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National Wildfire  
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# GIS

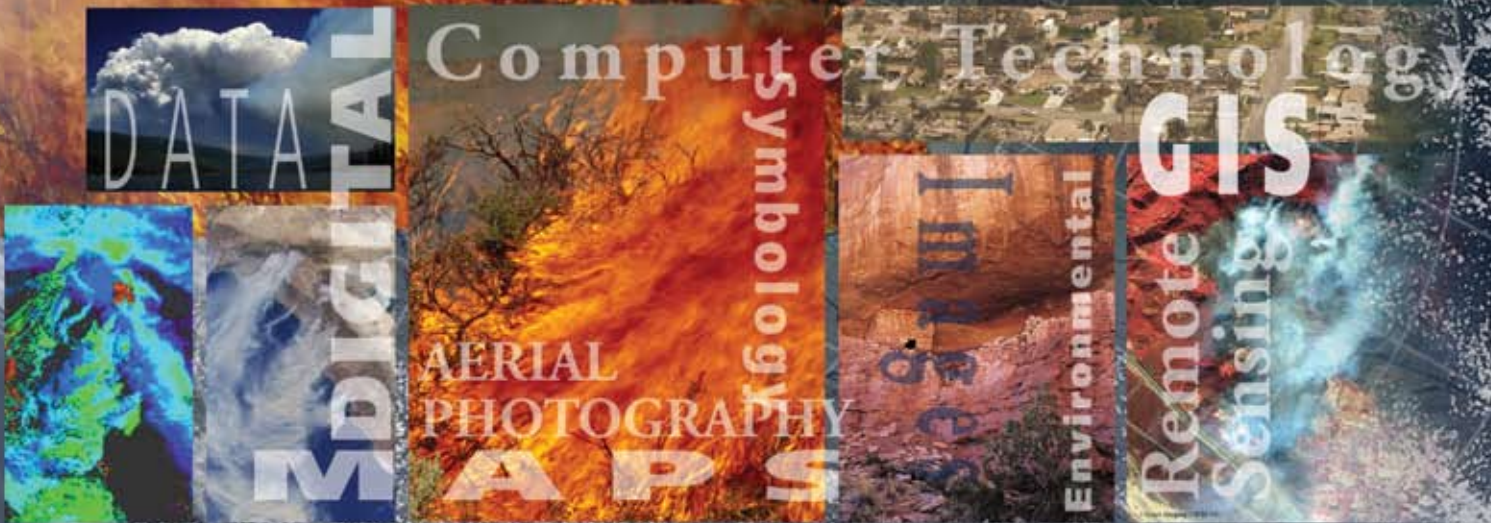
## STANDARD OPERATING PROCEDURES ON INCIDENTS



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Information Resource Management Working Team

Geospatial Task Group

For more information or to download additional copies of the standard operating procedures go to <http://gis.nwcg.gov/>

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## EXECUTIVE SUMMARY

Standard operating procedures (SOPs) are necessary for clarifying the Geographic Information System (GIS) business needs and functional standards for GIS in support of wildland fire incidents, including wildland fire use. These SOPs were developed to provide consistency in information delivery of GIS products and services. These SOPs focus on the GIS work performed by GIS Specialists to fulfill the GIS needs of the Planning Section of the Incident Management Teams. The SOPs may be useful for other types of events, such as all-risk incidents.

These SOPs were produced by the National Wildlife Coordinating Group (NWCG) Geographic Information System Standard Operating Procedures on Incidents Project work team under the guidance of the Information Resource Management Working Team and the Geospatial Task Group. The SOPs that are covered in this document pertain to GIS data management, map product development, incident GIS documentation and archiving, team transition and general guidance for the GIS Specialist, or those who are performing the mapping function at the incident.

This document contains SOPs that will be met by all NWCG participating agencies. However, it is acknowledged that under some extenuating circumstances, compliance with these standards may not be possible. Guidelines are also specified throughout the SOPs and are strongly encouraged.





# INTRODUCTION

The Geographic Information System Standard Operating Procedures on Incidents Project (GSTOP) was chartered by the National Wildfire Coordinating Group (NWCG) in fall 2004. The primary objective of the GSTOP was to create standard operating procedures (SOPs) for the use of GIS on wildland fire incidents. This effort has proceeded in conjunction with NWCG formal acceptance and development of the Geographic Information System Specialist (GISS) position task book and training. These SOPs will be used during NWCG-sanctioned GIS Specialist training and on all wildland fire incidents.

The purpose of this document is to standardize GIS products and methods and improve service to decision makers, including Incident Management Teams (IMTs) and others who rely on this critical information. The absence of SOPs for GIS support on incidents has created consistency-in-service issues such as data management problems for IMTs—especially during team transition periods.

The primary audience for this document is the GIS Specialist performing GIS work on a wildland fire incident, other members of the Planning Section within the Incident Management Team who need to display incident information, and other personnel reliant on Planning Section products; for example, Public Information Officers and Operations Section personnel.

These SOPs address a national interagency GIS information management issue and are intended to provide a technology-independent standard. While changes in technology may lead to different actual structures over time, the design parameters that represent business needs should remain constant.

The GIS SOPs within this document have been specifically developed to:

- provide people with the safety, health, environmental, and operational information necessary to perform a job properly;
- ensure that production operations are performed consistently;
- maintain quality control of processes and products;
- ensure that processes continue uninterrupted and are completed on an established schedule;
- serve as a training document for teaching users about the process for which the SOP was written;
- serve as a historical record of the “how, why, and when” steps in an existing process so there is a factual basis for modifying or updating those steps; and
- ensure the future utility of data generated on wildland fire incidents.



This document is aimed at the GIS Specialist on IMT Type 1, IMT Type 2, and Fire Use Management Team (FUMT) wildland fire incidents. As the size or complexity of a wildland fire incident increases, the mapping demands often expand to adequately portray information relevant to the protection of life, property, and resources. Local resources (from the home unit or a nearby unit) generally manage the GIS needs for IMT Type 3 wildland fire incidents; knowledge and use of these SOPs may be appropriate.

A team of wildland fire GIS incident support subject matter experts was brought together from all NWCG participating agencies and geographic areas. This interagency workgroup (GSTOP) identified the essential business requirements for the SOPs, and a draft document was completed in June 2005. The draft SOPs were sent to the business community—GIS Specialists, Planning Section Chiefs, Situation Unit Leaders, and other incident personnel—for review during the 2005 western fire season. After the 5-month review period, comments were incorporated into the final SOPs, submitted to the Geospatial Task Group in February 2006, and approved.

In this document, SOPs have been developed for the following application areas:

1. GIS Minimum Expectations—describes the requirements for the fulfillment of the minimum GIS expectations on an incident, including a discussion of hardware, software, infrastructure needs, and GIS Specialist knowledge, skills, and abilities, as well as a brief overview of incident procedures.
2. File Naming and Directory Structure—provides guidance on establishing and maintaining an efficient and consistent file naming and directory structure for incident geospatial data, including common abbreviations.
3. Documentation and Metadata—provides procedures for the daily documentation of incident GIS data.
4. Minimum Essential Datasets—describes the minimum base datasets other than incident data needed for incident mapping and analyses and how to obtain and evaluate those data.
5. Map Symbology—provides standard map symbology guidance and examples for incident mapping
6. Map Products—provides guidelines for the creation of five basic standard GIS map products used on incidents: Incident Action Plan Map, Transportation Map, Incident Briefing Map, Progression Map, and Situation—Plans Map, and. Also provides guidelines for additional common map products produced at wildland fire incidents, including fire use incidents.
7. Data Archiving and Sharing—provides procedures for the sharing and archiving of GIS data developed on an incident, including handling of sensitive data.
8. Team Transition—provides an effective and consistent method of transitioning from one operational GIS Specialist to another, including procedures, responsibilities, and communication guidance.
9. A list of acronyms and a glossary of terms important for the GIS Specialist on wildland fire incidents.



Although some of the SOPs are applicable for several types of incidents, the GSTOP group recognizes that future developments for additional SOPs may include GIS support for Burned Area Emergency Response (BAER) and all-risk incidents. The specifications for hardware, software, and skill set for GIS expertise for these incidents may be slightly different from those needed for wildland fire incidents and may require a higher technical skill level in environmental modeling and image processing to adequately support specific needs.

These SOPs do not cover specific information technology issues (i.e., hardware, software, and networking) and do not endorse or recommend any one commercial hardware or software product.

SOPs are subject to review and modification according to procedures outlined in the Change Management Plan administered by the NWCG IRMWT Geospatial Task Group. See the GTG Web site at <http://gis.nwcg.gov>. Requests for changes will be evaluated every year. This review is necessary to verify that the SOPs continue to meet the needs of the incident management teams and the GISS in the field.





# ACRONYMS

The following acronyms are used in the SOPs:

ANSI	American National Standards Institute
APR	(file format) ArcView Project
BAER	Burned Area Emergency Response
BLM	Bureau of Land Management
CD	Compact Disc
COTS	Commercial off-the-shelf software
CTSP	Computer Technical Specialist
D-Size	U.S. standard paper size of 34" × 22"
DHCP	Dynamic Host Configuration Protocol
DOC	(file format) Microsoft Word Document
DOCL	Documentation Unit Leader
DOQ	Digital orthophoto quadrangle
DOQQ	Digital orthophoto quarter-quadrangle
DP	Drop Point
DPRO	Display Processor
DRG	Digital Raster Graphics
DVD	Digital Video Disc
DVOF	Digital Vertical Obstruction File
E-Size	U.S. standard paper size of 44" × 34"
ESRI	Environmental Systems Research Institute
FAA	Federal Aviation Administration
FBAN	Fire Behavior Analyst
FGDC	Federal Geographic Data Committee
FOBS	Field Observer
FTP	File Transfer Protocol
FUMT	Fire Use Management Team
GAO	Government Accountability Office
GIS	Geographic Information System
GISS	Geographic Information System Specialist
GNIS	Geographic Name Information System
GPS	Global Positioning System
GSTOP	Geographic Information System Standard Operating Procedures on Incidents Project



GTG	Geospatial Task Group
HTML	Hypertext Markup Language
IAP	Incident Action Plan
ICP	Incident Command Post
ICS	Incident Command System
IMT	Incident Management Team
IR	Infra-Red
IRIN	Infrared Interpreter
JPEG	(file format) Joint Photographic Experts Group
LTAN	Long Term Fire Analyst
MAP	Management Action Point
MED	Minimum Essential Dataset
MMA	Maximum Manageable Area
MOA	Military Operation Area
MTR	Military Training Route
MXD	(file format) Multiple XML Documents
NFES	National Fire Equipment Systems
NTM	National Technical Means
NOTAM	Notices to Airmen
NWCG	National Wildfire Coordinating Group
PDF	(file format) Portable Document Format
PTB	Position Task Book
PMS	Publication Management System
RAM	Random Access Memory
SITL	Situation Unit Leader
SOP	Standard Operating Procedure
STANDDD	Scale bar, Title, Author, North Arrow, Date of Data, Datum
T&E	Threatened and Endangered
TFR	Temporary Flight Restriction
TXT	(file format) Text only
UPS	Uninterruptible Power Supply
UNC	Universal Naming Convention
USB	Universal Serial Bus
UTM	Universal Transverse Mercator
WFIP	Wildland Fire Implementation Plan
WFSA	Wildland Fire Situation Analysis
WUI	Wildland Urban Interface

# CHAPTER 1

## Purpose

Describes the requirements for fulfilling the minimum expectations for a GIS Specialist on an incident including:

- Knowledge and abilities required of the GIS Specialist
- Procedures the GIS Specialist can be expected to follow
- Environmental considerations affecting the worksite of the GIS Specialist
- Equipment needed for a GIS Specialist to function at a basic level—this may vary as the size and type of the incident change.

## Critical Items for GIS Operations

As per national standards, every piece of equipment taken to an incident must be on a Resource Order.

### Hardware

- PC or laptop with CD writer, USB ports, and sufficient RAM to run GIS software
- Appropriate output device (e.g., large-format (minimum 36" wide) plotter with sufficient paper and inks, 11" × 17" printer with paper and inks, projector)
- Appropriate connection cables, hubs, power supplies
- External portable hard drive (suggested)

### Software

- Standard current versions of commercial off-the-shelf (COTS) GIS software installed on the computer and operational
- Any required dongles (also known as sentinel or hardware keys) for appropriate licensing
- Appropriate software extensions and tools.

*Specific software tools are located at <http://lgis.nwcg.gov>.*

### Infrastructure

- Internet connection and service
- Power to the work site
- Uninterruptible Power Supply (UPS) with battery backup—surge protection (recommended)



**Media**

- USB jump drives or memory sticks
- Blank CDs or DVDs

**Data**

- Refer to Chapter 4

**GIS Specialist Knowledge, Skills, and Abilities**

*Specific tasks are outlined in the GIS Specialist Position Task Book. Recommended training is outlined in the Qualifications Guidelines (PMS 310-1).*

**GIS Specialist must be able to:**

- Effectively use the standard commercial off-the-shelf GIS software.
- Work with a variety of spatial data types (raster and vector), including knowledge of various data types such as coverages, geodatabases, and shapefiles.
- Understand Global Positioning System (GPS) data collection methods and be able to download, process, and incorporate the data.
- Understand the use of a variety of projections and datums including geographic coordinates (latitude–longitude) and be able to re-project data in multiple formats.
- Answer questions such as number of acres burned, acres by ownership, or other questions requiring basic GIS analysis and geoprocessing skills.
- Troubleshoot hardware and software problems sufficient to keep the GIS Specialist operational. This may include basic software installs, ensuring the license managers are functioning, installing print drivers, or connecting a plotter to a computer.
- Communicate effectively with people internal and external to the Situation Unit (e.g., GIS Specialists, Situation Unit Leaders [SITL], Infrared Interpreters [IRIN], Field Observers [FOBS], Display Processors [DPRO], and local hosting agency personnel or cooperating agency personnel) to
  - explain technical issues or concerns
  - train others in basic map reading
  - exchange technical information
- Perform the role of GIS Specialist in “incident conditions,” which may include
  - long hours (12- to 16-hour operational periods, day and night)
  - close quarters shared with other personnel
  - working in stressful conditions
  - traveling (away from home base) for 14 days or longer

- primitive fire camp conditions (sleeping on the ground, exposure to dust and smoke, and limited food choices)
- working around fire camp personnel, which may include agency, contract, military, or prison crews

### GIS Specialists must have knowledge of:

- Basic Incident Command System (ICS) structure and procedures, as outlined in the self-study course (ICS Orientation, Module 1, I-100; <http://training.nwcg.gov/classes/i100.htm>), sufficient to operate within the chain of command on a wildland fire incident. For example,
  - Knowledge of the organizational structure, and whom to go to for issues or support
  - Familiarity with the fire camp operations
  - Understanding of the general expectations of the supervisor (the SITL)
- Work and Rest standards and other pertinent standards as outlined in the Interagency Standards for Fire and Fire Aviation Operations manual.
- GIS Specialists must understand that firefighter and public safety is the first priority of the fire management organizations. "The commitment to and accountability for safety is a joint responsibility of all firefighters, managers, and administrators. Individuals must be responsible for their own performance and accountability. Safety comes first on every fire, every time." For the GIS Specialist, this means that each individual must demonstrate the maturity and judgment to:
  - Recognize when there might be too much work. The individual must be able to communicate to the SITL the need to prioritize, to adjust workloads, or to bring in additional staffing.
  - Monitor one's own physical, emotional, and mental limits.
  - Follow safe working practices and procedures, as well as identify and report unsafe working conditions through the appropriate chain of command.
- The complexity of the GIS demands on an incident is independent of the complexity level of the incident. It is possible to have a very complex GIS situation on a fire of minimal complexity.

### Incident Procedures

At the time of dispatch, before arriving at an incident:

Follow the mobilization tasks in the GIS Specialist PTB

- If possible, contact the Situation Unit Leader or any GIS Specialist currently assigned to the incident to inquire about the current situation. Inquire about hardware and software currently operating, any special needs or conditions, location of incident, what data are already available, and any transition needs (media, timing, and others).



- Recognize what resources are not available (e.g., is there a plotter available?) and manage the need. This could include such things as obtaining permission and logistics for using the hardware and software network of a local unit. It may be necessary to rent a plotter or other necessary equipment. Use the proper chain-of-command and proper ordering processes.

### **Setting up the GIS operations and running through the first operational period:**

- Check in—follow incident check-in procedures.
- Conduct a briefing with SITL to establish ground rules and expectations, as well as the planning timeline for map production.
- Work with SITL to establish an appropriate physical work space.
- Analyze the data, hardware, personnel, and supplies available. If additional hardware, supplies, or personnel are needed for effective GIS productivity, follow incident ordering procedures. Orders for GIS are submitted through the supervisor (SITL) using an ICS Form 213, General Message Form (Appendix A). The approved request is then delivered to the Ordering Manager.
- Set up network and shared drives and electronic workspaces, coordinating with the Computer Technical Specialist (CTSP).
- Set up the file directory structure in accordance with Chapter 2.
- Initiate ICS Form 214, Unit Log (Appendix B) in accordance with Chapter 3.
- Insert base data into directory structure.
- Establish what coordinate system and units will be standard for the incident data.
- Establish outer boundary of the incident's area of interest.
- Gather what incident data you can; collect hard-copy maps already in use.
- Generate map products according to the SOP for Standard Map Products and the SITL timelines and priorities.

### **Responsibilities**

#### **The GIS Specialist is responsible for the following:**

- Collecting, processing, and disseminating incident-related spatial data
- Maintaining the standardized filing structures (Chapter 2)
- Collecting and maintaining the Minimum Essential Datasets (Chapter 4)
- Creating new data as needed for incident operations:
  - Incorporating data from (GPS) units and other sources
  - Digitizing fire perimeter and other incident data
- Creating necessary products (Chapter 6) using the defined Map Symbology (Chapter 5) within the agreed-upon time





- Properly documenting data and archiving work (Chapter 3; Chapter 7)
- Complying with security data management agreement (Chapter 3; Chapter 7; Chapter 8)
- Transferring GIS data to and from various locations, which may include FTP sites or Web sites as requested by the SITL (Chapter 7)
- Effectively transferring the products, projects, and data created in GIS to other personnel on the incident or to the hosting agency (Chapter 8)
- Complying with demobilization procedures
- Keeping informed of any known hardware, software, or data difficulties and concerns
- Providing maps as requested by the SITL, emphasizing the standard maps.

**With regard to the GIS Specialist, the Situation Unit Leader is responsible for the following:**

- Directing and prioritizing all tasks of the GIS Specialists, allowing for individual strengths
- Coordinating and prioritizing incoming requests—especially those by public information officers, cooperators, and others
- Requesting map products
- Monitoring the workload
- Authorizing the uploading of perimeter data
- Ordering the necessary equipment or people to accomplish the GIS work most effectively (computer support, power, equipment).

**Other personnel collecting geospatial data on the incident are responsible for the following:**

- Knowing how to use their GPS units and having GPS download cables available for downloading the data.

## **Communications**

The GIS Specialist needs to maintain timely and effective exchange of information between the Situation Unit and all affected agencies and organizations. When communicating with incident personnel and technical staff from outside the incident, it is imperative that the GIS Specialist maintain a professional demeanor. When communicating within the incident, it is essential that the GIS Specialist follow the ICS chain-of-command at all times. Incident communications, such as requests for materials, maps, or information, are tracked using the ICS 213, General Message Form (Appendix A).

Whenever there is more than one GIS Specialist on an incident, one of them may be designated as the “lead” to coordinate and communicate with the SITL. Some Incident Management Teams have a GIS Specialist as part of their team; this individual may be designated as the “GIS Lead” by the SITL.



# CHAPTER 2

## **Purpose**

This chapter provides GIS Specialists with guidelines for standardized file naming and directory filing for GIS data and related documents created and used on incidents. The structure is intended to lead to an efficient method of work and provide a consistent file naming and directory structure that is repeatable, clear, and enables consistent archiving of incident geospatial data. The intention is to allow some extensibility while still meeting the business needs of the GIS Specialist (number of personnel, hardware, software, data, and physical location) and those with whom the specialist cooperates.

The incident directory structure provides a framework for storing and using GIS data and documents efficiently and in an organized fashion. Ensuring that all incident GIS files are stored in the proper location within a standardized directory structure is important because it promotes an efficient workflow, reduces ambiguity, and enables the data archival process. Typically, this structure would be established and used by incident GIS Specialists, but could also be used by GIS professionals at the home unit of the incident or other organizations after incident operations are over and the GIS data have been archived.

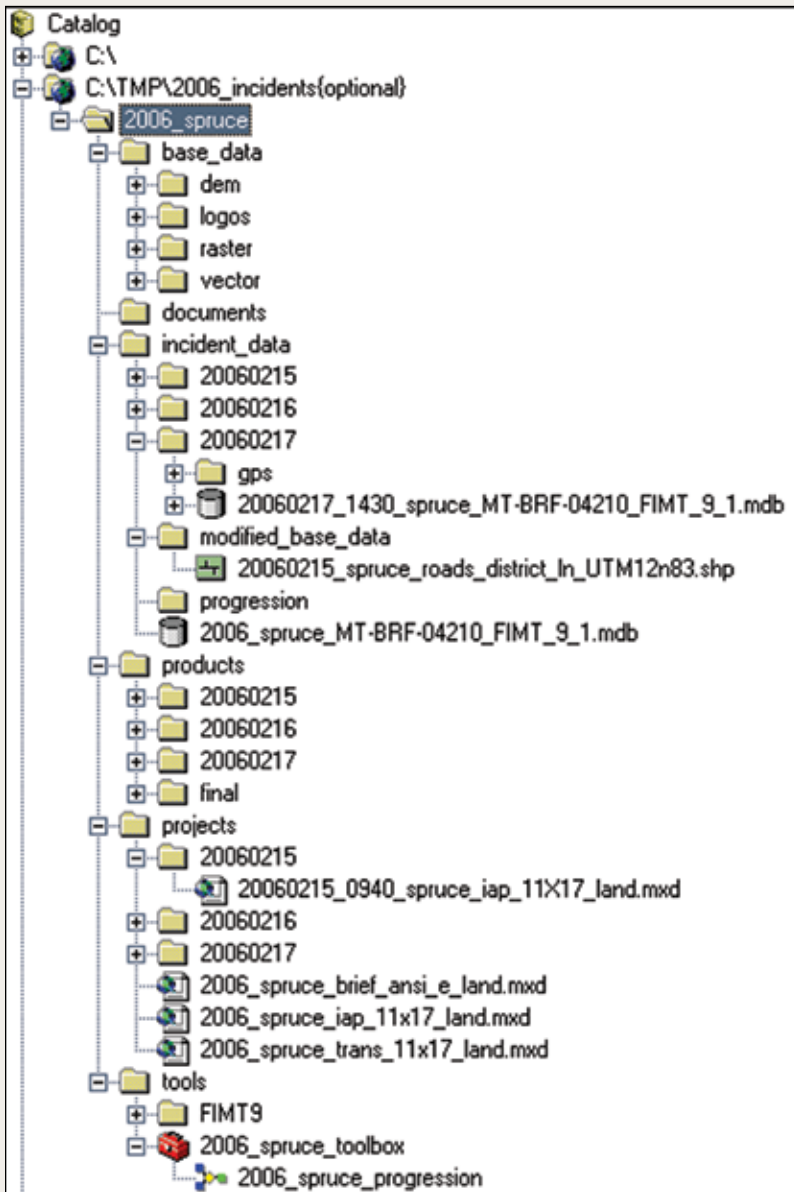
## **Specifications:**

The File Naming and Directory SOP and the Metadata SOP are designed so that the file and folder names include incident-specific identification information.

- File names cannot be longer than 255 characters. Note: long file names (more than 128 characters for path name and file name) may not allow backup onto CDs.
- File and folder names must not contain spaces or periods, aside from file extension delimiters.
- File names for specific layers include descriptive data about the incident.
- File names must be complete and stand on their own outside of the file structure.



TABLE 2.1 SAMPLE DIRECTORY STRUCTURE.



## Incident Directory Structure:

This structure can be stored in any location, however the following describes the core directories to be present for every incident and does not preclude other folders being added.

Note: According to agency needs, files for multiple incidents may be stored under a root folder named: {yyyy}\_incidents (at the root level, where yyyy = the current calendar year) (root folder name is optional)

{yyyy\_incident\_name} {i.e., 2005\_spruce, where yyyy = the year the incident started}

- **base\_data** {base data not created on the incident}
  - **dem** {digital elevation model data and derived products}
  - **logos** {agency logos, typically in nongeospatial raster format}
  - **raster** {other raster data such as orthoimagery or scanned quads}
  - **vector** {vector data file types}
- **documents** {spreadsheets, text documents, unit log, digital photos used on maps, and others}
- **incident\_data** {data created on the incident stored by date}
  - **incident spatial data file** {the master incident geospatial data file}
  - {yyymmdd} {contains date/time stamped incident spatial data files backed up from incident geospatial data file}
  - **gps** {optional, contains GIS data from field GPS downloads}
  - **other optional folders** {such as **IR**, **FARSITE**, ...}
  - **modified\_base\_data** {base data edited for the incident; i.e. roads, ownership, and structures}
  - **progression** {workspace to create progression data}
- **products** {contains GIS product files produced on the incident}
  - {yyymmdd} all products for an intended date of use (versus the date created)
  - **final** contains copies of all final products for the incident
- **projects** {GIS product tasks, daily map document files}
  - **master map document files** {the master map document files, one for each map product}
  - {yyymmdd} {contains backup map document files copied from master map document files}
- **tools** {extensions, tools, or other software used on the incident}



TABLE 2.2 SAMPLE FILE NAMES.

**Example from Cottonwood Incident:**

Master map document:

2005\_cottonwood\_iap\_11x17\_land.mxd

Map document backup file:

20050516\_2120\_cottonwood\_iap\_11x17\_land.mxd

Master incident geospatial data file:

2005\_cottonwood\_AR-CRR-1016\_fimt91.mdb

Incident geospatial data backup file:

20050516\_2230\_cottonwood\_AR-CRR-1016\_fimt91.mdb

Incident perimeter export file:

20050516\_2230\_cottonwood\_AR-CRR-1016\_per\_u15n83.zip

GPS data file:

20050516\_2230\_cottonwood\_AR-CRR-1016\_per\_fobs\_In\_u15n83.shp

Map product file:

20050516\_2120\_cottonwood\_AR-CRR-1016\_20050517Day\_iap\_11x17\_land.pdf

Non spatial Document:

20050516\_1923\_cottonwood\_ownership.xls

The following are required name elements for various file types. They are listed in the sequence they should appear in the file name, separated with underscore:

The general format is: {date}\_{incident information}\_{other information}

**Master map documents** (could be an MXD or APR file)

- This file is stored directly under the Projects folder
- Year (yyyy) the incident started
- Incident name
- Type of map (the standard map product description abbreviation)
- Page size (in inches or ANSI size A–E)
- Orientation of page (landscape or portrait)

**Map documents backup files** (could be an MXD or APR file)

- Date, including year (yyyymmdd), the file was saved
- Time (hhmm, 24-hour clock) the file was saved
- Incident name
- Type of map
- Page size
- Orientation of page

**Master incident geospatial data file** (the primary geospatial database used on the incident—could be a personal geodatabase)

This file is stored directly under the Incident Data folder.

- Year (yyyy) of the incident
- Incident name
- Incident number
- Tool and version used to produce data (optional)

**Incident geospatial data backup file** (could be a personal geodatabase)

- Date, including year (yyyymmdd), the file was backed up
- Time (hhmm, 24-hour clock) the file was backed up
- Incident name
- Incident number
- Tool and version used to produce data (optional)





**Incident perimeter export file** (exchange format, may be compressed file)

- Date, including year (*yyyymmdd*), the data were collected
- Time (*hhmm*, 24-hour clock) the data were collected
- Incident name
- Incident number, including 5-character Unit ID
- Incident data type (the type of data portrayed by the data layer)
- Feature type (point, line, polygon)
- Coordinate system
- Datum

**GPS data files** (could be shapefile or coverage or any other data type)

- Date, including year (*yyyymmdd*), the data were collected
- Time (*hhmm*, 24-hour clock) the data were collected
- Incident name
- Incident data type
- Source of data (the ICS position or name of person who collected the data)
- Feature type (point, line, polygon)
- Coordinate system
- Datum

**Map product files** (any map produced could be PDF, JPG, or EPS)

- Date, including year (*yyyymmdd*), the map was produced
- Time (*hhmm*, 24-hour clock) the map was produced
- Incident name
- Incident number (the official alpha-numeric incident designation)
- Type of map
- Date of operational period, including year (*yyyymmdd*), the map will be produced for
- Specify operational period (day or night) the map will be produced for
- Operational period the map will be produced for
- Page size
- Orientation of page

**Other supporting documents, spreadsheets, and other nongeospatial files** (could be XLS, DOC, JPG, TIFF, and others)

- Date, including year (*yyyymmdd*)
- Incident name
- Document contents



**Common Abbreviations:**

This is a list of standard abbreviations for file naming. For other features, select an unambiguous term.

**Incident Data Types**

per = Raw Perimeter  
dzt = Dozer Line  
prog = Progression Perimeter  
origin = Point of Origin  
unconfire = Uncontrolled Fire Edge  
ctlfire = Controlled Fireline  
contin = Contingency Line  
burn = Burned Area (area affected in a given time period)  
wfsa\_alt\_a = Wildland Fire Situation Analysis (alternatives a,b,c, etc.)  
damage = Damage caused by incident or suppression efforts  
icp = Incident Command Post  
ics\_fl = ICS fireline symbolized with ICS symbology  
ics\_pt = ICS points symbolized with ICS symbology  
ics\_div = ICS division breaks symbolized with ICS symbology  
mma = Maximum Manageable Area  
MAP = Management Action Point  
hand = handline

**Source Codes**

gps\_name = Global Positioning System (add collector's name) i.e., gps\_jones  
ir = Infrared  
fobs = Field Observer  
sitl = Situation Unit Leader

**Features** (for shapefiles, not needed with personal geodatabases)

pt = point  
ln = line  
pl = polygon  
gr = grid

**Coordinate System Codes** (for shapefiles, not needed with personal geodatabases)

(coordinate system, datum)

u10n27 = Universal Transverse Mercator (UTM) Zone 10, NAD 27  
u13n83 = UTM Zone 13, NAD 83  
lln83 = Latitude–Longitude; i.e., geographic NAD 83  
{st}sp5n27 = {State abbreviation} State Plane Zone 5, NAD 27



**Product Type**

airops = Aerial Operations Map  
brief = Briefing Map  
dam = Damage Assessment Map  
facil = Facilities Map  
fuels = Fuels Map  
iap = Incident Action Plan Map  
owner = Ownership Map  
plans = Situation–Plans Map  
prog = Progression Map  
rehab = Rehabilitation  
struct = Structural Protection Map  
trans = Transportation Map  
veg = Vegetation Map  
wfsa = Wildfire Situation Analysis Map  
wfip = Wildland Fire Implementation Plan

**Page Orientation**

land = landscape  
port = portrait

**Date Format**

yyyy = Year in which incident began, e.g., 2005  
yyyymmdd = Year, month, day, e.g., 20051207  
hhmm = Hour and minutes, 24-hour clock, e.g., 0945

**Responsibilities and Communications**

It is the responsibility of the GIS Specialist to communicate the file naming and directory structure used on an incident to other GIS Specialists, including the hosting unit GIS staff and regional GIS staff.

The Situation Unit is responsible for ensuring only that GIS file naming and directory structure standards are in place for the incident. This chapter specifies a national interagency standard, which should not be overridden at the incident level.

# CHAPTER 3

## Purpose

This SOP specifies procedures for the daily documentation of incident GIS data and direction for creating metadata about the data that have been created. This chapter provides procedures for further documentation aiding the local unit in creation of Federal Geographic Data Committee (FGDC) compliant metadata. Chapter 3 does not address how the metadata will be stored; for example, as attributes or in a text file. For incident metadata standards, refer to the Geospatial Task Group Web site (<http://gis.nwcg.gov/>).

## Specifications for metadata file naming

The following items are in Chapter 2:

- Date, including year (*yyyymmdd*)
- Time of data collection (*hhmm*, using 24-hour clock)
- Type of feature portrayed by the data
- Source of data (the ICS position or name of person who collected the data)
- Feature type (point, line, polygon)
- Coordinate system
- Datum
- Incident name

## Procedures

Documentation is kept on a Unit Log (Appendix B. ICS Form 214) by units operating on an incident situation to track significant events that occur throughout the operational day. The log may be hardcopy or digital files with attachments.

Keep a log of events such as the arrival of the IR perimeter, transition of personnel, or archiving of data. Include one of each type of map produced per operational period. This provides a record of significant changes to the incident data and the products produced.

If base data are used or edited, then these base data become modified base data. At this time, the GIS Specialist needs to fulfill the metadata or documentation requirements for these data.



## 3

### **Responsibilities**

The SITL (Situation Unit Leader) is responsible for ensuring that the GIS Specialist has the resources needed to fulfill the obligations to the Planning Section. The SITL authorizes what documentation the GIS Specialist will provide.

The GIS Specialist is responsible for providing agreed-upon documentation to the Documentation Unit Leader (DOCL) and managing agencies as directed by the SITL.

The DOCL (Documentation Unit Leader) is a customer of the GIS Specialist and is responsible for communicating needs to the SITL.



# CHAPTER 4

## Purpose

Minimum essential datasets are the minimum base datasets (other than incident data) needed to meet the business needs to make GIS maps or perform analyses on wildland fire incidents. Also addressed is where to obtain data and how to evaluate whether the data are suitable for use.

## Procedures

Datasets are used to develop Standard Map Products (Chapter 6); to develop other products and deliverables, including optional maps; to prepare Wildland Fire Situation Analyses (WFSA) and the Wildland Fire Implementation Plan (WFIP); and to complete other requested analyses.

This chapter distinguishes three classes of datasets:

- Required datasets for Standard Map Products (A)
- Required datasets for Optional Map Products (B)
- Optional datasets (C)

(See Table 4.1. Minimum Essential Datasets)

The GIS Specialist is responsible for gathering and evaluating all datasets to be used on an incident. The required datasets (A) should be gathered before arrival on an incident, and as many as possible of the required datasets for optional map products (B).

Specific information regarding preordering datasets is provided on the GTG Web site at <http://gis.nwcg.gov/>. See *Essential Optional Datasets Specification* for recommendations for obtaining base data, including possible data sources and required fields. Some datasets may be obtained from the local unit.

Upon receiving orders for GIS Specialist assignment, the GIS Specialist will contact the GIS staff at the local unit and request data. If there are already GIS Specialists on the incident, this may not be necessary. Check with the SITL.

In all cases, these datasets must be evaluated to determine if they are adequate for use on the incident. The evaluation of the datasets should include a review of the following elements:

- *Coordinate system and datum information.*  
This can be in the form of a file containing coordinate system information for vector data and a world file for images, or documentation associated with the dataset.
- *Scale.*  
Datasets designed for use at one scale may not be suitable for use at other or differing scales (i.e., roads digitized off small-scale State transportation maps may not be usable at 1:24,000-scale IAP maps).
- *Currency.*  
Determine whether the dataset is the most current dataset available (e.g., aviation sectionals are updated at least quarterly and old versions should not be used).
- *Attributes.*  
Datasets should contain meaningful attributes as per *Map Product and Deliverables Matrix*. Use caution with datasets with incomplete attribution.
- *Coded Attributes.*  
Lookup–translation table for codes should be available.
- *Security of Data.*  
Some datasets may contain sensitive or proprietary information and should not be distributed. Other datasets may have been procured under the premise that they will be used only on the incident and should not be copied or distributed.
- *Spatial Accuracy.*  
The dataset must meet locally acceptable accuracy requirements to be fit for a particular use. Marginal datasets may be used if a disclaimer is placed on the output product.

Each dataset that is obtained from a Federal source should contain metadata per Executive Order 12906 (<http://www.fgdc.gov/metadata>)

### **Responsibilities**

The GIS Specialist works with other people or groups (IRIN, FBAN, BAER team, Area Command) to obtain and provide datasets the others need for their job functions.

### **Communications**

Important contacts:

- SITL regarding available map layers, needed map layers, potential sources, etc.
- Computer Technical Specialist (CTSP) to obtain Internet access (if available) for downloading datasets.
- Local unit GIS staff for obtaining best available versions of local datasets relevant to the incident.

TABLE 4.1. MINIMUM ESSENTIAL DATASETS FOR MAP PRODUCTS.

DATASET	Required Map Products					Optional Map Products													Other			
	IAP Map	Progression Map	Situation/Plans Map	Briefing Map	Transportation Map	Aerial Operations Map	Facilities Map	Public Information Map	Rehabilitation Map	Structural Protection Map	Wildfire Situation Analysis Map	Wildland Fire Implementation Plan	Areas of Special Concern Map	Fire Perimeter History Map	Infrared Intelligence Map	Fuels Map	Ownership/Land Status Map	Vegetation Map	Damage Assessment Map	Evacuation Plan	FARSITE Layers	
<b>Class A - Datasets Required for Required Products</b>																						
Roads	O	R	R	R	R			R		R	O	O		O					R		R	O
Topographic Base (usually DRG)	R	O	O	O		O		O	O	O	R	R	O	O	R	R	O	R	O			
<b>Class B - Datasets Required for Optional Products</b>																						
Administrative Boundaries-Ownership-Land Status		O		O	O			O			R	R	O	O			R	O				
Airports-Helibases					O	R																
Aviation Hazards (including DADIF and DVOF)			O	O		R																
Canopy Cover																					R	
Communities (GNIS Populated Places)					O			R			R	R	O									
DEMs (Elevation, Slope, Aspect)																					R	
Fire Occurrence Polygons													O	R							O	
Fuels																R					R	
GNIS Geographic Names Information System		O			O	R		O	O	O							R	O				
Land Parcels										O	O	O					R	O				
Structures			O					O		R	R	R	O						R		R	
Subdivisions			O																	R		
Vegetation											O	O	O					R				
Hydrography (rivers-lakes)	O	O	O		O	R		O	O		O	O					O				O	
<b>Class C - Optional Datasets</b>																						
Archaeological Sites*											R	R	O									
Aviation Sectional						O																
Cultural Resources*											R	R	O									
Infrastructure											R	R										
Military Training Routes-Op Areas (MTR/ MOA)						O																
Ortho Imagery (usually DOQ)			O					O	O	O			O	O	O		O	O				
Other Scanned maps					O																	
Political Boundaries (County-State)			O		O		O	O	O	O	O	O	O		O		O	O				
Public Land Survey			O	O	O		O												O			
Response Areas (Direct Protection Areas)			O																			
Schools								O			O	O	O									
Shaded Relief		O	O			O		O	O		O	O	O	O	O	O	O	O	O			
Threatened and Endangered Species (T&E)											O	R	O									
Wilderness	O	O				O					O	O										
Wildland Urban Interface (WUI)											R	R	O									
<b>Legend:</b>	<b>R- Required layer for product</b>										<b>O - Optional Layer - may be added if available</b>											
* These datasets may be used for land manager planning, but may not be displayed on the final map as the sites are sensitive and not for public display																						

**TABLE 4.2. ESSENTIAL AND OPTIONAL DATASET SPECIFICATIONS.**

<b>DATASET</b>	<b>Data Content and Specifications</b>	<b>Suggested Acquisition</b>
Roads	Road Names, Road Class, Road Surface, Lookup tables with descriptions of coding. Accurate for use at 1:24,000 scale.	Prearrival
Topographic Base (usually DRG)—optional	Source Date, USGS Standard Color scheme—13 or 256 colors, Revision Date, Collar removed, scan resolution 200–1,000 dpi (USGS standard)	Prearrival
Hydrography (rivers—lakes)	Name (Optional)	Prearrival
GNIS Geographic Names Information System	Name, Type	Prearrival
Administrative Boundaries—Ownership—Land Status	Agency—Owner Name, contact info	Prearrival
DEMs (Elevation, Slope, Aspect)	Resolution	Prearrival
Public Land Survey	Township, Range, Section	Prearrival
Structures	Address, Risk Assignment (Optional)	Prearrival
Subdivisions	Name	Prearrival
Canopy Cover		Local Unit
Fire Occurrence Polygons	Fire Name, Year	Local Unit
Fuels	Fuel Model	Local Unit
Land Parcels	Parcel ID, Contact info (Optional)	Local Unit
Vegetation	Forest Type, Age, Basal Area, Height	Local Unit
Communities (GNIS Populated Places)	Name	Prearrival
Airports—Helibases	Name, Type, Latitude, Longitude	Local Unit
Aviation Hazards (including DAFIF and DVOF)	Hazard Type, Elevation, Latitude, Longitude	Local Unit
Orthoimagery (usually DOQ)	Source Date, Resolution	Prearrival
Political Boundaries (County—State)	Name	Prearrival
Shaded Relief	Not applicable	Prearrival
Archaeological Sites	Contact info	Local Unit
Cultural Resources	Contact info	Local Unit
Infrastructure	Name, Type	Local Unit
Other Scanned Maps	Source, Source Date	Local Unit
Response Areas (Direct Protection Areas)	Name	Local Unit
Schools	Name	Local Unit
Threatened and Endangered Species (T&E)	Type	Local Unit
Wilderness	Name	Local Unit
Wildland Urban Interface (WUI)	Type	Local Unit
Aviation Sectional	Source Date	Prearrival



# CHAPTER 5

## Purpose

The use of standard symbols in mapping wildland fires facilitates fast and consistent interpretation of mapping products. Standard map symbols are required to avoid ambiguous map interpretation, which can become a safety issue during an incident.

Symbols that are used by anyone who may create maps digitally or who may hand draw maps on an incident are addressed in this SOP to encourage safety, consistency, and readability.

## Procedures

The NWCG Fireline Handbook (PMS 410-1) map symbols are the primary standards. This document presents additional standard map symbols.

Accompanying text must be given for Drop Point (“DP”) and Helispot (“H”). These map symbols look identical when displayed in black and white. The text is used not only as a designator of the symbol type, but also as an identifier of a particular feature (e.g., DP-1, DP-2, H-5, etc.). Hot Spot symbols also look like Drop Points and Helispots when displayed in black and white. However, Hot Spot symbols do not include accompanying text. Care should be taken to place the identifying text close enough to the map symbol to avoid confusion with nearby symbology.

Caution is also advised in the use of a white halo border for symbols. A thin, white border around map symbols may facilitate visibility of the symbol. However, the halo may obscure relevant data underneath.

Although the symbols are evaluated individually and thus technically stand on their own as standards, it is best to assemble the standard symbology as a set of symbols for distribution.

This SOP is intended to be technology independent. Standard symbols sets for presently accepted GIS software packages (i.e., ArcGIS style set), along with instructions for loading the symbology, can be found on the GTG Web site (<http://gis.nwcg.gov>). The symbols will also be available individually as graphics files to be incorporated into any GIS software that allows custom symbols.

Choice of symbol size is left to the discretion of the GIS Specialist and the SITL.



General symbology, such as hydrography and roads, is not included as a standard for mapping wildland fires. However, it is highly recommended that national symbology standards be used where appropriate (e.g., BLM Ownership).

### Specifications

The following acceptance criteria were used for symbol selection:

1. GIS symbols must represent features that are incident-based only.
2. Standard GIS symbols must relate to the standard map products under the SOP for Standard Map Products.
3. Symbols must be easily and quickly identifiable when displayed in color and black and white.
4. Symbols must be clearly distinguishable between other ICS symbols when displayed in color and in black and white.
5. Symbols must be designed to allow field personnel to easily hand draw the symbols on hard-copy maps.
6. Symbols in the Fireline Handbook (PMS 410-1) shall be included and are not subject to modification with the exception of symbol size and optional halo.

**Note:** The symbols for Fire Origin, Mobile Weather Unit, and Fire Spread Prediction (from the Fireline Handbook) do not satisfy the GIS SOP symbology acceptance criteria defined for digital symbols. But while these symbols cannot be modified, the symbol size or use of halo borders can be adjusted .

### List of Interagency Wildland Fire GIS Standard Symbols

Marker (point) Symbols:

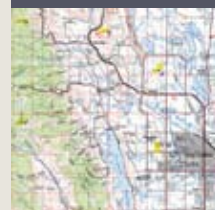
1. Aerial Hazard
2. Aerial Ignition
3. Branch Break\*
4. Camp\*
5. Division Break\*
6. Drop Point
7. Fire Origin\*
8. Fire Station\*
9. First Aid Station\*

\* Published in the Fireline Handbook (PMS 410-1, March 2004) See Table 5.2 for a complete set of symbols.

10. Helibase\*
11. Helispot\*
12. Hot Spot\*
13. Incident Base\*
14. Incident Command Post\*
15. IR Downlink\*
16. Lookout
17. MediVac Site
18. Mobile Weather Unit\*
19. Repeater, Mobile Relay\*
20. Safety Zone
21. Segment Break\*
22. Spot Fire\*
23. Staging Area\*
24. Telephone\*
25. Water Source\*
26. Wind Speed Direction\*
27. Zone Break

Line Symbols:

28. Active Burnout
29. Aerial Hazard
30. Aerial Ignition
31. Completed Burnout
32. Completed Dozer Line\*
33. Completed Line\*
34. Escape Route
35. Fire Break Planned or Incomplete\*
36. Fire Spread Prediction\*
37. Foam Drop
38. Highlighted Geographic Feature\*
39. Highlighted Manmade Feature\*
40. Line Break Completed\*
41. Management Action Point (MAP)
42. Planned Fireline\*
43. Planned Secondary Line\*



- 44. Proposed Burnout
- 45. Proposed Dozer Line\*
- 46. Retardant Drop
- 47. Uncontrolled Fire Edge\*
- 48. Water Drop

Fill (polygon) Symbols:

- 49. IR Intense Heat Area
- 50. IR Heat Perimeter
- 51. Maximum Manageable Area (MMA)
- 52. Temporary Flight Restriction (TFR)



TABLE 5.1. MAP SYMBOLOGY SAMPLES.

**Special Consideration: Safety Symbols**

When there is an occasion to map important safety features, the use of these standard map symbols is recommended. Field conditions can change, making locations outdated and dangerously misleading. These symbols should only be displayed on maps at the direction of the SITL.

**Safety Zone (point)—**

Several variations of Safety Zone symbols have been created and used on incidents. A standard Safety Zone symbol will facilitate safety through universal symbol recognition. The triangle shape is unique in ICS symbology. This makes the Safety Zone symbol easy to identify and distinguish from other ICS symbols.

**Lookout (point)—**

Lookout symbols represent the locations of Lookouts posted to facilitate safety of operations. They are not intended to locate lookout towers or other fixed locations. This map symbol may be used in the rare situations where a Lookout position is determined in advance for planning purposes, or for showing where Lookouts were posted after the fact.

**Escape Route (line)—**

Escape Route map symbols represent corridors of passage to safety zones. These features would most likely be determined in the field. However, in some instances, Escape Routes could be identified in advance and mapped accordingly.



## Responsibilities

The Situation Unit Leader (SITL) is responsible for ensuring that standard map symbology is used for mapping wildland fire incidents.

The GIS Specialist, in turn, is responsible for using the standard GIS map symbology. However, the GIS Specialist has the cartographic license to adapt (e.g., enlarge, use halo) the symbology for map readability while maintaining the essential design of the standard symbols. Map symbol colors, if applicable, will be maintained.

## Communications

The GIS Specialist should communicate with the SITL regarding the use of standard mapping symbology on an incident. This is especially important when the GIS Specialist uses cartographic license to enhance map symbols.

## Definitions

**Active Burnout:** The location where burnout operations are occurring.

**Aerial Hazard:** A hazard for aircraft, such as towers and power lines.

**Aerial Ignition:** Ignition of fuels by dropping incendiary devices or materials from aircraft. This is most often displayed as a line feature, but may be represented as a point.

**Branch Break:** A location where Branches adjoin. Branches are identified by roman numerals or by functional name (service, support).

**Burnout:** An area inside a control line where fire has been set to consume fuel between the edge of the fire and the control line.

**Camp:** A geographical site within the general incident area, separate from the incident base, equipped and staffed to provide sleeping, food, water, and sanitary services to incident personnel.

**Completed Dozer Line:** Completed fireline constructed by the front blade of a dozer. The map symbol for this line is often interpreted to encompass fireline created by all mechanical means.



**Completed Line:** Completed Line refers to any completed fireline type that serves as a Control Line. This term is often used to indicate Hand Line, or any other fireline type that is not constructed through mechanical means.

**Control Line:** An inclusive term for all constructed or natural barriers and treated fire edges used to control a fire.

**Division Break:** Location of Division boundaries. Divisions are identified with alpha characters. The naming scheme is created to allow for the addition or subtraction of Divisions. For example, when a fire has two Divisions, they are often designated as Division A and Division Z. Lettering is designated from A to Z, clockwise from the fire origin.

**Drop Point:** A predefined location where personnel, equipment, and supplies are to be delivered or picked up.

**Escape Route:** A preplanned and clearly identified route of travel that firefighting personnel are to take to access safety zones or other low-risk areas.

**Fire Break:** A natural or constructed barrier used to stop or check fires that may occur, or to provide a Control Line from which to work.

**Fire Origin:** A location that describes the best known location of an incident origin.

**Fire Spread Prediction Line:** A line used to show the predicted fire edge at a certain date and time.

**Fireline:** The part of a Control Line that is scraped or dug to mineral soil. Also called fire trail.

**Foam Drop:** The location where foam is dropped from aircraft during fire suppression operations.

**Helibase:** The main location within the general incident area for parking, fueling, maintenance, and loading of helicopters. It is usually located at or near the incident base.

**Helispot:** A natural or improved takeoff and landing area intended for temporary or occasional helicopter use.

**Highlighted Geographic Features:** Significant geographic features that are highlighted on maps.

**Highlighted Manmade Features:** Significant human-constructed features that are highlighted on maps.



**Hot Spot:** The location of a particularly active part of a fire. The map symbol for Hot Spot is similar to those for Drop Points and Helispots, but it is slightly larger.

**Incident Base:** Location at the incident where the primary logistics functions are coordinated and administered. (Incident name or other designator will be added to the term “Base.”) The Incident Command Post may be collocated with the Base. There is only one Base per incident.

**Incident Command Post (ICP):** Location at which primary command functions are executed. The ICP may be collocated with the Incident Base or other incident sites.

**IR Intense Heat Area:** An area of intense heat as interpreted by IRINs from data derived from infrared sensors.

**IR Downlink:** A location where there is a capability, through the use of a special mobile ground station, to receive air-to-ground IR imagery at an incident.

**IR Heat Perimeter:** An area of heat as interpreted by IRINs from data derived from infrared sensors.

**Lookout:** (1) A person designated to detect and report fires from a vantage point. (2) A location from which fires can be detected and reported. (3) A firefighter assigned to observe the fire and warn the crew when there is danger of becoming trapped.

**Management Action Point (MAP):** Geographic point on the ground or specific point in time where an escalation or alternative of management actions is warranted. These points are defined and the management actions to be taken are clearly described in an approved Wildland Fire Implementation Plan (WFIP) or Prescribed Fire Plan. Timely implementation of the actions when the fire reaches the action point is generally critical to successful accomplishment of the objectives. Also called Trigger Points.

**Maximum Manageable Area (MMA):** The maximum geographic limits of spread within which a Wildland Fire Use fire is allowed to spread.

**MediVac Site:** A mobile medical treatment and transportation site.

**Mobile Weather Unit:** A special weather station for forecasting weather for a specific incident, prepared by a meteorologist on site at or near the incident area.





**Retardant Drop:** The location where retardant is dropped from aircraft during fire suppression operations.

**Safety Zone:** An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety Zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas that can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity.

**Secondary Line:** Any fireline constructed at a distance from the fire perimeter concurrently or after a line already constructed on or near the perimeter of the fire. It is generally constructed as an insurance measure in case the fire escapes control by the primary line.

**Segment Break:** The location of a Segment boundary. A Segment may be a portion of a Division or an area inside or outside the perimeter of an incident. Segments are identified with arabic numerals (A-1 and so forth). Segment Breaks are also used to delineate the boundaries of Maximum Manageable Area (MMA) Segments.

**Spot Fire:** The location of a fire ignited outside the perimeter of the main fire by a firebrand. The arrow of the Spot Fire symbol should be rotated to point in the direction of the spot fire.

**Staging Area:** A location set up at an incident where resources can be placed while awaiting a tactical assignment on a three-minute available basis. Staging Areas are managed by the Operations Section.

**Temporary Flight Restriction (TFR):** A type of "Notices to Airmen" (NOTAM). A TFR defines an area restricted to air travel because of a hazardous condition, a special event, or a general warning for the entire FAA airspace.

**Uncontrolled Fire Edge:** A fire edge that is not controlled.

**Water Drop:** The location where water is dropped from aircraft during fire suppression operations.




























**Water Source:** Location of water sources for operations. The Water Source symbol should be accompanied by the water source type (pond, cistern, hydrant, etc.)

**Zone Break:** Location of Zone boundaries. Zones are the highest order in dividing an incident into geographic areas of operation.


















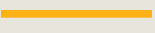

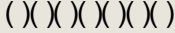



TABLE 5.2. COMPLETE SET OF STANDARD MAP SYMBOLS.

**Interagency Wildland Fire GIS Standard Operating Procedures—Point Symbols**

	Aerial Hazard <i>(purple)</i>		IR Downlink * <i>(blue)</i>
	Aerial Ignition <i>(red)</i>		Lookout <i>(blue)</i>
	Branch Break* <small>(Numbered clockwise from origin)</small>		MediVac Site <i>(red cross, blue outer circle)</i>
	Camp (Name)* <i>(blue)</i>		Mobile Weather Unit * <i>(blue)</i>
	Division Break* <small>(Lettered clockwise from origin)</small>		Repeater, Mobile Relay * <i>(blue)</i>
	Drop Point (Name, e.g. DP-1)		Safety Zone <i>(orange fill)</i>
	Fire Origin (Date Time)* <i>(red)</i>		Segment Break*
	Fire Station * <i>(blue)</i>		Spot Fire (Date Time) * <i>(red)</i> <small>(Arrow to be rotated in direction of spot fire movement)</small>
	First Aid Station * <i>(blue)</i>		Staging Area (Name) * <i>(blue)</i>
	Helibase * <i>(blue)</i>		Telephone * <i>(blue)</i>
	Helispot (Name, e.g. H-1) * <i>(blue)</i>		Water Source (Identify Type) * <i>(blue)</i>
	Hot Spot (Date Time) * <i>(red)</i>		Wind Speed Direction (Dir/Speed Time Date) *
	Incident Base * <i>(blue)</i>		Zone Break
	Incident Command Post * <i>(blue)</i>		

\* Published in the Fire Handbook (PMS 410-1) as of 3/2004.

**Interagency Wildland Fire GIS Standard Operating Procedures—Line Symbols**

	Active Burnout		Planned Fireline
	Aerial Hazard		Planned Secondary Line
	Aerial Ignition		Proposed Burnout
	Completed Burnout		Proposed Dozer Line
	Completed Dozer Line		Retardant Drop
	Completed Line		Uncontrolled Fire Edge
	Escape Route		Water Drop
	Fire Break Planned or Incomplete		
	Fire Spread Prediction (Date Time)		
	Foam Drop		
	Highlighted Geographic Feature		
	Highlighted Manmade Feature		
	Line Break Completed		
	Management Action Point (MAP)		



**Interagency Wildland Fire GIS Standard Operating Procedures—Polygon-Fill Symbols**



IR Intense Heat Area



IR Heat Perimeter



Maximum Manageable Area (MMA)



Temporary Flight Restriction (TFR)



# CHAPTER 6

## Purpose

The Standard Map Products described in this chapter are used often during ICS Incidents. This SOP provides guidelines for the creation of GIS map products during an incident. Optional map definitions have also been developed for other GIS maps that may be created during an incident.

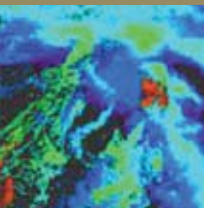
The objective is not to create an impossible standard, nor a standard for every possible product. These “standards” are intended to be used as guidelines. Flexibility will need to be applied to these standards, as SITL and other end-users may have specific needs or preferences.

Map examples are available on the GTG website (<http://gis.nwccg.gov>).

## General Procedures

Maps produced on an incident should communicate the intended message clearly. All map products produced should follow these standards where applicable. Some maps may be produced as a special request, and thus there will be no standard to follow, but the following elements should be included:

- Incident Name and Number
- Legend
- STANDD:
  - Scale. The scale is usually placed at the bottom of the map. If the map is “not to scale,” then label the map as such. Map scale may change during the copying process.
  - Title. The map title should be placed at the top of the map. Incident name and number should also be included (includes State, unit identifier, and number; for example: ID-BOF-0095).
  - Author’s Name.
  - North Arrow.
  - Date. The date and time information gathered should be written near the author’s name on the map.
  - Datum. The datum of the coordinates on the map should be placed on the map if coordinates are shown. This is important information for those who use Global Positioning Systems (GPS).



Map products should adhere to:

- ICS symbology standards (refer to Fireline Handbook)
- Use of standardized colors for maps printed in color (refer to USGS standards); blue for water, green for vegetation, and so forth.

### **Accuracy and Completeness**

- Data should be current
- Features are in correct location
- Map scale is accurate
- Map should be complete and readable

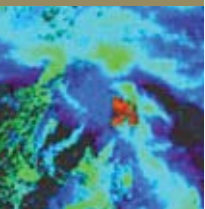
### **Other Procedural Considerations**

- SITL approves all maps and is the primary customer
- Use of logos shall be directed by the SITL
- Placement of fire acreage on maps is at the discretion of the SITL
- Consider page size and whether color is needed; many maps are reproduced on black-and-white copy machines and may need specific formatting
- North arrow may need to be rotated to correctly indicate true north
- Include "DRAFT" on maps that are for review only
- Sensitive Information—maps may need labels defining the sensitivity of the data (e.g., "For Official Use Only," "Not for Public Distribution or Use")
- Any other disclaimers, if requested
- Proprietary Information—cite source
- Planning Cycle Timeline—schedule map production to meet specific deadlines (refer to the Fireline Handbook)

### **The Standard Maps**

The minimum maps, as defined by the GIS Specialist position task book, are:

- Incident Action Plan
- Transportation Map
- Incident Briefing Map
- Progression Map
- Situation—Plans Map

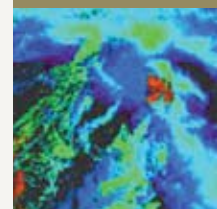


**Responsibilities**

Timelines for map production need to be established with the SITL. It is the responsibility of the GIS Specialist to produce all products on time for scheduled briefings and other meetings. Map definitions should be used as general guidelines; the SITL has the authority to deviate from the standards.

**Communications**

All map requests go through the SITL. This keeps the SITL informed of the GIS Specialist workload and helps prioritize needs. The SITL may instruct the GIS Specialist to work with the end-user of the map to clarify map product requirements. Final map products are approved by the SITL before release, unless otherwise arranged.



**Map Product Definitions—Standard****Product Name***Incident Action Plan (IAP) Map***STANDARD****Product Description**

The *IAP Map* is the primary map used by operations personnel in completion of their mission and is a supplement to the Incident Action Plan.

**Target Audience**

Incident operations personnel

**Objective**

The *IAP Map* effectively communicates geographic feature relations and incident management objectives on an incident. The *IAP Map* is a tool used by operations staff to display field assignments, crew instructions, and division safety concerns at the operational period briefings and breakout meetings. The *IAP Map* is a tool for firefighter safety.

**Guidelines**

- Standard ICS symbology
- Black and white to enable clear duplication
- Letter (8½" × 11") or tabloid (11" × 17") size
- Generally 1:24,000 scale; 1:63,360 scale in Alaska
- Prepared for operational period briefings

**Required Elements****Cartographic**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend
- Operational period (day–night)

**Data\***

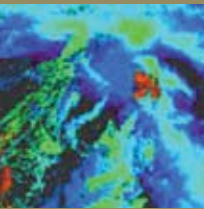
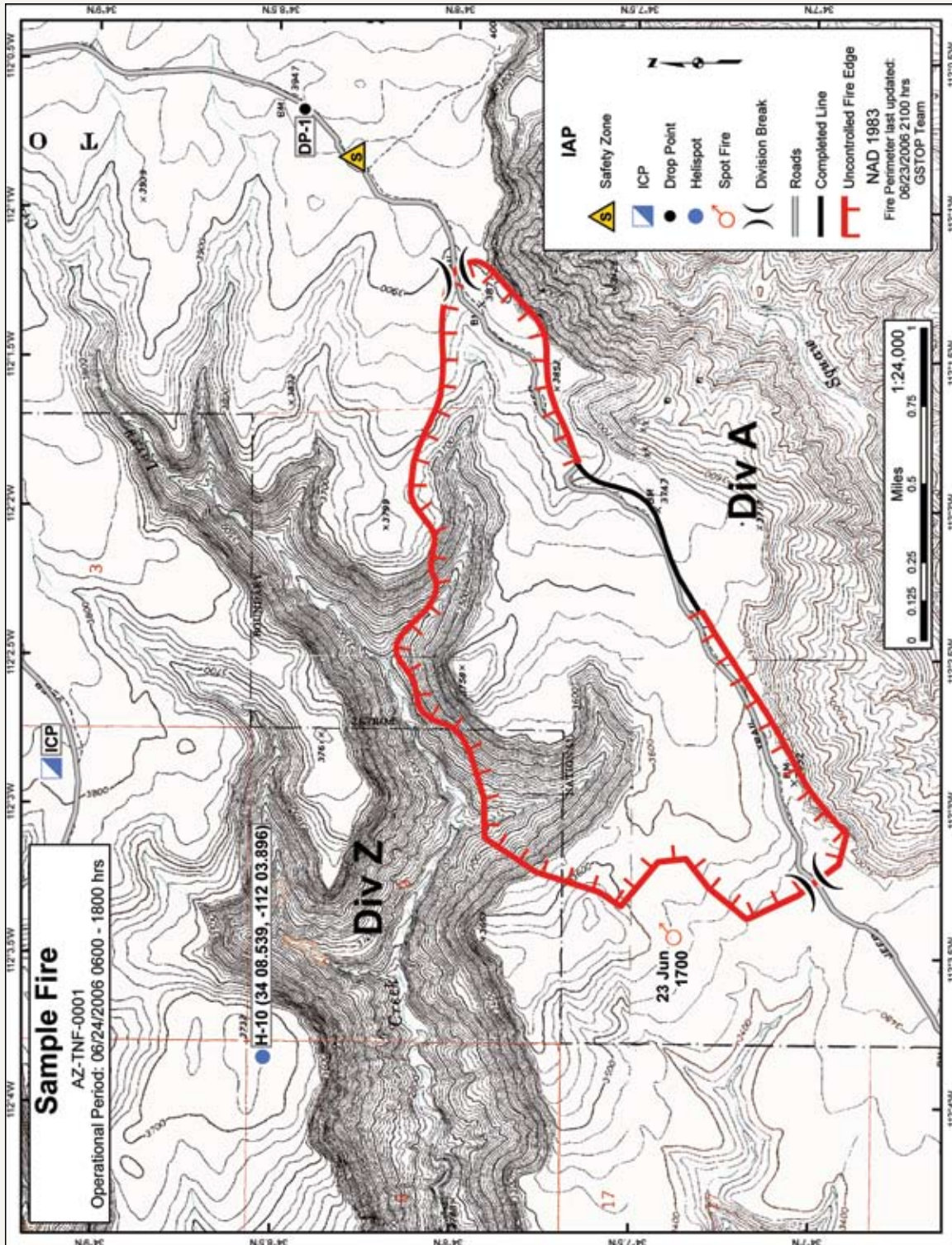
- Incident perimeter and fireline
- Division–Branch breaks and labels
- Topography (DRGs with the green turned off usually produce the best topographic line quality)
- ICS features (Drop Points, aviation features, camps, ICP, spot fires, Safety Zones, and others)
- Geographic reference (usually latitude–longitude)

**Optional Elements**

- Index map (when multiple sheets are required)
- Roads
- Hydrography
- Wilderness boundaries
- Data source citation (if data are special or requested)
- Disclaimer language (use when incident information is estimated, changing quickly, or requested)
- Magnetic declination and date

\* If the incident is a Wildland Fire Use incident, include MMAs, MAPs, and MMA segments when applicable.





**Product Name***Transportation Map***STANDARD****Product Description**

The *Transportation Map* is a small, planimetric map showing the access routes to the incident.

**Target Audience**

Operations, logistics, crews, ground support

**Objective**

The *Transportation Map* provides an overview of the transportation network in the incident vicinity to support safe transportation. This map is used to facilitate land-based delivery of equipment, supplies, and personnel to and from the incident location.

**Guidelines**

- Standard ICS symbology
- Black and white to enable photocopying and faxing
- Prepared for operational period briefings—insert into IAP

**Required Elements****Cartographic**

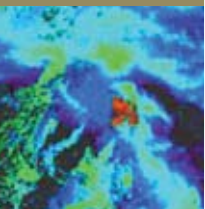
- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Incident name and number
- Date and time produced
- Symbol legend

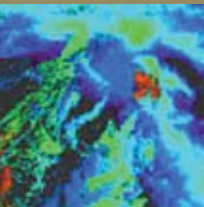
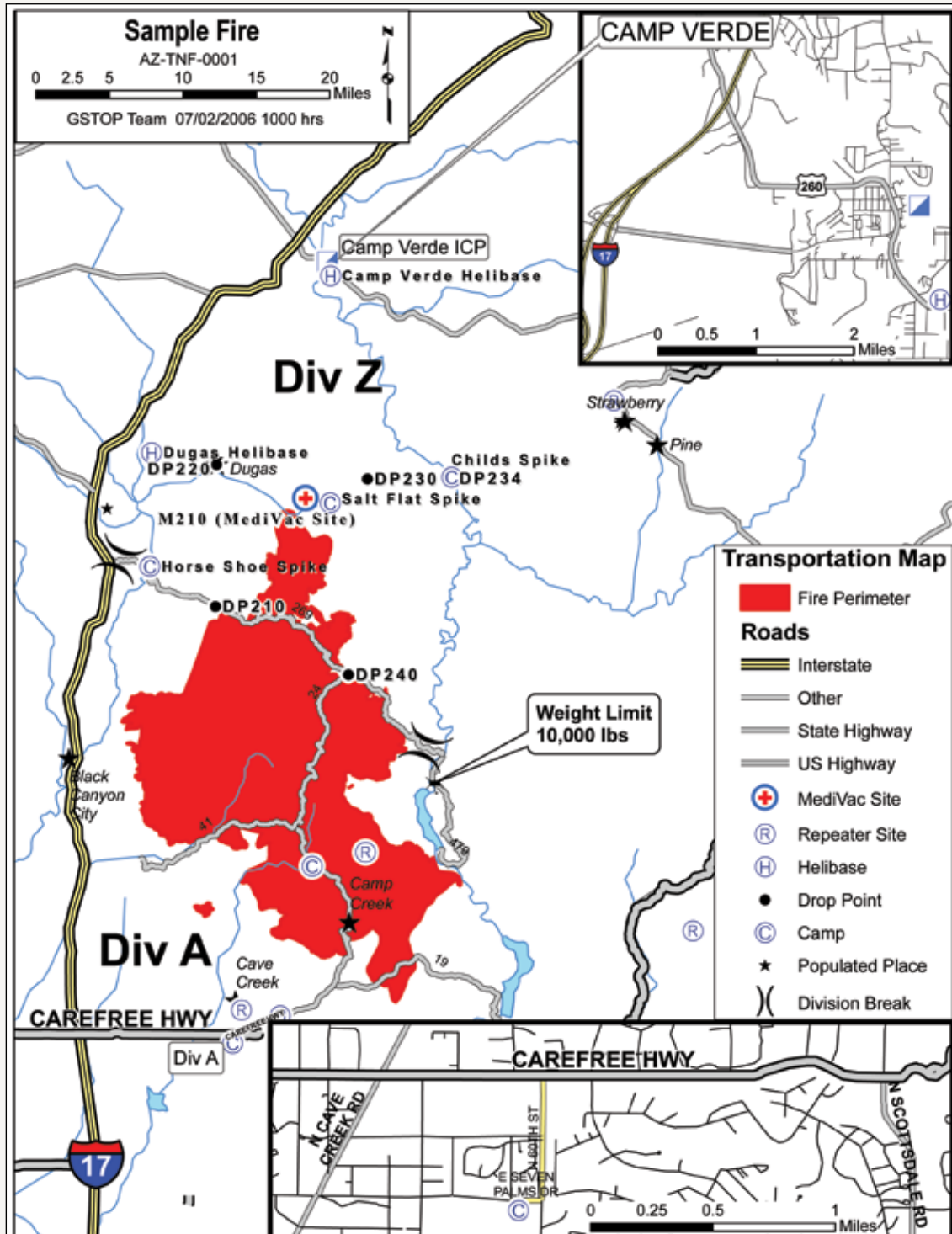
**Data**

- Incident Perimeter
- Division–Branch breaks and labels
- Major roads and names, type of route (dirt, 4WD only, one-way, etc.)
- Route restrictions (e.g., bridge weight limits)
- ICS features (e.g., Drop Points, Camps, ICP)

**Optional Elements**

- Incident fireline
- Geographic reference (latitude–longitude, Public Land Survey)
- Landmarks
- Vicinity maps
- Label distances along travel routes
- Mile markers
- Disclaimer language
- Administrative boundaries
- Hydrography, such as rivers and lakes
- County boundaries
- Communities (GNIS populated places)
- Airports–Helibases
- Other Scanned Maps





**Product Name***Incident Briefing Map***STANDARD****Product Description**

The *Incident Briefing Map* is a large-format map of the incident area, which is used during briefings to discuss work assignments and other details for the upcoming operational period.

**Target Audience**

Plans Section Chief, Incident Commander, Operations Section Chief, Safety Officer, Fire Behavior Analysts

**Objective**

The *Incident Briefing Map* communicates sufficient incident detail to enable operations staff to brief personnel assigned to the upcoming operational period.

**Guidelines**

- Standard ICS symbology
- Simple fonts and symbols, large enough to be read from the back of the briefing area
- Reduced clutter to enable clear communication
- "E" size (34" × 44") or larger

**Required Elements****Cartographic**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Incident name and number
- Date and time produced
- Symbol legend

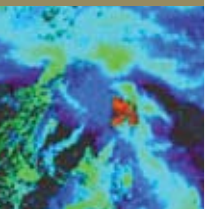
**Data\***

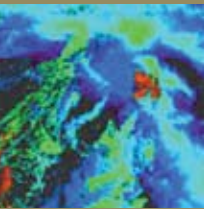
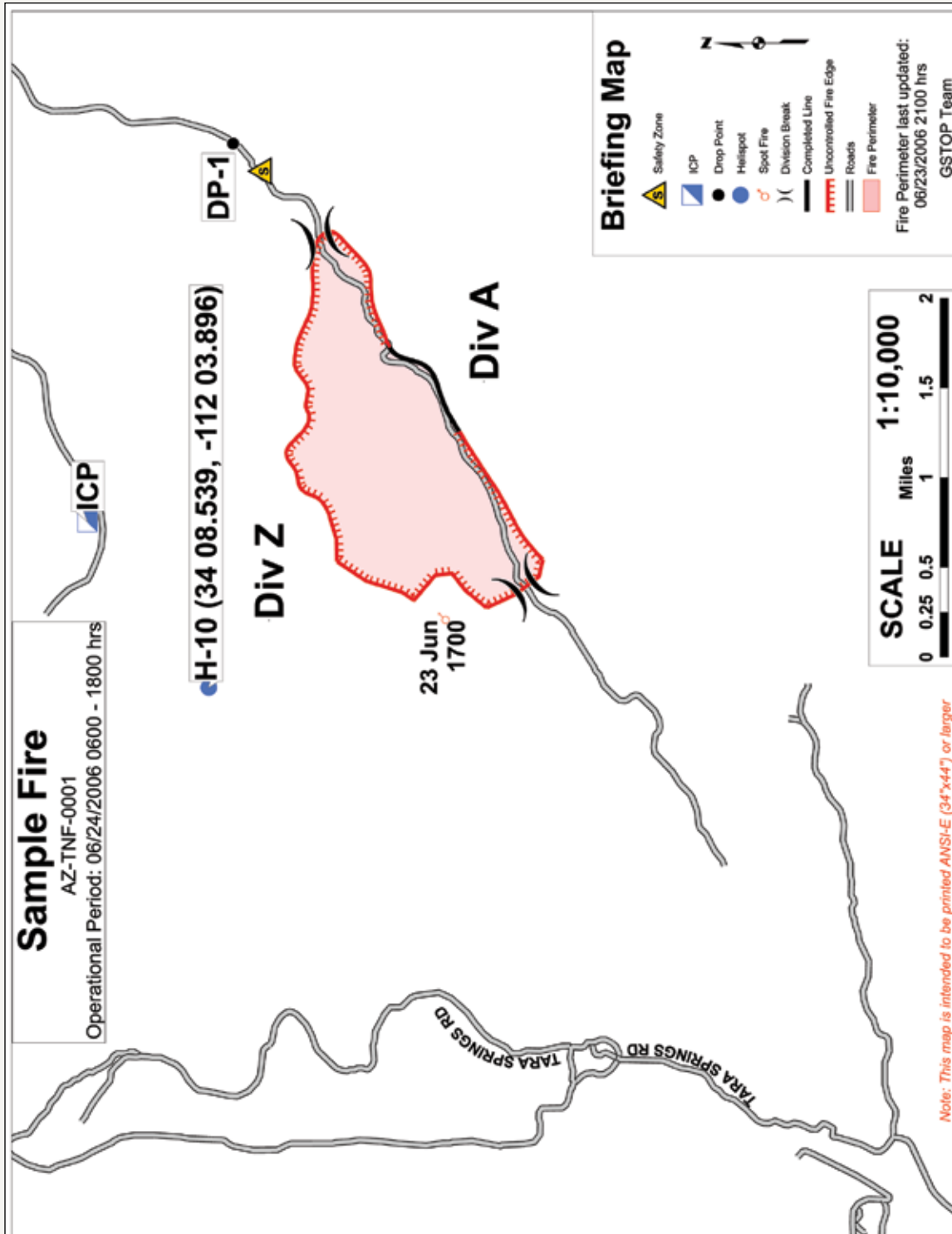
- Incident perimeter and fireline
- Division–Branch breaks and labels
- Major transportation routes to incident
- ICS features (Drop Points, Camps, ICP, Aviation features)

**Optional Elements**

- Safety Hazards
- Escape Routes
- Topography
- Geographic reference (latitude–longitude, Public Land Survey)
- Administrative boundaries (e.g., Land Status, Administrative, Ownership, Jurisdiction, Containment WFSA area)

\* If the incident is a Wildland Fire Use incident, include MAPs and MMA segments when applicable.





**Product Name***Progression Map***STANDARD****Product Description**

The *Progression Map* shows the areas affected by the incident over time.

**Target Audience**

Fire Public Information Officer, Fire Behavior Analysts

**Objective**

The *Progression Map* graphically displays the progression of the incident over the landscape.

**Guidelines**

- Can be scalable from letter size to "E" size
- If more than five time periods are shown, standardized color ramps are effective in showing trends rather than discrete values.
- Distribution through the Web should be considered.

**Required Elements****Cartographic**

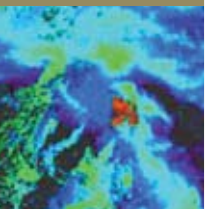
- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Incident name and number
- Date and time produced
- Symbol legend

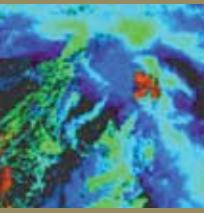
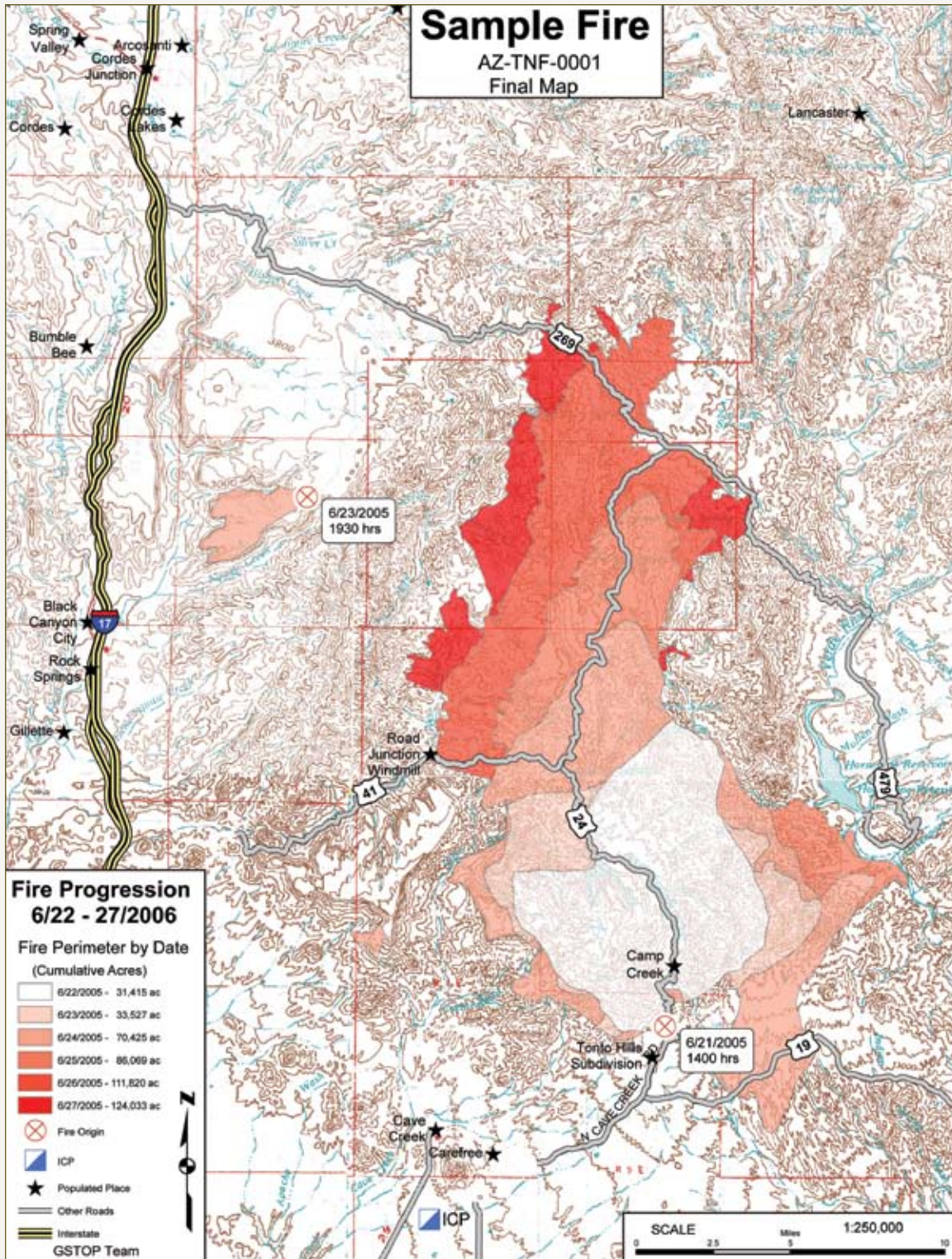
**Data**

- Point of Fire Origin
- Origin date and time
- Shaded relief base—topography base
- Key geographic features, such as mountains, valleys, peaks, major roads
- Differing colors for each perimeter time period
- Acreage affected for each time period

**Optional Elements**

- Administrative boundaries
- Vicinity maps
- Hydrography
- Wilderness boundaries





**Product Name***Situation–Plans Map***STANDARD****Product Description**

The *Situation–Plans Map* is a large-format master map with an accurate, current, and detailed record of the incident information.

**Target Audience**

Planning Section, Incident Command General Staff

**Objective**

The *Situation–Plans Map* provides a geographic tool for the Plans Meeting to develop incident strategies and alternatives. Also, this map is used as the master map for tracking incident intelligence.

**Guidelines**

- Standard ICS symbology
- Feature symbology discernable from the back of the meeting area
- Usually "D" size (22" × 34") or larger
- Usually 1:24,000 scale; 1:63,360 scale in Alaska

**Required Elements****Cartographic**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Incident name and number
- Symbol legend
- Date and time produced
- Geographic reference (coordinate grid, latitude–longitude)

**Data\***

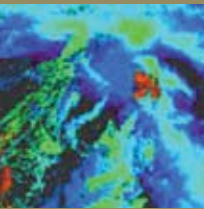
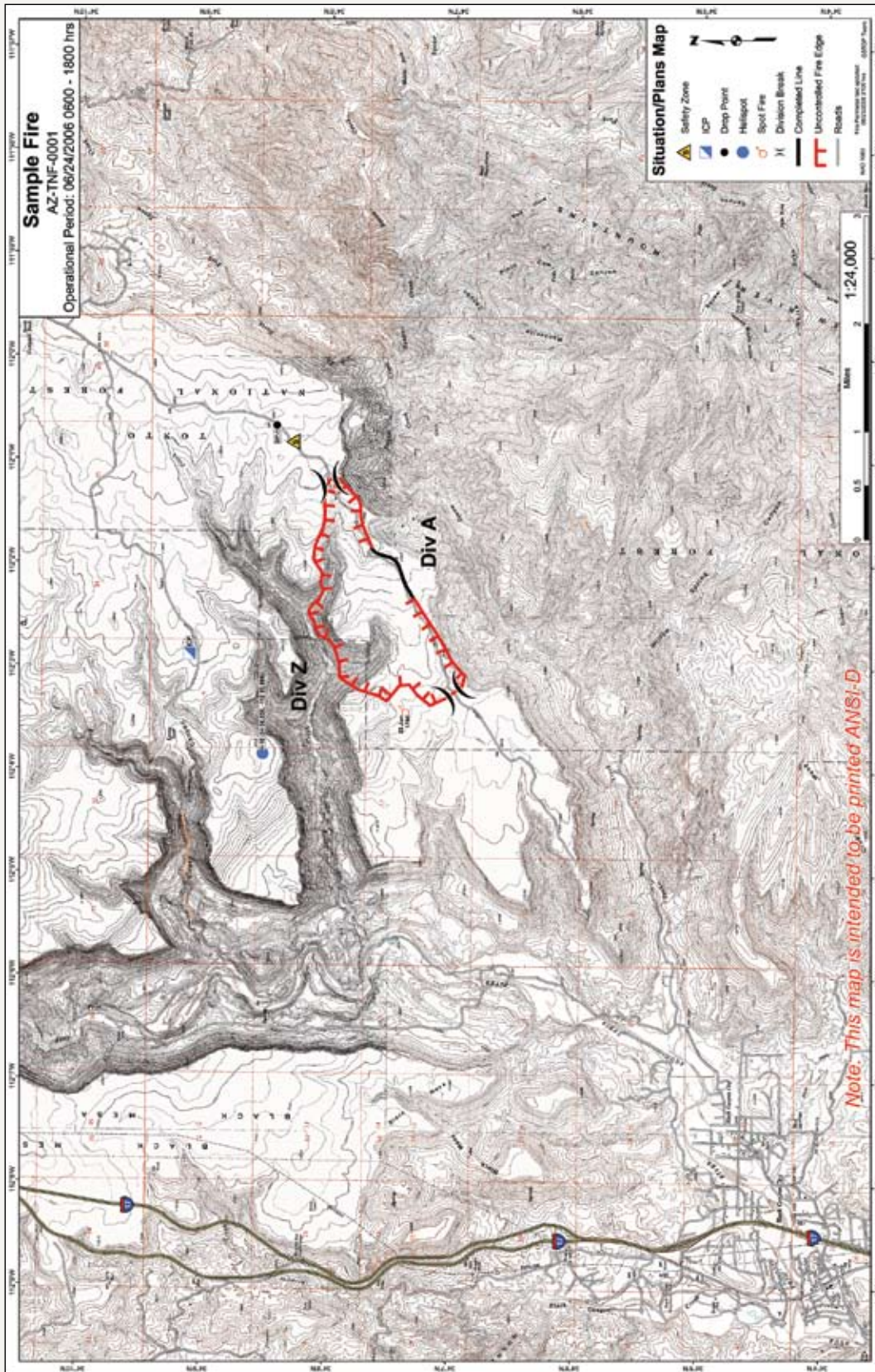
- Incident perimeter and fireline
- ICS features
- Division–Branch breaks and labels
- Transportation routes
- Safety hazards, if available
- Some kind of base background::
  - ◆ Orthoimagery base
  - ◆ Shaded relief base
  - ◆ Topographic base (usually Digital Raster Graphics)

**Optional Elements**

- |                         |  |
|-------------------------|--|
| • Safety zones          | • Structures                               |
| • Escape routes         | • Subdivisions                             |
| • Vicinity maps         | • Public Land Survey System                |
| • Hydrography           | • Political boundaries (County–State)      |
| • Wilderness Boundaries | • Response areas (Direct Protection Areas) |

\* If the incident is a Wildland Fire Use incident, include MMAs, MAPs, and MMA segments, when applicable.







## Map Product Definitions—Optional

### Product Name

#### *Ownership–Land Status Map*

### Product Description

The *Ownership–Land Status Map* shows the ownership or land status for the areas affected by the incident. It graphically shows such things as the land ownership or fire protection responsibility in the area of the incident.

### Target Audience

Plans Section, Fire Information Officer, Finance Section, Local Unit or Managing Agency Managers

### Objective

The *Ownership–Land Status Map* is used in operational planning, public meetings, and for cost apportionment purposes.

### Guidelines

- Can be scalable from letter size to “E” size
- If the ownership is public it is best to use a standardized color palette to avoid confusion.

### Required Elements

#### Cartographic

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Incident name and number
- Date and time produced
- Symbol legend

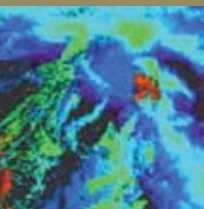
#### Data\*

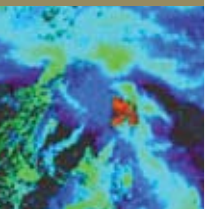
- Incident perimeter and fireline
- Ownership or land status
- Key geographic features
- Data source citation
- Incident origin (may be sensitive information so may not be shown on draft maps until authorized)

### Optional Elements

- Total acres or percentage of area affected by owner
- Shaded relief base
- Vicinity maps
- Topographic base (usually DRG)
- Orthoimagery base
- Administrative boundaries, if different from ownership
- Political boundaries (County–State)
- Hydrography
- Disclaimer (if requested, or if accuracy issues with data sources)

\* If the incident is a Wildland Fire Use incident, include MMAs, MAPs, and MMA segments when applicable.



**Product Name*****Aerial Operations Map*****Product Description**

The ***Aerial Operations Map*** is a map of an incident that emphasizes features important for air operations.

**Target Audience**

Pilots, air operations staff

**Objective**

The ***Aerial Operations Map*** provides air operations with enough detail to aid in locating key features on an incident.

**Guidelines**

- Standard ICS symbology
- Minimal clutter on map
- Small size for lap reading in aircraft

**Required Elements****Cartographic**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Incident name and number
- Date and time produced
- Symbol legend
- Latitude–longitude reference

**Data\***

- Incident perimeter and fireline
- Division–Branch breaks and labels
- Airports–Helibases
- Aviation hazards
- ICS features
- Key landmarks
- Hydrography
- Temporary Flight Restrictions (TFR) , if available

**Optional Elements**

- Table showing latitude and longitude of key locations
- Elevation shaded relief
- Topographic Data (FAA Sectionals or DRGs)
- Military Training Routes (MTR) and Military Operation Areas (MOA)
- Wilderness boundaries

\* If the incident is a Wildland Fire Use incident, include MAPs when applicable.

**Product Name**

*Damage Assessment Map*

**Product Description**

The *Damage Assessment Map* shows the buildings damaged by the incident.

**Target Audience**

Structural Liaison, Information Officer, Public

**Objective**

The *Damage Assessment Map* tracks buildings and resources damaged in the incident. This product will be used in operational planning and public meetings.

**Guidelines**

- Should be made to a scale at which individual structures can be distinguished
- May be made early in an incident to serve as a triage tool

**Required Elements****Cartographic**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

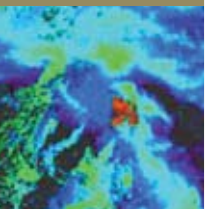
**Data**

- Incident perimeter
- Structures symbolized by type or extent of damage
- Roads—including names and addresses

**Optional Elements**

- Latitude–longitude graticules
- Tax lot base
- Administrative boundaries
- Political boundaries (County–State)
- Public Land Survey System
- Topographic base
- Vicinity maps
- Orthoimagery base
- Shaded relief
- Key geographic features



**Product Name*****Structural Protection Map*****Product Description**

The ***Structural Protection Map*** shows the buildings potentially threatened by the incident.

**Target Audience**

Structural Liaison, Information Officer, Public

**Objective**

The ***Structural Protection Map*** tracks buildings and resources that could be affected by the incident. This product will be used in operational planning and public meetings.

**Guidelines**

- Should be made to a scale at which individual structures can be distinguished
- May be made early in an incident to serve as a triage tool

**Required Elements****Cartographic**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

**Data\***

- Incident Perimeter
- Structures symbolized by type or triage
- Structure addresses or ID numbers
- Trigger points and evacuation routes
- Roads—including names and addresses

**Optional Elements**

- Latitude–longitude graticules
- Tax lot base
- Topographic base
- Vicinity maps
- Orthoimagery base
- Key geographic features
- Political boundaries (County–State)
- Road blocks

\* If the incident is a Wildland Fire Use incident, include MMAs, MAPs, and MMA segments when applicable.

**Product Name**

*Public Information Map*

**Product Description**

The *Public Information Map* shows the area affected by the incident.

**Target Audience**

Information Officer, Public

**Objective**

The *Public Information Map* keeps the public informed of the location of the incident. This product will be used in public meetings and for bulletin boards and displays. Many different types of public information maps may be requested to fit specific needs of the public for information.

**Guidelines**

- Should be made to a scale large enough for viewing at public meetings
- Also may need smaller copies for handouts at meetings

**Required Elements****Cartographic**

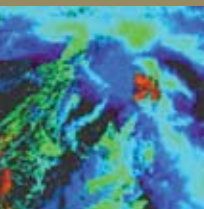
- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

**Data**

- Incident perimeter (fireline may be optional)
- ICP location
- Major towns and road names
- Roads and road names
- Communities (GNIS Populated Places)

**Optional Elements**

- Structures if available
- Location of campgrounds or lodges
- Evacuation areas if established
- Roadblocks if established
- Public meeting places
- Information board locations
- Latitude–longitude graticules
- Hydrography
- Administrative boundaries
- Political boundaries (County–State)
- Public Land Survey System
- Schools
- Topographic base
- Vicinity maps
- Orthoimagery base
- Shaded relief
- Key geographic features



**Product Name*****Rehabilitation Map*****Product Description**

The ***Rehabilitation Map*** shows the rehabilitation requirements and progress of rehabilitation efforts for the areas affected by the incident.

**Target Audience**

Burned Area Emergency Response (BAER) Team, Information Officer, Public

**Objective**

The ***Rehabilitation Map*** assists in the rehabilitation efforts in the area of the incident. This product will be used in operational planning and public meetings.

**Guidelines**

- Should be made as a tool to be used long after the Incident Management Team (IMT) has left.

**Required Elements****Cartographic**

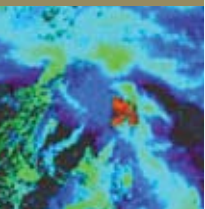
- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

**Data**

- Incident perimeter and fireline
- Treatments—uniquely symbolized

**Optional Elements**

- Acreage affected for each treatment
- Shaded relief base
- Topographic base
- Orthoimagery base
- Latitude–longitude graticules
- Vicinity maps
- Key geographic features
- Political boundaries (County–State)
- Hydrography (rivers and lakes)





**Product Name***Facilities Map***Product Description**

The *Facilities Map* shows the layout of the Incident Command Post (ICP) and the associated units.

**Target Audience**

Command and general staff, Facilities Unit Leader, law enforcement, visitors to camp

**Objective**

The *Facilities Map* assists individuals in locating various resources and support functions in and around the ICP.

**Guidelines**

- Standard ICS symbology
- May be schematic

**Required Elements****Cartographic**

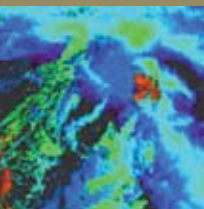
- STANDDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

**Data**

- Locations of ICP resources and support functions

**Optional Elements**

- Vicinity maps
- Political boundaries (County–State)



**Product Name*****Infrared Information Map*****Product Description**

The ***Infrared Information Map*** is a large-format topographic map showing the interpretation of remotely sensed infrared imagery of the entire incident.

**Target Audience**

Situation Unit, Planning Section, Incident Command General Staff

**Objective**

The ***Infrared Information Map*** provides a geographic tool for the Situation Unit to determine the incident perimeter and key areas of operational focus.

**Guidelines**

- Standard ICS symbology
- May be produced by the Infrared Interpreter (IRIN)
- Usually 1:24,000 scale; 1:63,360 scale in Alaska

**Required Elements**

Cartographic

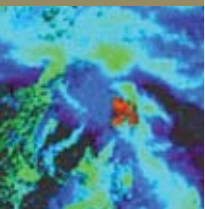
- STANDD (Scale, Title w/IR, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

**Data**

- Heat perimeter, isolated heat points, heat areas by intensity (these may not all be available)
- Incident perimeter, fireline, and points
- Usually on topographic base

**Optional Elements**

- Geographic reference (latitude–longitude, Public Land Survey)
- Shaded relief
- Vicinity maps
- DOQQ base
- Political boundaries (County–State)



**Product Name**

*Fire Perimeter History Map*

**Product Description**

The *Fire Perimeter History Map* shows the polygons of previous fires in the area of the present incident.

**Target Audience**

Operations, FBAN, LTAN

**Objective**

The *Fire Perimeter History Map* is used in operational planning to determine where fires have burned in the past and where the present active fire may or may not go according to the previous history of the area.

**Guidelines**

- Standard ICS symbology

**Required Elements****Cartographic**

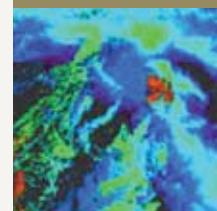
- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

**Data**

- Fire history perimeters—perhaps colored by decade with year labels
- Present fire perimeter and fireline
- Usually on topographic base

**Optional Elements**

- Shaded relief
- DOQQ
- Roads
- Administrative boundaries



**Product Name*****Vegetation Map*****Product Description**

The ***Vegetation Map*** shows the vegetation in the area of the present incident.

**Target Audience**

Operations, FBAN, LTAN

**Objective**

The ***Vegetation Map*** may be used by fire behavior analysts to help predict fire behavior and to develop suppression strategies. It may also be used to develop rehabilitation strategies.

**Guidelines**

- Standard ICS symbology
- Color vegetation types (suggest grasses = yellow, brush = orange, oak woodlands = blue-green or light green, conifers = green, alpine species = purple, barren = gray, water = blue)

**Required Elements****Cartographic Elements**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

**Data Elements**

- Vegetation
- Usually on topographic base
- Present fire perimeter and fireline

**Optional Elements**

- Shaded relief



**Product Name**

*Fuels Map*

**Product Description**

The *Fuels Map* shows the surface fuels in the area of the present incident.

**Target Audience**

Operations, FBAN, LTAN

**Objective**

The *Fuels Map* may be used by fire behavior analysts to help predict fire behavior or develop suppression strategies. It may also be used to develop rehabilitation strategies.

**Guidelines**

- Standard ICS symbology
- Color fuel types

**Required Elements****Cartographic**

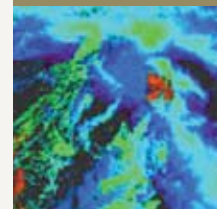
- STANDDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

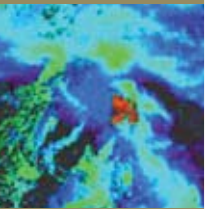
**Data**

- Fuels
- Present fire perimeter and fireline
- Usually on topographic base

**Optional Elements**

- Shaded relief





## Product Name

### *Areas of Special Concern Map*

## Product Description

The *Areas of Special Concern Map* shows sensitive cultural or environmental areas in the vicinity of the present incident.

## Target Audience

Operations, Resource Advisor, Archaeologist

## Objective

The *Areas of Special Concern Map* is used in operational planning to identify sensitive areas such as Endangered Species habitats or locations, Cultural Resources, and other areas at risk.

## Guidelines

- Standard ICS symbology
- Coordinate symbology for areas of concern with local resource advisor
- Not for public distribution

## Required Elements

### Cartographic

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident name and number
- Symbol legend

### Data\*

- Cultural or environmental areas of concern
- Present fire perimeter and fireline
- Incident points
- Usually on topographic base

## Optional Elements

- Shaded relief
- DOQQ
- Structures
- Administrative boundaries
- Political boundaries (County–State)
- Communities (GNIS Populated Places)
- Fire history perimeters—perhaps colored by decade with year labels
- Vegetation
- Archaeological Sites\*\*
- Cultural Resources\*\*
- Schools
- Threatened and Endangered Species (T&E)
- Wildland Urban Interface (WUI)

\* If the incident is a Wildland Fire Use incident, include MMAs, MAPs, and MMA segments when applicable.

\*\* These datasets may be used for planning but may not be displayed on the final map, as the sites are sensitive and not for public display.

**Product Name**

*Wildfire Situation Analysis (WFSA)–Contingency Map*

**Product Description**

The *WFSA–Contingency Map* shows the area in which to plan the attack.

**Target Audience**

Land Managers, Incident Management Team–Planning Unit

**Objective**

The *WFSA–Contingency Map* is used in operational planning to identify contingency lines and areas at risk.

**Guidelines**

- Standard ICS symbology

**Required Elements****Cartographic Elements**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident Name and Number
- Symbol legend

**Data Elements**

- Contingency lines
- WFSA Alternative lines–boundaries
- Current fire perimeter and fireline
- Incident points
- Usually on topographic base
- Values at Risk (e.g., forage areas, forest plantations, cultural resources, \*\* archaeological sites, \*\* recreational resources, structures, safety concerns, etc.)
- Administrative boundaries
- Communities (GNIS Populated Places)

**Optional Elements**

- Shaded relief
- Wilderness
- Roads
- Hydrography (rivers and lakes)
- Land Parcels
- Political boundaries (County–State)

\*\* These datasets may be used for land manager planning but may not be displayed on the final map, as the sites are sensitive and not for public display.



**Product Name**

*Wildland Fire Implementation Plan (WFIP) Map*

**Product Description**

The *WFIP Map* shows the area in which the fire can be managed.

**Target Audience**

Land Managers, Incident Management Team—Planning Unit, Fire Use Manager

**Objective**

The *WFIP Map* is used in operational planning to identify the maximum area in which the fire can be managed.

**Guidelines**

- Standard ICS symbology

**Required Elements****Cartographic Elements**

- STANDD (Scale, Title, Author, North Arrow, Date of Data, Datum)
- Date and time produced (small font for reference)
- Incident Name and Number
- Symbol legend

**Data Elements**

- Maximum Manageable Area (MMA)
- Maximum Manageable Area Segments
- Management Action Points, if required
- Current fire perimeter
- Incident points
- Values at Risk (e.g., forage areas, forest plantations, cultural resources, \*\* archaeological sites, \*\* recreational resources, structures, safety concerns, threatened and endangered species, etc.)
- Administrative boundaries
- Usually on topographic base

**Optional Elements**

- Shaded relief
- Wilderness
- Vegetation
- Risk Assessment Trajectories—RERAP—Farsite—Behave outputs

\*\* These datasets may be used for land manager planning but may not be displayed on the final map, as the sites are sensitive and not for public display.



# CHAPTER 7

## **Purpose:**

This chapter provides procedures for the archiving of data and the sharing of GIS data developed on an incident. The purpose of archiving data is to capture incident data for safekeeping of the record. Data archiving allows the GIS Specialist to recover a recent status of the incident data in case of computer failure or data corruption. Data sharing guidelines ensure that the transition between incoming and outgoing teams is effective, minimizing confusion and reducing redundancy. Data sharing also includes making the data available to other users of the data.

## **Specifications:**

Incident data and incident base data layers that have been edited for the incident must be archived. Export all incident vector data layers to shapefiles before archiving. This allows for compatibility of data among software versions and vendors.

The primary datasets that need to be shared on a daily basis are the fire perimeter and fireline data layers. Post these data on a designated ftp site (e.g., <ftp://ftp.nifc.gov>) or Web site.

## **Procedures:**

*Data Archiving:* GIS data are in a digital format that requires constant maintenance. Part of this maintenance involves the backing up and archiving of the data. For the purpose of the SOP, “archiving” is used for the process of copying data from an operational format to another for safety and record keeping purposes. Refer to the definition, below, for complete information.

The main features of archive policy are:

- The archived copy may be kept indefinitely or for a defined period of time; the archive retention period is usually set at 3 or 5 years and can be renewable.
- Multiple versions of the same file may be archived; however, this is not recommended unless the contents of files are different and required.
- Archived data should also include the datasets in their original format.

*Data Sharing:* At the end of each operational period, the fireline and fire perimeter data are updated and uploaded to <ftp://ftp.nifc.gov>. FTP directions are provided on the GTG Web site (<http://gis.nwcg.gov>).



This allows the data to be accessed by local agencies and other interested parties. File names must adhere to protocols established in Chapter 2. The GTG Web site (<http://gis.nwcg.gov>) will list the current upload sites and acceptable file formats.

### **Guidelines:**

(Refer to Chapter 2 for File Naming and Directory Structure.)

- Export incident data to shapefiles before any archive task; also archive the geodatabase
- At the end of each operational period, archive the incident\_data, incident\_products, and incident\_projects directories to a different location than the operational computers.
- Only dynamic datasets need to be archived. All base data should also be stored on media separate from operational systems.
- Data should be archived in formats that allow for quick recovery.
- Make an entry in the GIS Specialists log for each archive.
- Hourly or simple backups can occur for datasets as they change.
- Consider providing a copy of the GIS incident data archive to CTSP or DOCL for safekeeping.

### **Responsibilities:**

The GIS Specialist is responsible for checking with GIS representatives of local agencies regarding preferred data format, ensuring proper transition and ease of use of data.

### **Communications:**

When asked for access for information (data, maps, etc.) the GIS Specialist is responsible for communicating these requests to the SITL to get the proper authorization to release the data to the requesting party.

Handling of sensitive data is subject to restrictions.

### **Definitions:**

**Archive**—Archive is the long-term storage of data that are considered to be of value to the Incident. It is held, independent of the continued existence of the file on your local disk. Archived files may be removed from the local disk on your computer, if required (for example, for space reasons).

**Backup**—Backup is intended to provide a mechanism for securing your **current, active** files; that is, files and data that are resident on your local disk and by implication actively in use. It enables you to recover your disk to its most recent state in the event that it is lost (for example, hardware failure); it also enables you to recover a file or files that have been lost (for example, accidentally deleted).

Data sharing—the process of distributing data to other interested parties or agencies during the course of an incident. At the end of the incident, data are transitioned (Chapter 8).

Incident Data—Data that are created or edited in support of the Incident.

Base Data—Existing data that are used to provide the base features for mapping (e.g., Roads, Land Ownership, DRGs, etc). These data are not edited during the Incident.

Modified Base Data—Base Data that have been edited in support of the Incident, but are not ICS data.





# CHAPTER 8

## **Purpose**

This chapter provides the GIS Specialist with an effective and consistent method of transitioning from one GIS Specialist to another. Providing the methods of work and direction ensures that all data, products, and other related information are transferred successfully.

## **Specifications**

Transition of the GIS responsibilities refers to any hardware purchased for the incident's GIS Specialist plus all relevant GIS data and media. It is important that all data are transferred and remain in their current directory structure (Chapter 2).

## **Procedures**

It is always important for the GIS Specialist to remain focused and follow procedures during this transition period.

The first procedure that must be addressed is transferring data from one storage device to another. It is critical to preserve the directory structure, drive letter mapping, or to follow Universal Naming Conventions (UNC) from one GIS Specialist to the next.

GIS Specialists use a variety of media when operating on an incident. Storage devices range from basic shared drives on computers utilizing workgroups and shared portable hard drives to advanced computer networks utilizing switches, hubs, DHCP, and Snap Servers. Several transition methods can be used (Peer to Peer, DVD, external hard drives).

### **General Guidelines:**

- Before saving all final products, turn off all software extensions so that the final GIS documents can be opened with the basic installation of the relevant GIS Commercial Off-the-Shelf Software (COTS).
- Before data transfer begins, archive all incident data to portable media (CD or DVD).
- Document any unique characteristics of the data, along with the software (including version) and any tools being used.
- Check for any sensitive information and what guidelines need to be satisfied for it to be transitioned to the next team. (This could include the need to reformat contractors' hard drives or any other media that will be leaving the incident.)



**Documentation useful at transition includes:**

- An image, hardcopy, and a list of each map type that has been produced on the incident, as an example of products produced.
- A short narrative describing the status of equipment, workload, work schedule, and other activities.
- A list of resources being used for mapping and data collection (IR, Contract, NTM, Helicopter, FOBS).
- If a GIS Specialist remains on the Incident, the specialist should work with the SITL to describe the skill sets of the individual GIS Specialists to better utilize them with the incoming team and advise of their schedules and availability.
- If the SITL authorizes use of nonstandard symbols on an incident, the GIS Specialist should include necessary documentation in the transition package to incoming IMTs or GIS Specialists.
- The outgoing GIS Specialists will provide map symbology information to the incoming GIS Specialists or the SITL during the transition briefings. This facilitates consistency in the use of map symbols on an incident.

**To ensure transition is complete, use the following checklist:**

- Are there enough GIS Specialists and is workload appropriate?
- Are the incoming GIS Specialists able to reproduce products produced by the exiting GIS Specialists?
- Are the needs of the local unit and other entities being met?
- Have the new GIS Specialists established communication with the local unit to share data (e.g., perimeter data)?

**Responsibilities****It is the responsibility of the outgoing GIS Specialist to:**

- Ensure that the incoming GIS Specialists have a clean, usable, and documented copy of the incident data.
- Communicate the requirements for storing, sharing, and displaying sensitive data.

**It is the responsibility of the outgoing GIS Specialist and SITL to:**

- Ensure that the GIS staffing and equipment requirements are planned for and will be met during the transition

**It is the responsibility of the incoming GIS Specialists to:**

- Test and verify that all data have been transferred successfully and are fully usable (access, read, and edit).

**Communications**

If any Sections and Units on the Incident want maps, requests should go through the SITL.

The Computer Specialists (CTSP) of the outgoing and incoming teams should be aware of the network, hardware, and software requirements of the GIS Specialists.



# GLOSSARY

**Attribute**—information about a geographic feature, generally stored in a table and linked to the feature by a unique identifier. (6)\*

**Backup**—a copy of one or more files made for safekeeping in case the originals are lost or damaged. (8)

**Coordinates**—the x- and y-values that define a location in a planar or three-dimensional coordinate system. (21)

**Coordinate System**—a reference system consisting of a set of points, lines, and surfaces, and a set of rules used to define the positions of points in space in either two or three dimensions. (21)

**Datum**—in the most general sense, any set of numeric or geometric constant from which other quantities, such as coordinate systems, can be defined. (25)

**Declination [magnetic]**—the horizontal angle between geographic north and magnetic north from the point of observation. (25)

**Differential Correction**—a technique for increasing the accuracy of GPS measurements by comparing the readings of two receivers—one roving, the other fixed at a known location. (27)

**Digitize**—to convert the shapes of geographic features from media such as paper maps or raster imagery into vector x, y coordinates. (28)

**Documentation**—tracking information about geospatial data using methods that are less than FGDC compliant. These may include “ReadMe” files (in TXT or HTML format) or attribution of datasets describing the projection, methods of collection, contact information, and other information.

**Dongle [sentinel key]**—the sentinel key is a parallel or USB port hardware device that provides a unique number used in the generation of your licenses. The sentinel key will return its number only when the sentinel key and the sentinel key driver are communicating properly.

**Feature**—(1) an object in a landscape or on a map; (2) a shape in a spatial data layer, such as a point, line, or polygon, that represents a geographic object. (37)



**Infrared Imagery**—an image created by a device that detects infrared radiation and converts it into an electrical signal that is recorded on film or magnetic tape. (52)

**Latitude**—the angular distance along a meridian north or south of the equator, usually measured in degrees. Lines of latitude are also called parallels. (59)

**Longitude**—the angular distance, expressed in degrees, minutes, and seconds, of a point of the earth's surface east or west of a prime meridian (usually the Greenwich meridian). All lines of longitude are great circles that intersect the equator and pass through the North and South Poles. (62)

**Map Scale**—the ratio or relation between distance or area on a map and the corresponding distance or area on the ground. (89)

**Metadata**—information about data, such as content, source, vintage, accuracy, condition, projection, responsible party, contact phone number, method of collection, and other characteristics or descriptions.

**Orthoimagery**—a digital perspective aerial photograph from which distortions owing to camera tilt and ground relief have been removed. An orthophotograph has the same scale throughout and can be used as a map. (73)

**Planimetric [map]**—a map that gives only the x, y locations of features and represents only horizontal distances correctly. (77)

**Projection [map]**—a mathematical model that transforms the locations of features on the earth's curved surface to locations on a two-dimensional surface. It can be visualized as a transparent globe with a light bulb at its center casting lines of latitude and longitude onto a sheet of paper. Generally, the paper is either flat and placed tangent to the globe (a planar or azimuthal projection), or formed into a cone or cylinder and placed over the globe (cylindrical and conical projections). Every map projection distorts distance, area, shape, direction, or some combination thereof. (63)

**Remote Sensing**—collecting and interpreting information about the environment and the surface of the earth from a distance, primarily by sensing radiation that is naturally emitted or reflected by the earth's surface or from the atmosphere, or by sensing signals transmitted from a satellite and reflected back to it. Examples of remote sensing methods include aerial photography, radar, and satellite imaging. (85)



Server—a computer and storage device dedicated to storing files. Many users on a network can store files on a particular server.

Shaded Relief Image—a raster image that shows light and shadow on terrain from a given angle of the sun. (91)

Shapefile—a vector file format for storing the location, shape, and attributes of geographic features. It is stored in a set of related files and contains one feature class. (91)

Topography—the shape or configuration of the land, represented on a map by contour lines, hypsometric tints, and relief shading. (100)

Unit ID—a code used within the wildland fire community to uniquely identify a particular government organizational unit (e.g., IDBOF = Boise National Forest located in the State of Idaho).

USB External Storage Drive—an external disk drive that is connected to a computer through a USB connection.

*Note: Numbers after entries refer to pages in the Dictionary of GIS Terminology, The ESRI Press, Redlands, California, 2001, edited by Heather Kennedy.*





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# NOTES

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# NOTES

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The mention of company names, trade names, or commercial products does not constitute endorsement or recommendation for use by the Federal Government.



Introductory  
Information



GIS Minimum  
Expectations



File Naming and  
Directory Structure



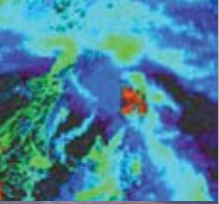
Documentation  
and Metadata



Minimum  
Essential Datasets



Map Symbology



Map Products



Data Archiving  
and Sharing



Team Transition



Glossary



References



Appendixes