. They both tried to start the engine to no avail. The two fire fighters stayed in the vehicle as the flaming front raced past them. The two left the vehicle as soon as they felt safe, ran through the flanking fire to unburned fuel and were picked up by the Burn Boss/ IC. The subsequent heat around the T6 engine caused it to be engulfed in fire. The two were examined by local ambulance staff and later treated at the health clinic. The fire was contained by the VFD forces that arrived to assist at 1600. A short debrief was held at the NW corner parking lot at 1645 and staff was set home. The unit was mapped at 440 acres; 156 acres were burned with 35 acres on private land.

GENERAL FINDINGS

The investigative team was met with a positive attitude by all participants. Individuals seemed willing to discuss the events and actions on the New Holland Prescribed Fire. The working relationship between Huron Fire District and Lake Andes WMD is good and improving.

The primary cause of the escape was the wind shift that was not forecasted in the spot weather forecast. However, underestimating potential risk, coordination of lighting and holding forces and relying on line prep rather than adequate holding and contingency planning affected the staff's ability to safely and effectively respond to the wind shift.

SPECIFIC FINDINGS & RECOMMENDATIONS

A, B Findings
o Recommendations

I. Prescribed Burn Plan:

A. Burn complexity was accurately summarized as Moderate, but several complexity elements relating to on and off site values, public interest, fire behavior and risk of escape were underestimated as low. It appeared that the burn plan preparer and reviewer often evaluated complexity on the average conditions rather than on the worst-case scenario or conditions at critical holding points. This may have affected the quality of subsequent holding and

contingency planning. The worse case scenario would be something similar to any one or combination of the following; winds at the high end of the prescription, winds shifting to an opposite direction, spot fire escaping containment and burning towards town, or relative humidity dropping below predictions.

- Burn Plan preparers and reviewers must be able to consistently and realistically complete complexity analysis. Additional training may be required to improve these skills.

B. The moderate complexity Burn Plan was prepared by a RXB3 (RXB2 trainee) on 8/8/05 and reviewed by a RXB2 on April 06, 2006, (the RXB2 believes this was during the first week of April).

C. The Holding plan addressed pre-burn preparations rather than holding considerations, and did not address all of the criteria identified in the Fire Management Handbook (FMH).

- Holding plans should identify critical holding points or areas of particular concern, and identify the means and resources needed to mitigate those concerns.
- BEHAVE SPOT and CONTAIN runs should be used to help in estimating holding resource needs.
- Because of the wide prescription and range of potential fire behaviors, it may be useful to utilize a matrix of holding resources and qualifications in future burn plans. This allows the plan to identify the need for additional holding resources as fire behavior increases. It also helps to identify the minimum qualifications needed within the burn organization.

D. The contingency plan was not based on the potential fire behavior at the high end of the prescription.

- Contingency plans must consider the potential fire behavior and what resources and tactics will or will not be effective under those conditions. A matrix approach is often useful.
- BEHAVE SPOT and CONTAIN runs should be used to help in estimating contingency resource needs for head and or flanking fire of an escape fire.
- Contingency plan should identify those values which must be protected.

E. The burn organization identified the minimum resources needed to implement the plan at the low end of the prescription, and identified optional resources. However, it did not identify any type of considerations for determining when the optional resources would be needed, and did not clearly address the need for the minimum number and qualifications of arduous fitness rated staff to meet holding and contingency needs.

- Consider using a matrix to better display the number and type of resources required at certain fire behavior or weather triggers. Ensure that these identified resources adequately cover holding and contingency needs under those conditions.

Burn Plan Review and Approval

F. The Prescribed Burn Plan was prepared by a Range Technician on 8/08/05.
The Plan was reviewed by a Prescribed Fire Technician and signed the first week of April 2006.
Project Leader Michael Bryant signed plan on 4/12/06.
The complexity rating worksheet was signed by the Range Tech and Project Leader on 4/12/06, day of the burn.
The reviewer did not identify plan deficiencies as identified above.
- Reviewers must adequately review plans and ensure deficiencies are corrected.
- Reviewer should enter the entire date (DD/MM/YY) of review rather than month and year.
- It may be helpful to review plans earlier in the season so that there is no rush to complete the review and correct and deficiencies.
- Burn Plans should be approved by the appropriate line officer in advance of the burn day to assure adequate time to review, discuss, and revise the plan as needed.
- The Project Leader's Go/No-Go Pre-Ignition Checklist was signed the day of burn and can be completed up to 15 days prior to the ignition of the Prescribed Fire. It is recommended that the checklist be signed ahead of ignition date to eliminate additional headache on the day of the burn.

Implementation

G. The preparations and briefings were according to the plan and adequate.

H. The RXB2 did a good job of following up with the NWS to get an updated spot weather forecast when the original spot forecast appeared to significantly underestimate wind speed.

I. The RXB2 completed the GO/NO-GO checklist. While the assigned burn staffing met the minimum requirements in the plan, this was a missed opportunity in not recognizing that staffing was stretched for being at the top end of the prescription.

J. Stress the importance of the GO/NO-GO decision, and the ability of the Burn Boss to delay a burn even when all plan requirements are met.

K. The Prescribed Fire/Pile Burning Report Form that Northern Great Plains Interagency Dispatch Center (GPC) requests of all agencies was not completed nor faxed to GPC. This information allows GPC to track burning activity on any given day.

- Ensure that Prescribed Fire/Pile Burning Form is completed and faxed to GPC at least two days prior to implementation. This will allow for accurate communication between GPC and agencies.

L. Burn operations generally went well at the beginning of the burn, but it was obvious that staffing was stretched since nobody was assigned to be a fire behavior and weather monitor, and the RXB2 (T) was also doing some interior lighting as well.

- The use of a dedicated fire behavior and weather monitor is recommended to ensure that good observations are taken (that can help refine future prescriptions) and to allow the RXB2 to focus on operations and the big picture.
- RXB2 (t) and FIRB should be focused on maintaining situational awareness and directing firefighters rather than doing the actual firing.

M. Firefighters were not assigned to a particular piece of equipment or task, but were used interchangeably as needed. This can be an effective management strategy when the crew has significant experience working together, but these firefighters had little experience working on fires together.

N. Assign firefighters to a specific leader, piece of equipment, and task until they have sufficient experience working together.

O. The span of control on the fire was stretched because of the lack of individuals qualified at the single resource boss or advanced firefighter level. The RXB2 (t) was supervising all assigned fire fighters working multiple flanks with multiple engines.
   - Service policy recommends an ENOP to be assigned to each engine on the burn.
   - FFT1s should be utilized to lead firing teams and improve the span of control.

P. The firing sequence was reasonable given the spot forecast predicting wind from the SW later in the afternoon. The west ignition (4) progressed well, but may have gotten out of sync with east ignition (3). The RXB2 (t) on an ATV may have been too aggressive when igniting the flanking strip along the south side of the windrow. The rationale was legitimate, but timing was poor considering the ignition on the east flank had slowed due to the sparse fuel.

   - A much shorter strip or waiting until the black lining had been completed would have been more prudent.
   - Continue or improve communications with all resources during lighting.

Q. The ignition on the west line to the row of trees had backed through the tree line when the unpredicted wind change of W to NW (instead of SW as predicted) hit the unit. This produced a head fire that the east line could not hold and which could not be safely or effectively attacked with burn resources. This was the primary cause of the escape.

   - The Burn Boss situational awareness must include worst case scenario. This includes but is not limited to asking the following questions, what if there is a wind shift right now, T6 engines breaks down, lighters run out of fuel, communication stops between forces, lighting is taking longer that expected, .
   - Ensure that lighting and holding operations are coordinated.

R. Wildfire qualifications and experience levels must be considered when making holding and contingency assignments for employees assigned to prescribed fires. The high proportion of moderate fitness rated firefighters assigned to the prescribed fire significantly limited the RXB2's options for dealing with slopovers/escapes.

- The FWS should continue to develop the experience level and qualifications of its staff to ensure that the appropriate fire skills are being learned which will enhance prescribed fire program.
- FWS personnel should be encouraged and allowed to participate in wild fire assignments to build knowledge base and capability.

II. Escaped Fire Operations

A. The RXB2 did a good job of recognizing the wind shift, the probability of escape, and reassigning resources based upon their experience and qualifications.

B. The high proportion of moderate fitness rated firefighters assigned to the burn significantly limited the RXB2/ICT4s options for initial attacking the wildfire, and added an extra level of complexity to the situation.

- Insure that there are adequate numbers of qualified and experienced staff assigned as contingency forces given anticipated fire behavior.

C. The decision to utilize a FFT2 with no wildfire experience as the driver of the IA engine is questionable.

D. The RXB2 did a good job of rapidly declaring the fire a wildfire and ordering additional resources.

E. The engine boss made a good decision to stay in the stalled engine and encouraged FFT2 in that decision, while the fast moving head fire passed, before exiting the engine.

F. The RXB2 (t)/ENGB assigned to the engine initial attacking the escape should have disengaged sooner given the engine's effectiveness and safety considerations. His situational awareness and ability to effectively make this decision was likely affected because he was operating the hose on a very active flaming front.

- The primary responsibility of an ENGB is maintaining situational awareness and providing for the safety of the engine and assigned staff.

G. All 3 engines had vehicle problems on the wildfire.

- Further investigation into engine problems is needed to insure engines are maintained in a fire ready state.
- Review engine maintenance schedule.
- Assigning staff to single engines and requiring comprehensive engine checks on the day of the burn may alleviate potential problems. Engine check checklists are commonly available.

Debriefing

H. RXB2 requested that each employee write a narrative of their observations for that day.

I. There was not an adequate AAR at the end of the shift because of the desire to get firefighters on the road due to previous commitments.
   - AAR's should be conducted after all incidents, particularly ones where escapes and injuries have occurred. An After Action Debrief was held later in the week. The results of AAR's should be documented so that Lessons Learned can be passed on to other units.

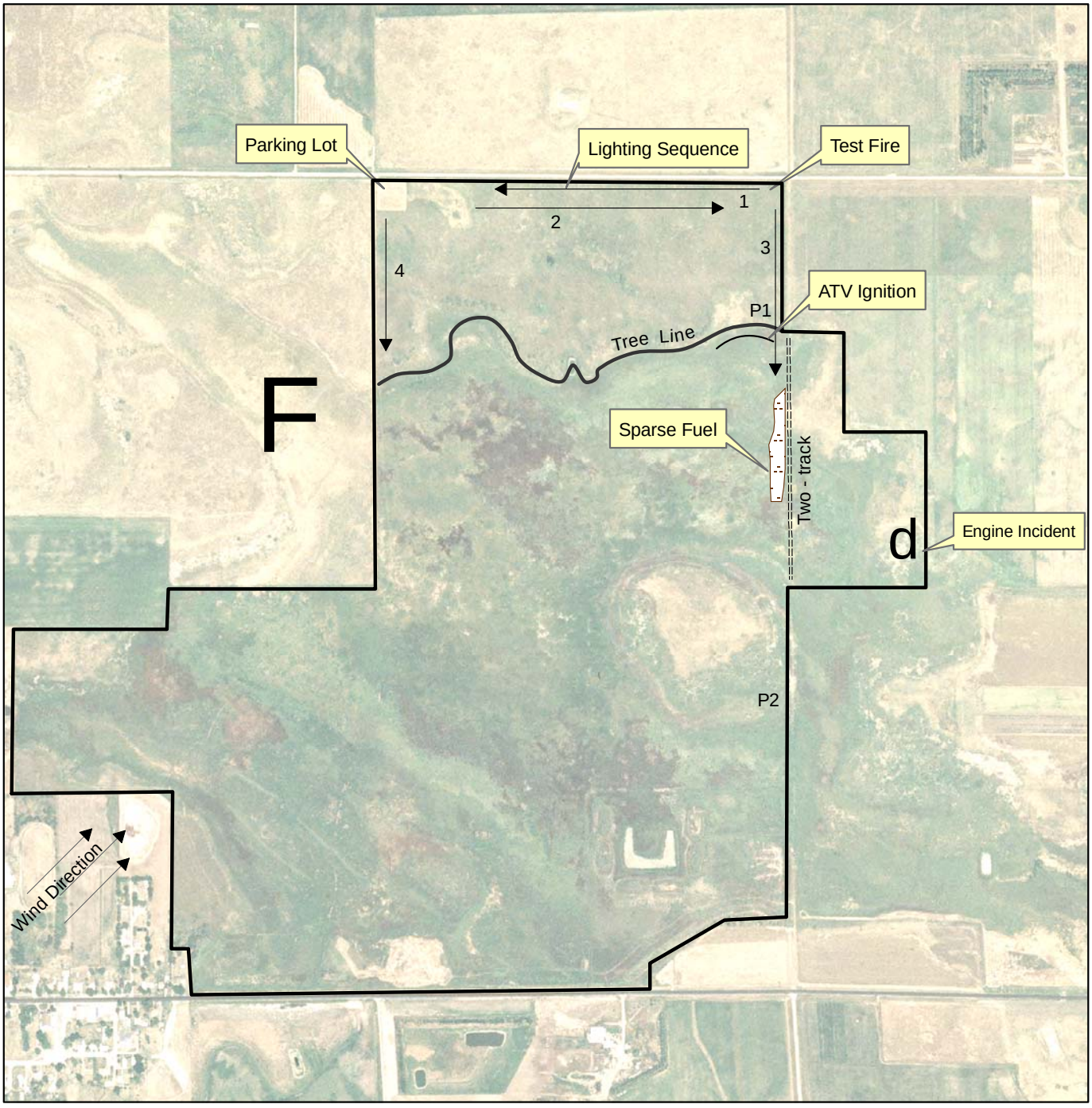
Additional items related to this event

Refuge did initiate a Critical Incident Stress Debrief. It has been documented in several publications that individuals need this type of interaction as soon as possible.

Verify that notification procedures are in place for serious Wildland Fire Related Accidents.

NEW HOLLAND UNIT MAP

New Holland Prescribed Fire
Activity Map



P1 - East line fuel type, looking SE

P2 - New Holland Prescribed Fire crossing east line. Looking N

FWS T6 Engine on scene

PRESCRIBED BURN PLAN

Lake Andes, South Dakota
Refuge or Station

New Holland 440
Prescribed Fire Name or Unit **Acreage**

T. 100 N. R.66 W, S.36 **2**
Legal Description **Complexity**

Proposed Burn Dates: January - December

Prepared By_____ **Date 8/8/05**
Field Representative

Reviewed By_____ **Date**
District Fire Management Officer

Reviewed By_____ **Date**
Zone Fire Management Officer

Reviewed By_____ **Date**
Additional Reviewer as Required

Project Leader / Refuge Manager

As the line officer who will be ultimately responsible for the outcome of the implementation of this prescribed fire project, I certify that I have reviewed this Prescribed Fire Plan and certify that all related planning documents are complete, and that the prescribed fire conditions will, to the best of my knowledge meet the planned objectives when carried out according to this plan. This plan is valid for up to four years following my signature below.

Approved_____ _____
Project Leader / Refuge Manager **Date**

Re-Certification For Multiple Years

Prescribed Fire Plans are valid for up to four years after Approval by the Project Leader/Refuge Manager. During this time the plan may be executed more than once but must be re-approved by the Project Leader/Refuge Manager each year.

I certify that I have re-reviewed this Prescribed Fire Plan, that conditions described in this plan are substantially still the same, and that the plan is still valid.

_____ _____
Project Leader / Refuge Manager **Date**

Project Leader / Refuge Manager **Date**

Project Leader / Refuge Manager **Date**

PROJECT LEADER'S GO/NO-GO PRE-IGNITION CHECKLIST

Instructions: ***The Project Leader's Go/No Go Pre-ignition Checklist and Approval is the first of two Go/No-Go decisions that must be completed before a prescribed burn can be implemented. By completing the checklist, the Project Leader or Refuge Manager evaluates whether compliance requirements, prescribed fire plan elements, political considerations, and internal and external notifications have been established. The Project Leader's Go/No-Go Pre-Ignition Approval is then signed to give final management approval prior to execution of the prescribed fire.***

Once the Approval is signed, it is valid for up to 15 Days. If ignition of the prescribed fire is not initiated prior to the expiration date determined by the Project Leader/Refuge Manager, a new approval will be required. Attach additional copies of this page to the burn plan as necessary.

Prescribed Fire Name New Holland

KEY ELEMENTS	YES	NO
The Prescribed Fire Plan is up-to-date and contains no unapproved changes or amendments.		
Safety considerations, including LCES, have been addressed in the plan. Concerns and strategies will be adequately communicated with field personnel prior to ignition.		
All T & E species and/or Cultural Resource concerns have been adequately addressed in NEPA documentation and have been/will be appropriately mitigated.		
All smoke management requirements have been completed?		
The prescribed fire complexity rating has been completed with rationale. The appropriate mitigations have been identified.		
There are no extenuating circumstances that preclude successful completion of this project? (i.e. regional, national, unusual circumstances, drought, outstanding issues, other fires or recent escapes, etc.)		
All pre-ignition internal and external notification and media releases been completed or will be completed prior to ignition.		

Project Leader's Go/No-Go Pre-Ignition Approval

I certify that I have reviewed the burn objectives and that I am in agreement that the Prescribed Fire Complexity Analysis is correct and that all the above questions were answered "YES."

Recommended by: _____ _____
FMO/Burn Boss Date

Approved by:_____ _____
Project Leader / Refuge Manager Date

Approval Expires:_____(Approval may be up to 15 days in advance).
Date

PRESCRIBED FIRE OPERATIONS GO/NO-GO CHECKLIST

Instructions: ***The Prescribed Fire Operations Go/No Go pre-ignition is the last of two Go/No-Go decisions that must be completed before a prescribed burn can be implemented. The Prescribed Fire Operations Go/NO-Go Checklist and the Approval is completed by the Burn Boss, and is the final operational approval to implement the prescribed fire.***

Yes	No	GO/NO-GO CHECKLIST FOR PRESCRIBED FIRE (All questions must be answered with a YES before Test Fire ignited)
		1. PRESCRIBED FIRE PLAN • **Do you have an APPROVED prescribed fire plan?** • **Do you have a signed Agency Administrator's Pre-Ignition Go/No-Go Approval Checklist?** • **Has the contingency planning process adequately considered fuels adjacent to the burn area?**
		2. PRE-IGNITION WORK / PRESCRIPTION ELEMENTS • **Has all pre-burn preparedness work been completed (fuels, signs, closures, etc.)?** • **Has a drought or other climatological analysis been completed and is it favorable?** • **Are current and forecasted weather conditions favorable for execution of the prescribed burn?** • **Are ALL smoke management specifications met?** • **Has a spot weather forecast been obtained and does it support the needed prescription for the life of the prescribed burn project?**
		3. NOTIFICATION / PERMITS • **Have ALL required notifications been made, including to the Project Leader/Refuge Manager?** • **Have ALL permits and clearances been obtained?**
		4. PERSONNEL / EQUIPMENT • **Are ALL personnel certified for their assigned positions?** • **Are ALL required personnel on-site?** • **Are holding forces adequate for containment under expected conditions?** • **Are Contingency forces available and in communication?** • **Are all equipment and supplies required in the prescribed fire plan in place and functional (pumps, radios, ignition devices, hose lays, etc)?**

		5. SAFETY • **Have ALL personnel been briefed on the project objectives and their assignment?** • **Have ALL personnel been briefed on their safety hazards and concerns?** • **Are LCES in place?**
		6. In YOUR OPINION, can the prescribed fire meet the planned objectives and can it be carried out according to the approved plan?
IF ALL BELOW,	**ITEMS AND**	**ABOVE HAVE BEEN ANSWERED "YES", THEN PROCEED WITH TEST FIRE, ANSWER NOTE KEY TEST FIRE BURN CHARACTERISTICS ON BACK.**
		7. TEST FIRE / CONCURRENCE • **Are results of Test Fire acceptable?** • **Have you discussed Strategy/Tactics with Ignition/Holding supervisors and have concurrence that planned activities are in-line with burn complexity and have a high probability of success?**

Prescribed Fire Burn Boss Approval and Concurrence

As the Burn Boss who will conduct this prescribed burn, I certify the Prescribed Fire Operations GO/NO-GO Checklist has been accurately completed, and I believe the prescribed burn can meet the planned objectives when carried out according to this plan.

I also understand that:

- *Any changes to this plan must be approved by the agency administrator or his/her acting in writing.*
- ***All** questions on the Go/No Go Checklist must be honestly answered "Yes" before the burn proceeds.*
- *I am responsible for conducting and carrying out all aspects of the burn until relieved by the Agency Administrator or his/her acting.*

Burn Boss: _____ Date: _____

I. Burn Unit General Description

Location: Lat.43, 22, 58. Long. 98, 36,56

County: Douglas Co

Drainage or Basin Name: Lake Andes basin

Land Form: Upland Prairie, Prairie Pothole

Threatened and Endangered Species: Threatened and endangered species in and adjacent to the proposed burn areas are identified in the Lake Andes NWR fire management plan. The overall impacts on the described habitat will result in positive impacts for bird and mammals indigenous to the area.

Is a section 7 consultation being forwarded to Fish and Wildlife Enhancement for review YES No X

NEPA compliance checklist complete YES **XX** NO

Cultural Resources: A section 6 consultation has been completed for this site. No Cultural resources or critical sites are located on the property.

Size: 440 acres

Elevation :(Ft.)Top: 1,560 **Bottom:** 1,550 **Average:** 1,555

Aspect (s): N/A Flat

Slope: Maximum: 0-2 % **Minimum:** **Average:** 0-2%

Vegetation Type	Size in Acres or % of Burn Unit	Fuel Model NFFL	Fuel Model NFDRS
Mixed Grasses	50%	1	L
Wet Land Vegetation	50%	3	N

Fuel Loading and Dead Fuels

Fuel Loading by size class:	< 1/4" 3.04 Tons per Acre	1/4- 1" .71 T/A
	1-3" N/A	> 3 " N/A

Habitat Conditions: The Lake Andes Fire Management district is composed of a mix of native and non native species. With this mix of the **Fire Regime Condition Class** of the general area are **FR2** and a **CC** of 2 or 3. Due to the spread of the non-native invasive species the **CC** is generally not below 2 however there are small fragmented areas that have been restored to historic levels and they are threatened by surrounding vegetation types**.** The New Holland unit consists of a combination of upland prairie, mixed cool season grasses warm season grasses and a central wetland with scattered trees on the edge.

Resource Objectives:

1). Re-establish native grasses in support of refuge goals of promoting natural ecosystems for the benefit of waterfowl and other migratory birds.

2). Provide quality habitat for avian and mammalian species indigenous to the northern prairie ecosystem.

3). Restore vigor to the existing plant community, by rejuvenating native prairie thus providing healthy, upland native flora communities.

4). Reduce hazardous invasive fuels by 80% in the unit.

Prescribed Fire Management Objectives:

1). Consume 80% of vegetation, thatch and hazard fuels to reduce the potential for damaging wildfires, and to provide optimum habitat.

2). Keep prescribed fire with in unit boundaries and prescriptions.

3). Promote or increase frequency of native grass species.

4). Reduce the amount of undesirable and exotic plant species while promoting native species by 20-30%.

5). Return accumulated nutrients stored in dead fuels to the soil, which in turn provides natural fertilization assists in the production of more nutritious and palatable vegetation, and also increase seed production.

Acceptable Range or Treatment Objectives and Specifications:

1). Consume > 80-100 % of the 1-hour fuels
2). Consume > 80% of the heavy dense thatch

II. Pre-Burn Monitoring

Type of Transect: None

Photo Documentation: Photo points will be established. Photographs will be taken following the burn, and as determined adequate during the summer following.

Other: N/A

III. PLANNING AND ACTIONS

Prescribed Fire Complexity Rating System Guide Worksheet

Project Name: New Holland Number _____

Complexity elements:

1. Potential for Escape

Risk	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	The Unit is surrounded by crop fields, water body and grazed pasture there is minimal potential for escape. Mow lines, disc lines and wet lines are easy to hold.
Final Rating: ***Low*** *Moderate High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	An escape would only remove crop residue and pastures are grazed down and fire should not carry across the grazed pasture.
Final Rating: ***Low*** *Moderate High*	No change

Technical Difficulty	Rationale
Preliminary Rating: ***Low*** *Moderate High*	Holding forces can use wet line and burn out methods to blacken the line as firing progresses and all holding lines will be burned out before head fire contacts them.
Final Rating: ***Low*** *Moderate High*	No change

2. The Number and Dependency of Activities

Risk	Rationale
Preliminary Rating: **Low** ***Moderate*** *High*	The units will be burned with two burn teams and holding forces and the activities are inter-dependant upon each other. The operation can take as much time as needed to keep it easy to manage.
Final Rating: **Low** ***Moderate*** *High*	No change for units.
Potential Consequences	**Rationale**
Preliminary Rating: **Low** ***Moderate*** *High*	The units are not complex in shape or fuel types however timing of burn teams will be critical for fire fighter safety.
Final Rating: **Low** ***Moderate*** *High*	No change for units.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Low numbers of staff and visual contact with entire units make these units easy to complete.
Final Rating: ***Low*** *Moderate High*	No change.

3. Off-Site Values

Risk	Rationale
Preliminary Rating: **Low** ***Moderate*** *High*	Most off site resources are of small value (fence posts, Power poles).
Final Rating: ***Low*** *Moderate High*	No Change
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Area is surrounded by grazed pasture.
Final Rating: ***Low*** *Moderate High*	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Any of the off-site values can be protected with basic firefighter skills.
Final Rating: ***Low*** *Moderate High*	No change.

4. On-Site Values

Risk	Rationale
Preliminary Rating: ***Low*** *Moderate High*	The only on site values are fence posts and power poles, and will be wet lined as holding progresses. As addressed in the burn plan there are no identified T & E species.
Final Rating: ***Low*** *Moderate High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Implementation will not adversely affect on-site resources. This burn is anticipated to improve habitat condition

Final Rating: ***Low*** *Moderate High*	No change
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Resource values inside the Unit are easy to protect, and no special skills are needed
Final Rating: ***Low*** *Moderate High*	No change

5. Fire Behavior

Risk	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Fuels are constant and fire behavior is easy to predict. Type 1 & 3 fuels. The fuel loading is uniform and continuous.
Final Rating: ***Low*** *Moderate High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	The grazed pastures will produce less fire intensity than in the unit.
Final Rating: ***Low*** *Moderate High*	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	The pre-burn briefing will be adequate to cover all aspects of firefighter safety. Fire behavior is easy to predict with no expected changes.
Final Rating: ***Low*** *Moderate High*	No change.

6. Management Organization

Risk	Rationale
Preliminary Rating: **Low** ***Moderate*** *High*	The units will be burned with a small number of personnel however there will need to be multi level organization of supervision for the safety of personnel.
Final Rating: **Low** ***Moderate*** *High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	The Unit is small in size and the ability to see the entire unit will make management easier.
Final Rating: ***Low*** *Moderate High*	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Personnel for the burns will be from the local area or the supervision of all personnel will be by some one from the local area.
Final Rating: ***Low*** *Moderate High*	No change.

7. Public and Political Interest

Risk	Rationale
Preliminary Rating: ***Low*** *Moderate High*	The local area is agriculture based and the residents are familiar with burning for resource benefits.
Final Rating: ***Low*** *Moderate High*	N/C

Potential Consequences	Rationale
Preliminary Rating: *Low* ***Moderate*** *High*	In the event of an escape with damage to private property there could be public backlash against the Government.
Final Rating: ***Low*** *Moderate High*	In the past when private citizens have had escape problems the negative publicity has been short lived and the ability to use fire has not been stopped. Notification of local sheriff, VFD's, and local residents should help mitigate public and media interest. In addition there will be smoke signs along the roads to notify the public.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	The use of Media release at the beginning of the prescribed fire season is adequate for the unit.
Final Rating: ***Low*** *Moderate High*	No change.

8. Fire Treatment Objectives

Risk	Rationale
Preliminary Rating: ***Low*** *Moderate High*	The goals and objectives are easily meet in this grass fuel type. The weather Rx is broad and the fire intensities will be low to moderate and easy to manage.
Final Rating: ***Low*** *Moderate High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	There are other methods that could be used such as grazing / haying if needed to accomplish the stated goals. If objectives are not met it would not have an adverse affect on the program.
Final Rating: ***Low*** *Moderate High*	No change
Technical Difficulty	**Rationale**

Preliminary Rating: ***Low*** *Moderate High*	The units are easy to monitor and there are no restrictions on the methods to accomplish the stated goals. With just limited pre-burn monitoring is needed to determiner when the unit is in prescription.
Final Rating: ***Low*** *Moderate High*	No change.

9. Constraints

Risk	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	The only constraints are that the Lake Andes NWR usually does its Prescribed burning in the spring/fall to avoid habitat damage.
Final Rating: ***Low*** *Moderate High*	No change
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Project can be completed whenever in prescription.
Final Rating: ***Low*** *Moderate High*	No change
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Constraints do not increase difficulty.
Final Rating: ***Low*** *Moderate High*	No change

10. Safety

Risk	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Safety issues are easily addressed in pre-burn briefing and there should be no adverse impacts to public safety or health.
Final Rating: ***Low*** *Moderate High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	There is minimal potential for serious accidents or injuries to firefighters and public.
Final Rating: ***Low*** *Moderate High*	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Safety concerns can be mitigated through LCES.
Final Rating: ***Low*** *Moderate High*	No change.

11. Ignition Procedures/Methods

Risk	**Rationale**
Preliminary Rating: *Low* ***Moderate*** *High*	Burn boss can monitor firing of the units visually at all times and timing is critical for the safety of personnel to accomplish fire goals.
Final Rating: *Low* ***Moderate*** *High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Fire shall be lit with the use of hand held firing devices on the edges to ensure firefighter and public safety.

Final Rating: ***Low*** *Moderate High*	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	No need for special ignition equipment.
Final Rating: ***Low*** *Moderate High*	No change

12. Interagency Coordination

Risk	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	No interagency considerations.
Final Rating: ***Low*** *Moderate High*	No change
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	No interagency coordination so project can be completed as planned.
Final Rating: ***Low*** *Moderate High*	No change
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	No interagency issues.
Final Rating: ***Low*** *Moderate High*	No change

13. Project Logistics

Risk	Rationale
Preliminary Rating: ***Low*** *Moderate High*	No interagency considerations. Adjoining land is privately owned. Restrictions form national or geographical preparedness levels are not anticipated in affecting completion of this burn due to the time of year the burn is planned.
Final Rating: ***Low*** *Moderate High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Logistical support will not increase risk of escape.
Final Rating: ***Low*** *Moderate High*	No change
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	No special support needed.
Final Rating: ***Low*** *Moderate High*	No change

14. Smoke Management

Risk	Rationale
Preliminary Rating: ***Low*** *Moderate High*	With the unit closed to the public and with the acceptable wind direction the smoke affect on the public and nearby homes should be minimal. Smoke management for burn crew is addressed in burn plan.
Final Rating: ***Low*** *Moderate High*	No change.
Potential Consequences	**Rationale**

Preliminary Rating: ***Low*** *Moderate High*	The smoke will only impact minor prairie trails and exposure will be minimized to personnel.
Final Rating: ***Low*** *Moderate High*	No change. Smoke management for roads is addressed in the burn plan
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Only limits on smoke are wind direction and stability of atmosphere. These limits are broad and commonly achieved in the spring/fall.
Final Rating: ***Low*** *Moderate High*	No change.

COMPLEXITY RATING SUMMARY

RISK **OVERALL RATING Moderate**

POTENTIAL CONSEQUENCES **OVERALL RATING Moderate**

TECHNICAL DIFFICULTY **OVERALL RATING Low**

SUMMARY COMPLEXITY RATING **Moderate**

RATIONALE: this plan is written for a multi-unit burn some of the units have rated moderate and some of the units have rated low. The Unit is in a grass fuel model with easy to protect edges and resource goals are easy to achieve. The duration and fire behavior of the burn will produce no complication for the prescribed fire personnel. Adjoining land use is pasture and potential for any escape is minimal.

Prepared by: _____ Date: _____
********** (Range Tech)

Approved by: _____ Date: _____
(Agency Administrator

Site Preparation:

The unit will utilize the existence of natural and man made fuel breaks to contain the prescribed fire and a "Light Hand On the Land" approach will be used through out. The unit will use the central water / mud flats and existing prairie trails. Mow lines or disc lines will be placed along the outside boundary fences (15 feet minimum in grass 20 feet in cat tails) on the inside of the boundary fence. The mow lines will be completed by fire management staff with rotary mower or the use of local cooperators to hay the lines will be used. Shelter belts found in the unit will have a 15 foot mow line surrounding them. The lines will be completed the preceding fall early spring/fall so that there will be ample time to ensure the lines are complete. In areas that have exposed mineral soil in crop lands the team will burn off of there and mow lines will not be created. Wooden fence posts will be treated with water as burn out continues for protection and monitored to ensure they do not catch fire. (See unit & holding map).

Weather Information Required:

The Burn Boss (or a qualified person appointed by the burn boss) will be responsible for obtaining weather information. Current weather information will be recorded on the morning of the scheduled burn. A Spot Weather Forecast will be obtained from the National Weather Service in Sioux Falls (1-605-330-4250). Weather information will be recorded on the forecast form and attached to this plan. The Burn Boss will closely monitor weather conditions, including any possible change in wind direction. Drought indices and vegetation greenness will be monitored prior to burning through Internet websites and checking local RAWS information. Please refer to the section identified cumulative drought and the effects on fire behavior for specific web sites.

Safety Considerations and Protection of Sensitive Features:

The New Holland unit will be closed to the public during the burn. Continual monitoring needs to be done throughout the area to ensure that spectators do not enter the burn unit. All spectators will be confined to the designated areas on gravel roads on the up wind side of the burn unit.

Inhalation of smoke is a problem and crews will be rotated as needed to reduce exposure.

Light Hands on the Land is the approach that will be used by all suppression forces to minimize environmental impacts. Fence posts will be checked and extinguished.
Prescribed Burning and Smoke Management signs will be in place on adjacent roads. All vehicles will drive with their headlights or emergency lights on to maintain high visibility.

Smoke may cause discomfort if prolonged exposure is experienced. Concern should be given to spectators or local residents who are suffering from respiratory diseases. All adjacent landowners will be notified prior to burning.

Caution needs to be practiced while filling drip torches and gloves need to be worn during this Operation. If a spill occurs on clothing, the article will need to be changed.

Travel outside of designated paths or trails inside the burn unit are not recommended with engines. Visibility will be reduced because of smoke and the intermixed wetlands will greatly increase the possibilities of getting equipment and personnel trapped if a vehicle becomes stuck. If a vehicle and/or crew become stuck they shall notify the Burn Boss **Immediately**. If a crewmember or engine becomes entrapped, burn out a safety zone with Fuzees and stay in the black.

All personnel **MUST** obey and practice the Standard Fire Orders at all times. Use LCES, identify escape routes and make them known.

All personnel will wear the required PPE at all times.

All accidents and medical injuries will be reported to the Burn Boss. In the event of a Medical emergency, the procedures will be to use a designated cell phone to dial 911 and request an ambulance or emergency flight to the nearest hospital or burn center. If air medivac is used, a temporary helispot will be located on the up wind of the burn unit and flagging will be put out to designate local wind direction. Local personnel and or EMT's present will stabilize the victim.

Special Safety Precautions Needing Attention:

A portable pump will be set up on unit. If adequate water supply is not available then portable water supply will be set up at the discretion of the Burn Boss. The pump will be tested, and secured, prior to ignition.

Media Contacts: Photographs will be taken before and during the burn, and after subsequent vegetative re-growth for use with feature news articles. Experience has shown that news releases, provided with appropriate photographs, usually result in more extensive coverage providing us with the opportunity to tell our story in more detail.

Newspapers

Geddes/charles Mix Co. News	P.O. box 257 57342	337-2571
Lake Andes Wave	P.O. box 369 57356	384-5616

Radio Stations

KMIT	501 S Ohlman St Mitchell 57301	605-996-9667
KQRN Q107	319 N Main St Mitchell 57301	605-996-1073
KOOL 98	501 S Ohlman St Mitchell 57301	605-996-1100
KORN	319 N Main St Mitchell 57301	605-996-1490

Special Constrains and Coordination:

No special constraints are needed for the unit.

IV. IGNITION, BURNING AND CONTROL

Estimated burn duration (time) 0900 - 1800.

Acceptable prescription & fire behavior ranges along control Lines of the prescribed burn unit. NOTE: Flame Length in excess of 8ft may occur in the interior portion of the unit due to scattered wetlands. During these conditions Flame Length up to 60ft are acceptable prescription parameters as long as the perimeter has been burned clean a minimum of 100ft along the downwind control line

FBPS Fuel Model 1 & 3	Low Fire Behavior	High fire Behavior	Actual
Temperature	40	85	
Relative Humidity	55	20	
Wind Speed (20' forecast)	5	20	
Wind Speed (mid-flame)	3	15	
Cloud Cover (%)	90	0	
Wind Direction	Varies depending on unit	Varies depending on unit	
Soil Moisture (%)	Moist to	w/in 5 in	surface
1 hr. Fuel Moisture (%)	10	4	
10 hr. FM (%)	N/A	N/A	
100 hr. FM (%)	N/A	N/A	
Woody Live Fuel Moisture	N/A	N/A	
Herb. Live Fuel Moisture	N/A	N/A	
Litter/Duff Moisture	14	4	
FIRE BEHAVIOR	SEE	BEHAVE	WK-SHEET

Fuel Model 1	Low			high			
Type of Fire (H, B, F)	B	F	H	B	F	H	
Rate of Spread (CH/HR)	3	2.1	9	54	15	345	
Fire line Intensity (BTU/FT/S)	3	1	15	58	26	607	
Flame Length (FT) (on holding line)	.8	.5	1.6	2.9	2	8.6	
Energy Release Component NFDRS Fuel Model A/F/H	N/A			N/A			

Fuel Model 3	Low			High			
Type of Fire (H, B, F)	B	F	H	B	F	H	
Rate of Spread (CH/HR)	4.1	8.1	46.8	7.1	13.5	527.7	
Fire line Intensity (BTU/FT/S)	49	97	562	100	194	7575	
Flame Length (FT)	2.7	4.2	8.3	3.8	5.1	27.4	
Energy Release Component NFDRS Fuel Model A/F/H	N/A			N/A			

Determining Acceptable Prescription Parameters for Burning

The behave fire prediction model does not have the ability to factor in the effects of green-up in fuel models 1 & 3. The model is based on the assumption the fine dead fuels will be the principle carrier of the fire. Another assumption or limitation of behave is that the model assumes all fuels are uniform and continuous. The model does not adequately predict fire behavior predictions in grass fuel types with a high live to dead fuel ratio during spring or fall green-up. The predicted rate of spread and flame lengths using Behave will be fairly accurate when there is little to no green-up present. The fact that the exotic and native cool season grasses will typically begin to green-up in the spring/fall will lessen the fire behavior substantially from the predicted fire behavior.

Also noted is that the wind speed correction factor of .4 does not seem to accurately predict mid-flame winds for the terrain and fuel type of the mixed grass prairie. Based on my experience and weather observations this correction factor is too low and a correction factor of .7 is more representative of actual conditions measured on other sites.

As a rule-of-thumb there is a degree of art involved in prescribed burning, we will use varying degrees of parameters based on their relationship: e.g., the cooler the temperature and the higher the relative humidity, the upper wind limits will be used; higher temperatures with lower relative humidity, the lower wind limits will be used; the more green-up showing, upper limits of all parameter could be used safely.

Behave runs for fuel model 3 typically provide fire behavior indices in excess of what is considered acceptable for control even at low wind and high fuel moisture conditions. Since fuel model 3 is represented almost entirely by marsh fringe and emergent vegetation around small wetlands and adjacent to large river and marsh systems, these fuels are generally not a concern to holding. **Rate of spread, fire intensity and flame length conditions outlined in the prescription table refer to indices acceptable along the perimeter of the burn where control is required. These indices may be higher within the unit where control is not a factor and still remain within prescription.** Perimeter holding lines where the ignition patterns include head fire off the line heading into the interior of the burn may also have heightened indices as these areas do not require significant holding efforts as the fire is burning away from the line towards the interior of the unit.

Adjacent land use also plays a major role in acceptable prescription parameters. Crop-land in a tilled state or heavily grazed pasture may be burned with higher fire behavior indices due to the ease of holding in these areas based upon lack of fuel. Areas with CRP, cured crop, or heavy pasture will require significantly more holding forces and will be burned with lower prescription limitations.

Prescribed burning at Lake Andes on days with a low RH below 25% and/or low fuel moistures below 5% will only be allowed when the FMO determines that there is a minimum of 20% green fuels in the fuel bed. This information will be gathered through web sites. No burning will be conducted when the relative humidity drops below 20% or fuel moistures drop below 4%.

Cumulative effects of weather and drought on fire behavior:

Weather conditions and drought indices will be monitored (via internet websites and local RAWS information) prior to the burn. They can be monitored using the Keetch-Byrum Drought Index on the North Dakota Dispatch Center Home Page (http://ndc.fws.gov), US Weather Service (http://www.crh.noaa.gov) and WIMMS. The effects of drought on Prescribed burning on these

unit may be that holding will be more difficult, that fire behavior will be increased and that fires may burn down into organic soils and hold over for extended times (days- weeks) and reappear at a later date. It may also prove that with out following moisture there may be a negative impact on the resource with limited re-growth after a burn in these condition.

These are the recommended KBDI trigger points for the Lake Andes Fire Management District:

1). Below 300 KBDI operations as normal follow plan as written.
2). 300 – 350 KBDI holding lines will be increased to a minimum of 30 feet in FM1 and 40 feet in FM3.
3). 351 – 399 KBDI the perimeter of the control lines will be patrolled and checked with a hand held infrared heat detector to search for hidden spots before forces are released for the scene.
4). 400 – 449 KBDI an additional engine (with two firefighters) or two ATVs with 50 gallon tanks and 25 GPM pumps will be added to the staffing needed.
5). 450 – 499 KBDI the Project Leader, Assistant Project Leader, Zone FMO, FMO and Burn Boss will meet to discuss the possible negative impacts associated with any prescribed burn operations as they relate to the resource objectives, risks and the consequences of possible failure.
6). 500 + KBDI no burning will be done.

A test burn will be ignited prior to the ignition of each unit and will show expected fire behavior. No burning will be done when the Fire Danger Index is in the extreme or when burning restrictions are in place.

Ignition Technique:

All ignitions will be done using hand-held firing devices. A backing, flank, and head fire sequence will be used. The Burn Boss based on personnel and equipment availability, weather and fuel conditions will decide the actual firing pattern on the day of the burn. To speed up completion of the burn it may be decided to fire the interior of the unit after the edges have been re-enforced or by the use of flare pistols (only qualified personnel will use fire devices and the proper PPE will be worn at all times).

Communications:

The South Dakota interagency (high-band) fire communication frequencies will be used for all burning operations. This frequency is licensed for all state and federal wildfire agencies and rural fire departments. The communication frequencies that will be used are identified in the attached communications plan.

The Burn Boss will have cell phone contact with the Lake Andes NWR office headquarters (487-7603), with the Charles Mix County Sheriffs Office (487-7625), and Great Plains Dispatch Center (605-393-8017). All engines and personnel on ATV's or on foot will have a radio. The burn boss will coordinate all activities during pre-burn, burn and post-burn operations.

Prescribed Fire Organization:

Minimum crew size for this burn will be addressed in the burn day activities portion of the burn plan they will include Burn Boss, Firing Boss and Engine Boss. Depending on personnel

available, more that one of these positions may be filled by one person. If available, more crewmembers/equipment than the minimum number of crewmembers/equipment can be utilized.

Effective fire line patrol will be extremely important during the all phases of this burn, and any additional crewmembers will be used to patrol.

V. SMOKE MANAGEMENT

Smoke Management Contingency Plan

If changes in weather conditions or other factors occur that cause imminent smoke problems, the following plan shall be implemented:
1).All attempts will be made to reduce smoke emissions from the burn as quickly as possible. This may include immediate shut down of the burn and suppression of any area still on fire. Mop-up will also be initiated in order to eliminate as much smoke production as possible.
2).If it appears that smoke from the burn will impact local communities or other smoke sensitive locations, all effort will be made to identify the potential problem areas and inform the public so that local actions to reduce impacts such as closing up buildings and moving smoke sensitive individuals away from the impacted area can occur.
3).If additional resources are needed to extinguish the burn and eliminate further smoke production, they will be called in through the established dispatch system for the district and may include fire departments, personnel from other refuges or other state and Federal agencies in the area.
4).The burn boss shall remain on site until the smoke problem is resolved or until relieved by an individual appointed by the line officer.
5). Smoke warning signs will be placed at minimum of 2 miles downwind from the burn unit on affected roads.
6). Authority form the county or state highway dept. will need to be obtained to place smoke signs on the roads
7) All signs on the road right-of-way will meet the standards set in the Manual of Uniform control Devices and Chapter 6-I of the federal regulations

Permits required: No permits are required for this burn.

Distance and Direction from Smoke Sensitive Area(s):
SEE BURN DAY CONTACTS LANDOWNERS CHART AND SMOKE TRAJECTORY MAP FOR WIND DIRECTION USED.
The town of New Holland is 1 mile to the Southeast of the unit. Also See burn day contacts for local residence information.

Necessary Transport Wind Direction, Speed and Mixing Height

Transport Wind Speed (mph): 7+

Wind Direction (20 foot): A north wind is preferred. Acceptable winds are South and Southwest.

Mixing Height: Greater than 1600 feet preferred.

Atmospheric Stability: Less than 7. This information will be obtained from the National Weather Service in Sioux Falls, SD as part of the Spot Weather Forecast. Moderate winds and an unstable atmosphere will allow smoke to rise and disperse.

Visibility Hazards:

Same as Smoke Sensitive Areas listed previously. Also, heavy smoke may occur along the fire perimeter while the backfire is conducted, directly impacting crewmembers.

Actions to Reduce Smoke Problems & Visibility Hazards:

Fuels must be adequately dry to allow for complete combustion. The fuels consist of 1-hour fuels that will be consumed with little smoldering. Burning will not commence if a low level inversion exists over the area. Burning will be postponed until the inversion breaks mid to late morning. It is recommended that the burn will be conducted during the middle of the day, from approximately 10:00 a.m. to 4:00 p.m. when fuels are dry and when it can be completed as rapidly and as safe as possible. This technique may also serve to create a convection column, moving smoke into the upper atmosphere and off the ground.

Smoke warning signs will be placed on adjacent county roads and/or highways down wind of the unit that may be affected by smoke or that may cause a visual distraction for drivers prior to ignition. Traffic control will be initiated and the county sheriff or other law enforcement personnel may be called to assist with local traffic control, including temporary closure of area roads if smoke impacts roads.

Mop-up will begin as needed or when the firing operation is completed. The Burn Boss depending upon weather and other factors will determine the amount of mop-up.

Fire engines used in the vicinity of the fire lines where personnel are working will maintain high visibility with vehicle lights and slowly travel. Communication between engine operators and fire line personnel will be maintained for the duration of the burn and mop-up.

Visibility hazards will be discussed during the pre-burn briefing. If firefighters are exposed to heavy smoke all fire line personnel will be rotated out of heavy smoke areas on a regular basis.

Particulate emissions in Tons/Acre and how calculated: see attached **SASEM** run

No burning on days with winds of 5MPH of less and poor dispersion.

Prescription monitoring:

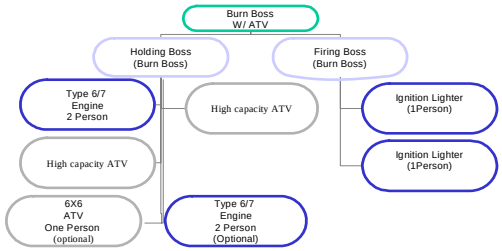
Weather will be monitored during the burn. Temperature, relative humidity, wind direction and speed, fire behavior and fire intensity will be closely monitored and recorded to insure conditions remain within prescription parameters. Crewmembers will be advised of the weather conditions. Burning will be stopped if conditions exceed those parameters specified in this plan, if those conditions pose a safety hazard.

VI. FUNDING AND PERSONNEL

Activity Code: 9263

	Equipment and Supplies	Labor	Overtime	Staff Days	Total Cost
Administration (planning, permits, etc.)	$50	$600		4.5	$650
Site Preparation	$100	$200		2	$300
Ignition and Control	$300	$800	$200	8	$1,300
Travel/per diem	n/a				
TOTAL	$450	$1,600	$200	14.5	$2,250

RX Burn Organization



VII. BURN-DAY ACTIVITIES

Crew & Equipment Assignments:

The Burn Boss will determine specific equipment assignments on the day of the burn depending on weather, site conditions, and staff availability. Prescribed burn personnel may fill more than one position.

7-person crew at minimum, 3 Type 6 engine or Type 7 engine, 1 6x6 ATV with mounted water sprayer (optional) 1 high capacity ATV with 50gal water tank and one portable pump.

Personnel and equipment will be selected and job assignments made on burn day. Additional personnel and equipment may be utilized if available.

Crew Briefing Points

The Burn Boss prior to starting ignition for each unit will conduct a pre-burn briefing. All personnel assigned to the burn will be in attendance. The following checklist will be covered, as will the aspects of the Go-No-go checklist. Burned areas, pastures, tilled fields, wetlands, water refill sites and gravel roads will be reviewed. The location of the portable pump/water source will be reviewed. A post burn briefing will also be held after the burn has been completed and prior to the burn team members departing the area. See the attached Appendix for a crew briefing list.

Ignition Technique:

1) Firing Method: base lines anchored to secondary roads, mowed and raked control lines, two track roads, open water, or wet lines and will be fired by hand crews.
2) Type of Fire: Backing/Flank/Head.
3) Firing Sequence: Refer to Ignition Map.

Personnel Escape Plan:

Personnel escape routes and safety zones will consist of adjacent roads, mowed pastures, ponds and areas back into the black. Crews will be briefed prior to ignition on escape routes, water sources and areas to avoid depending on current wind conditions and expected weather. Some wetlands may be available as safety zones if on foot. Roads, two track paths, grazed pasture, and croplands are adjacent to areas next to the burn unit. All fire personnel will carry fuzees in case an emergency burn out is needed. All engines will have fencing pliers readily available.

Special Safety Requirements:

All personnel will follow the agencies policies regarding prescribed fire. Vehicle travel outside of designated roads and firebreaks should be avoided to prevent vehicles from becoming stuck. Use caution adjacent to wetlands due to potentially soft ground.

Holding and Control:

Each unit will be held on the by a mow line re-enforced with wet line from a type 6/7engine or ATV pumper. Also the roads can be utilized when ever feasible.

Water Refill Points:

The designated fill site will be marked with flagging prior to ignition. A portable pump will be set up on the east side of the unit. The pump will be tested prior to ignition. If adequate water supply is not available then portable water supply will be set up.

Other:

The burn unit will be inspected before the burn to insure all pre-burn preparations are completed and to determine current fuel moisture, weather, and site conditions. This pre-burn inspection will allow assigned fire personnel to familiarize themselves with the unit.

Contingency Plan:

The contingency plan for this unit shall consist of the following: If a slop over or escape occurs, the prescribed burn boss will be notified of the situation, ignition will cease and information will be communicated so that a reasonable response can be made to contain the incident. Initial attack will be done by one engine on the appropriate side or by the assigned engine on patrol. Ignition crews will remain at their ignition sites and monitor the prescribed fire. Minor slop overs if readily controlled will be extinguished and ignition activities will resume.

Trails, roads and other barriers that will provide for secondary control lines for containment include:

*the crop field and pasture surrounding the **New Holland unit** allows easy access for direct or indirect attack.

* If the fire escapes the burn boss will become the IC. The IC will order and additional type 6 engine for initial attack. Also the IC will order a structure engine for structure protection.

* Life safety and structure protection will be the first priority should a fire be escape or be declared a wildfire. Resources assigned structure protection will assist in establish priorities with homes and outbuildings, identify adequate defensible space, complete any preparation needs, and use direct and indirect tactics as conditions warrant.

* An escape from **New Holland unit** can best be controlled using direct attack during the spring/fall prescribed fire season. Nearby cropland provide excellent barriers to stop the fire growth should an escape occur. Any escape during the spring/fall prescribed burning season should be flanked into adjacent cropland or open pools of water. Indirect attack can best be utilized if an escape occurs in wetlands or if burning is done at a time during the fall when agricultural crops are reaching maturity or in a dormant condition. (See attached contingency map for alternative locations for indirect attack).

* Traffic control on secondary roads may be necessary due to reduced visibility if an escape occurs.

*An escaped fire will be declared a wildfire in any event the prescribed burn exceeds the prescription, requires additional resources, or threatens to escape initial attack on private lands. This determination will be made no later than 15 minutes after the slop over is detected. The following agencies will be asked about their availability prior to ignition and if available be asked to provide assistance for a wildfire. These resources will be requested through a cell phone that is available to the burn boss.

Douglas County Sheriffs Office (946-5178)
Corsica Fire Dept (911)

* The Burn Boss will serve as initial attack incident commander on escaped fires. Incident Commander (IC) will determine the need for additional resources.

* For extended attack resources see Lake Andes NWR Fire Management Plan for additional support personnel and their roles.

* The burn boss will contact the line officer and inform them of an escape should one occur.

* The burn Boss will identify the roles and responsibility of ALL burn personal at the pre-burn briefing**. ALL Moderate tested** personal will continue with **holding actions** or will be utilized in **support duties** commensurate with their abilities, agency qualifications, equipment abilities in accordance with agency policy.

Suppression Mop-up and Patrol Actions:

Suppression techniques will be under the confine and contain strategy to keep the fire inside the burn unit boundaries as identified on the maps. The purpose of the engines will be to respond to protect property if fire develops outside of the unit, fence posts and patrol for any slop overs. Mop-up will be completed simultaneously throughout the day as the burn progresses. Any areas that have 100 hr fuels will require added mop-up activity. Upon completion of the firing and holding operations a type 6 engine and crew will stay and patrol the burn perimeter until such time it is determined by the burn boss that patrols are no longer needed.

If significant smokes remain in the interior of the burn after the perimeter is secure, at least one engine with engine boss will remain at the Burn Unit, at a road or other area where it is highly visible, until the smoke has died down or until the Burn Boss makes the decision to mop up the smoke source. While not required for safety purposes the presence of an engine while significant smoke remains is important to avoid criticism that the burn was left unattended.

The fire will be declared contained when there is an absence of visible smoke and out after three days of no smoke on the fire.

The fire will be checked by an engine boss or burn boss III for the following three days unless significant rain or moisture has fallen. Significant moisture is grater then .05 inches

Rehabilitation Needs:

No rehabilitation needs are anticipated.

DI 1202 Submission Date:

Within 24 hours of completion of burn or next business day.

Special Problems: None anticipated

Public/Media Contacts on Burn Day:

Print and Electronic media will be contacted with a news release in the spring prior to Prescribed fire season and requests for more information will be handled at that time.

Burn Day Contacts

Name Location	Phone #	Date Time	Remarks	Notified	
				Yes	No
Sioux Falls NWS	330-4250				
Great Plains Dispatch Center	393-8017				
Corsica VFD	911				
Douglas Co Sheriff's Office	946-5178				
Lake Andes NWR	487-7603				

Landowners:

House # On Map	Name	Location of burn from residence	Phone #	Date Contacted	Remarks	Notified	
						Yes	No
1	**********	1 Mile SE from you	***-****				
2	**********	¾ Mile SE from you	***-****				
3	**********	½ Mile E from you	***-****				
4	**********	¾ Mile NE from you	***-****				
5	**********	2 North from you	***-****				
6	**********	½ NW from you	***-****				
7	**********	1 ½ W from you	***-****				
8	**********	½ SW from you	***-****				
9	**********	½ NW from you	***-****				
10							
11							

VIII CRITIQUE OF BURN

Were burn objectives within acceptable range of results? (Refer to Section I)

What would be done differently to obtain results or get better results?

Was there any deviation from the plan? **If so Why?**

Problems and general comments:

IX. POST BURN MONITORING

Date_____Refuge Burn Number
Length of time after burn:

Vegetation Transects:

Comments on Habitat Conditions, etc.:

Photo Documentation:_____

Other:

X. FOLLOW-UP EVALUATION

Date:_____Refuge Burn Number
Length of time after burn:

Vegetative Transects:

Comments on Habitat Conditions, etc.:

Photo Documentation

Appendix 1

Prescribed Burn Briefing Outline

I Handouts

A. Map of Burn
B. Organization Chart

II. Description of Burn Area

A. Objectives
B. Vegetation Type.
C. Acreage
D. Slope
E. Roads / Access
F. Values at Risks
G. Water Sources
H. Natural and Manmade Barriers

III. General and Spot Weather Forecast

A. Wind Direction and Speed
B. Relative Humidity
C. Temperature
D. Fuel Moisture
E. Atmospheric Stability
F. Predicted Changes

IV. Burn Organization

A. Organizational Chart and Assignments
B. Equipment Assignments
C. Other Resources
D. Escape Fire Situations

V. Firing Sequence

A. Test Burn
B. Type and Sequence of Firing Patterns
C. Ignition Equipment (drip torch, flare pistol etc.)
D. Fire Behavior

VI. Communications

A. Procedures
B. Frequencies / Channels
    1. Burn Crew
    2. Refuge Dispatch
    3. State Radio
    4. Other

VII. Safety

A. Escape Routes
B. Safety Zones
C. Hazards (power lines, wildlife, topography)
D. Potential Problems
E. Smoke Management
G. refueling procedures
H. Personnel Protective Equipment
I. Expected Fire Behavior

Appendix 2

SAFETY BRIEFING

A. Public Safety

1. Access roads adjacent to burn will be signed to warn public of low visibility.
2. Burning will not be done under conditions, which would seriously reduce visibility along highways.

B. Crew Safety

1. Daily Briefings.
   a. Obey and practice the Standard Fire Orders at all times. Use LCES, identify escape routes and make them known.
   b. The Burn Boss will conduct an on-the-ground briefing with all personnel involved before beginning.
   c. The Ignition Specialist must know the location of all firing crewmembers at all times (radio or visual).
   d. Firing crewmembers must use care to avoid spilling diesel fuel on there clothes. If clothing is saturated with diesel fuel the employee will be promptly removed from the fire area and fresh clothing obtained or they will be released for the day.
   e. All **PPE** to be worn by all personnel.
   f. Persons involved in night operations will utilize headlamps while on the burn.
   g. Fatigued crewmembers that need break or rotated must coordinate this with their immediate supervisor.

2. Fuel Handling
   a. Fuel handlers will wear gloves and goggles while mixing fuel.
   b. Access to fuel cans in the truck, shall be from the rear with the tailgate open.

3. Protective Clothing
   a. Nomex shirt pants - all personnel
   b. Hard Hats - all personnel
   c. Face Mask - optional
   d. Fire Shelter - all personnel will wear shelters
   e. Goggles - optional
   f. Leather Gloves - all personnel
   g. 8" lace boots with non-skid soles - all personnel.

4. Biological Hazards
   a. Snakes - identify and take necessary precautions
   b. Heavy Smoke - rotate personnel as necessary

5. General
   a. The Ten Standard Firefighter Orders apply and will be utilized by all personnel involved in the burning.
   b. Opening day of hunting season? (Identify open hunting seasons before beginning the prescribed burn.)

Appendix 3
Incident Radio Communications Plan

Incident Communications Plan	1. Incident Name **New Holland**	2. Date/ Time Prepared 2005	Operational Period: Day Shift and Night

Radio Codes — 4. Basic Radio Channel Utilization

RADIO NAME	CHANNEL	FREQUENCIES	ASSIGNMENT	FREQUENCY NAME	REMARKS
King	Channel # 1	***.*** TX / RX	Command/Tactical	SD Mutual Aid I	Simplex / Operations
King	Channel # 2	***.*** TX / RX	Back-up Channel	SD Mutual Aide II	Available for contingency **and** to talk to VFD's
King	Channel # 3	***.*** TX / RX	Back-up Channel	National Fire	Available for contingency and to talk to VFD's
King	Channel #4	***.*** TX / RX	Back-up Channel	NIIMS	Available for contingency and to talk to VFD's
King	Channel # 5	***.*** TX / RX	Back-up Channel	Air to Air - SD	Available for contingency
King	Channel # 6	***.*** TX / RX	Back [-up Channel	Air to Ground - SD	Available for contingency
King	Channel # 7	***.*** TX / RX	Back-up Channel	Alternate Air - Grnd	Available for contingency
King	Channel 13	***.*** TX / RX	Back-up Channel	Air Guard / Life flight	Available Emergency use only Air to Ground contact.
EF Johnson	**State Fire 1**	**Digital Truncated**	Command/Tactical	**State Fire 1**	
EF Johnson	**State Fire 2**	**Digital Truncated**	Command/Tactical	**State fire 2**	

Prepared by: ********** (Range Tech)

USE ONLY FREQUENCIES ASSIGNED

CELL PHONES

CELL PHONE NUMBERS	PHONE ASSIGNED TO
(605) 350-0442	**********
(605) 354-3226	**********
(605) 350-0448	**********

Appendix 4 - Medical Plan

Medical Plan	1. Incident Name: **New Holland**	2. Date Prepared 2/2/05	3. Time Prepared	4. Operational Period Day and or Night

5. Incident Medical Plan

Medical Aid Stations:	Location:	Paramedics	
		Yes	No
N/A			**XX**

6. Transportation

A. Ambulance Services

Name:	Address:	Phone	Paramedics	
			Yes	No
Douglas Co Ambulance Service	Armour SD	724-2159		X-EMT'S

B. Incident Ambulances

N/A	N/A	N/A		

C. Life Flight Ambulance

Care Flight (Fixed Wing)	800 East 21st Street, Sioux Falls SD	1-800-367-3278	Yes	
Care Flight (Helicopter)	800 East 21st. Street, Sioux Falls SD	1-800-367-3278	Yes	

7. Hospitals

Name	Address	Travel Time		Phone	Burn Center	
		Air	Ground		Yes	No
Platte Health Center	Platte	N/A	45 Min	(605) 337-3364		X
McKennan Hospital	Sioux Falls	90 Min.	N/A	1-800-367-3278	X	
Avera Queen of Peace	Mitchell	N/A	70 Min	(605) 955-2000		X

8. Medical Emergency Procedures

In an emergency contact the Burn Boss. The Burn Boss will contact the appropriate facility and request they dispatch an ambulance or medical flight. If air medvac is used a temporary helispot will be located adjacent to the prescribed burn. Local personnel and or EMT's present will stabilize the victim. The Burn Boss will:

- Utilize appropriate frequencies to coordinate a response- do not use names.
- Obtain and facilitate nearest EMT's to scene, request a medical unit respond.
- Convey the nature of problem, number injured, conditions and location (coordinates).
- Scene area and identify witnesses for later investigation - Keep a log

Prepared by:

********** (Range Tech)

Appendix *5*

WEATHER FORECAST *605-255-0519*

FIRST CALL:

DATE: TIME: FIRE INDEX:

WINDS:

WINDS ALOFT FOR SMOKE TRANSPORT-1500' AGL and 7 mph minimum:

TEMP:

RH:

CLOUD COVER:

INVERSION:

STABILITY:

SECOND CALL:

DATE: TIME: FIRE INDEX:

WINDS:

WINDS ALOFT FOR SMOKE TRANSPORT-1500' AGL and 7 mph:

TEMP:

RH:

CLOUD COVER:

INVERSIONS:

STABILITY:

Appendix 6
Monitoring Data Sheet

Unit:_____. Date:_____. Observer:_____.

Environmental Values	**Time Observations are made**						

Fire Behavior Fuel Model Fuel Loading / Percent of total							
NFDRS Fuel Model Fuel Loading / Percent of total							
Depth of Fuel Bed							
Soil Moisture/ Drought Index							
Shade / Cloud cover %							
Dry Bulb °F							
Wet Bulb °F							
Relative Humidity %							
Fine Fuel Moisture (1 hr. TL) A= Actual A % E= Estimated E %							
10 Hour TL Fuel Moisture A % or E %							
100 hour TL Fuel Moisture A % or E %							
Live Fuel Moisture A % or E %							
Eye Level – Mid Flame Wind speed MPH							
Wind Direction							
Slope							
Aspect							
Elevation							

Notes:

Appendix 7
Monitoring Data Sheet

Unit:_____. Date:_____. Observer:_____.

Fire Behavior Observations	**Time Observations are made**						
Rate of Spread (Feet/Minute)							
Rate of Spread (Chains/ Hour)							
Average Flame Length- Head							
Maximum Flame Length- Head							
Average Flame Length- Backing							
Fire Whirls Y / N							
Spotting Occurring Y / N							
Spotting Distance Feet							
Torching Y / N							
Crowning Y / N							

Smoke Observations	**Time Observations are made**						
Mixing and Dispersal **G**ood, **F**air, **P**oor							
Trajectory of Column- Surface							
Trajectory of Column- Upper Level							
Duration of Problems (Note in Remarks)							

Remarks:

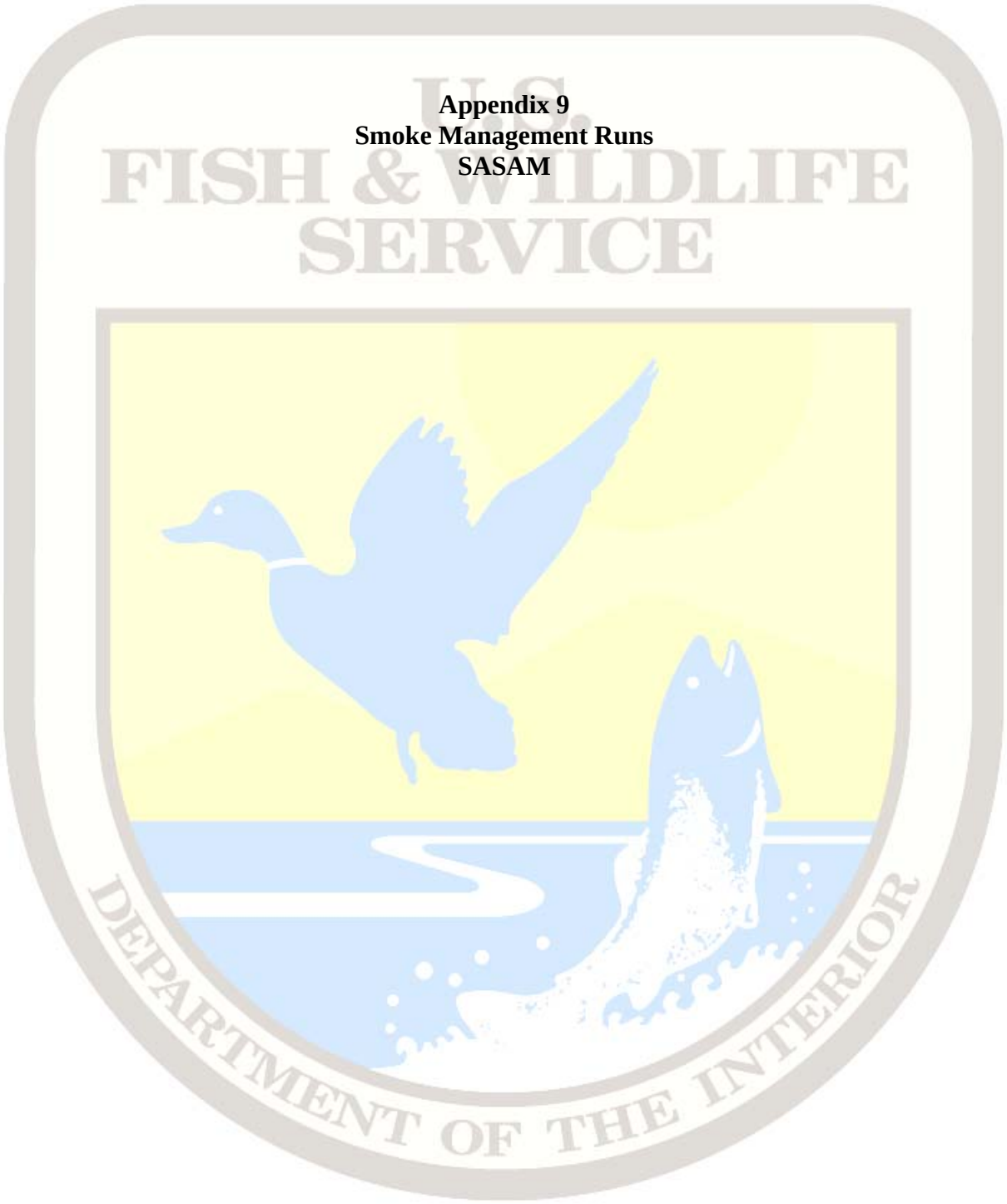
Appendix 8
Monitoring Data Sheet
Post Burn
First Order Fire Effects

Unit:_____. Date:_____. Observer:_____.

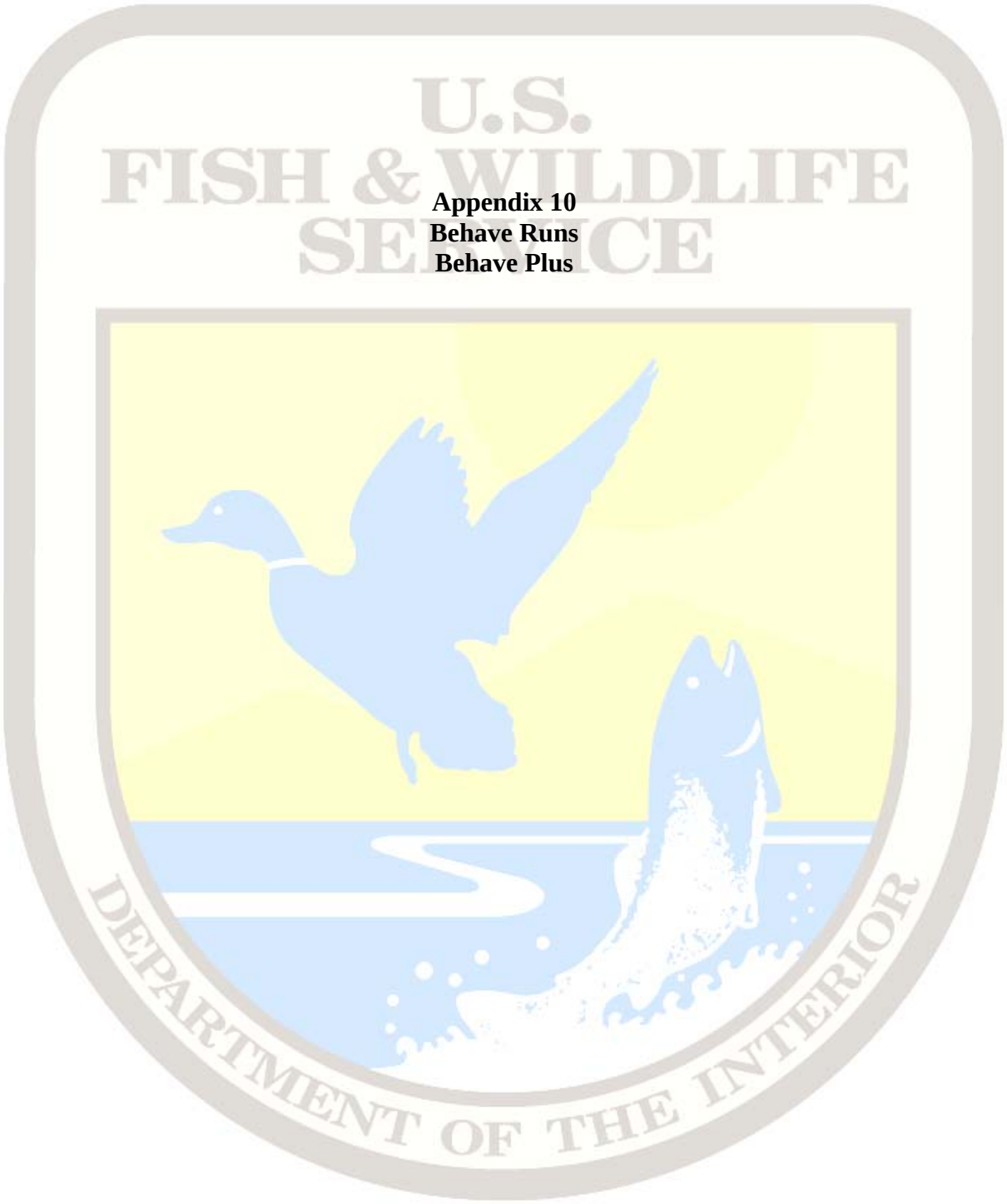
Element	Observation
Percent of Area Burned	
Percent of Fuels Consumed 1 Hour TL Fuels 10 Hour TL Fuels 100 Hour TL Fuels	
Percent of Thatch/ Duff Consumed	
Scorch Height (Feet)	
Mortality (%)	

Remarks:

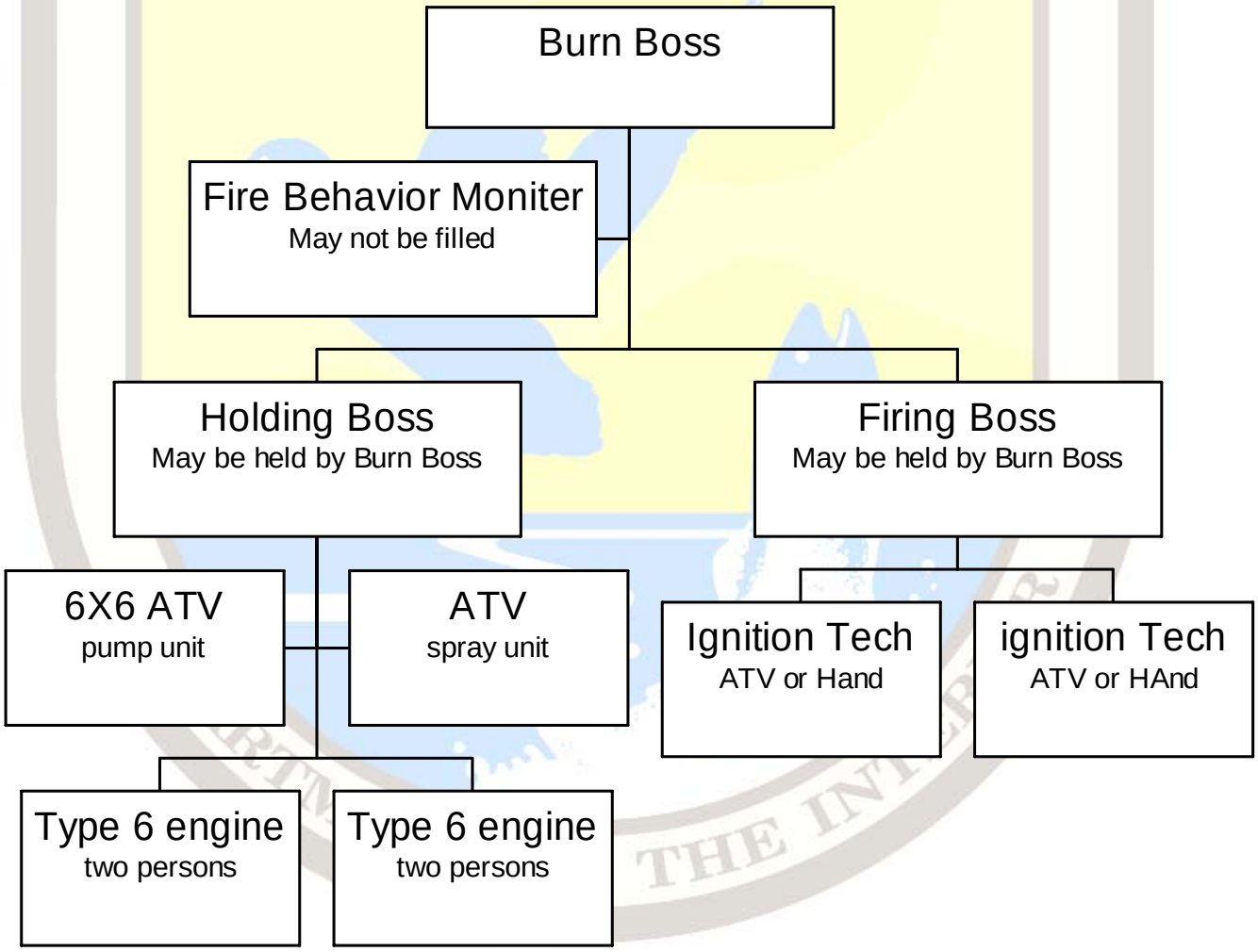
Appendix 9
Smoke Management Runs
SASAM



Appendix 10
Behave Runs
Behave Plus



Appendix 11
Organization Chart



Spot Forecast for New Holland Burn

National Weather Service Sioux Falls
812 AM CDT Wed Apr 12 2006

IF CONDITIONS BECOME UNREPRESENTATIVE,
CONTACT THE NATIONAL WEATHER SERVICE.

DISCUSSION...WEAK HIGH PRESSURE WILL BE IN CONTROL
TODAY...PRODUCING A WEST TO NORTHWEST FLOW AT THE 20 FOOT LEVEL.
MIXING POTENTIAL WILL GREATLY IMPROVE BETWEEN 1000 AND 1100.

FOR PLANNED IGNITION TIME OF 1000 AM CDT 04/12/06

FORECAST FOR WEDNESDAY TIME(CDT)	10AM	NOON	3PM	6PM
SKY/WX.....	MOCLR	MOCLR	PTCLDY	PTCLDY
TEMP (F).....	56	66	75	76
DEW PT (F).....	37	38	38	38
RH (%).....	50	36	26	25
20 FT WIND (MPH).....	W-4	SW-2	SW-3	SW-4
MIXING HGT (FT, AGL).	788	5226	7500	7460
TRANSPORT WIND (MPH).	W-5	W-8	W-11	SW-10
DISPERSION INDEX.....	FAIR	GOOD	EXCELLENT	EXCELLENT
HAINES INDEX.....	6 (HIGH)	6 (HIGH)	5 (MOD)	5 (MOD)

OUTLOOK FOR WEDNESDAY NIGHT TIME(CDT)	9PM	12AM	3AM	6AM
SKY/WX.....	PTCLDY	PTCLDY	PTCLDY	PTCLDY
TEMP (F).....	66	59	55	52
DEW PT (F).....	39	39	40	41
RH (%).....	37	47	57	66
20 FT WIND (MPH).....	SE-4	SE-6	SE-6	S-8
HAINES INDEX.....	6 (HIGH)	6 (HIGH)	6 (HIGH)	6 (HIGH)

OUTLOOK FOR THURSDAY AFTERNOON TIME(CDT)	9AM	NOON	3PM	6PM
SKY/WX.....	PTCLDY	PTCLDY	PTCLDY	PTCLDY
TEMP (F).....	58	72	79	79
DEW PT (F).....	41	42	43	43
RH (%).....	53	34	28	28

20 FT WIND (MPH).....	SW-11	W-16	W-16	NW-10
MIXING HGT (FT, AGL).	502	2821	6542	6703
TRANSPORT WIND (MPH).	SW-17	W-26	W-31	W-26
DISPERSION INDEX.....	FAIR	EXCELLENT	EXCELLENT	EXCELLENT
HAINES INDEX.....	6 (HIGH)	6 (HIGH)	6 (HIGH)	6 (HIGH)

Wildland Fire Fatality and Entrapment Initial Report

THE FOLLOWING INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE

Submitted by: Mike Bryant
Position: Project Leader
Agency: U.S. Fish and Wildlife Service
Location: Lake Andes NWRC
Phone: 605 487-7603 (w)
Email: michael_j_bryant@fws.gov

1. General Information

Date of Event: 4/12/2006 *Time*: ~ 2:30 p.m.
Fire name, location, agency, etc.: New Holland prescribed burn and wildfire, near New Holland, South Dakota, U.S. Fish and Wildlife Service.
Number of personnel involved: 2
Number of Injuries: 2 (minor burns)
Number of Fatalities: 0

2. Fatalities (Not Applicable)

3. Fire-Related Information

Fuel Model: 3
Temperature:~70F RH:~28% Wind:~12mph
Topography: flat
Fire size at time of the incident/accident: ~100 acres
Incident management at time of the incident/accident: type 4
Urban/Wildland intermix?: Yes
Cause of fire: escaped prescribed burn

4. Entrapment Information

Brief description of the accident: An unforecasted change in wind direction caused a prescribed fire to leave its control lines. Burn personnel were pulled off of the line and notified that it was now a wildfire. Engine crews were reorganized and assigned to initial attack.

Two firefighters in a Type 6 engine were performing direct attack on the flank of the wildfire when the truck motor quit. The engine failed to restart and flame impingement was immediate.

Both firefighters were in the cab of the truck. After a few seconds the flames subsided and both firefighters exited the engine. Fire shelters were not deployed.

Entrapment Description
Person trapped: With fire shelter
Burns/smoke injuries incurred while in fire shelter: Not Applicable
Burns/smoke injuries incurred while escaping entrapment: Yes
Burns/smoke injuries incurred while fighting fire: No
Fire shelter performed satisfactorily: N/A
Fire Shelter was available, but not used: Yes

Personal Protective Equipment Used
Fire shelter: No
Gloves: Yes
Protective Pants: Yes
Boots: Yes
Protective Shirt: Yes
Goggles: No
Face/neck protection: Yes
Hardhat: Yes

72 – hr. Report

THE FOLLOWING INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE

Injured employees: firefighters (2)

Preliminary factual findings: The injured individual was participating as an Engine Boss on an escaped prescribed fire which had been converted to a wildfire. The engine was engaged in direct attack of the southern flank in tall grass. The fire overran the engine with the Engine Boss and another firefighter in the cab. Both firefighters were able to move from the engine to a safety zone after the passage of the initial flaming front. The Engine Boss received minor burns on his legs and arms, the second fire fighter received slight burns to his face, while moving from the engine.

Narrative: The Engine Boss and firefighter were assigned to a Type 6 engine engaged in the initial attack of the southern flank of the fire which was actively burning in tall grass. They were utilizing a rolling attack with the firefighter driving the engine and the Engine Boss working the hardline. The Engine Boss determined that it was time to disengage, stopped the engine to throw the line on, and then moved to engine cab and directed the firefighter to move through the green to a safety zone. The engine would not start, and the flaming front overran the engine almost immediately. The Engine Boss waited for the flaming front to pass, and then led the firefighter through the black to a safety zone. The firefighters encountered significant residual heat while moving from the engine to the safety zone, and received minor burns. Both firefighters were wearing full PPE.

The interagency investigation team reviewed the fire scene and interviewed employees assigned to the prescribed fire and wildfire. The team has determined that this situation met the definition of entrapment.

Lessons Learned: Based upon the preliminary findings by the investigation team, the following Lessons Learned should be transmitted to all wildland firefighters for the remainder of the 2006 Fire Season:

1. Engine crews must identify and maintain adequate safety zones and escape routes in the event that an engine breaks down.
2. Engine cabs may be a safer option than shelter deployment in fast moving fires in tall grass.
3. Driving over areas with significant residual heat can result in vehicle malfunctions.
4. Wildfire qualifications and experience levels must be considered when making holding and contingency assignments for employees assigned to prescribed fires.
5. Prescribed fire contingency plans must realistically address options for worst case scenarios.

The report of the investigation team will be issued within 30 days.

DAN MORFORD
Team Leader