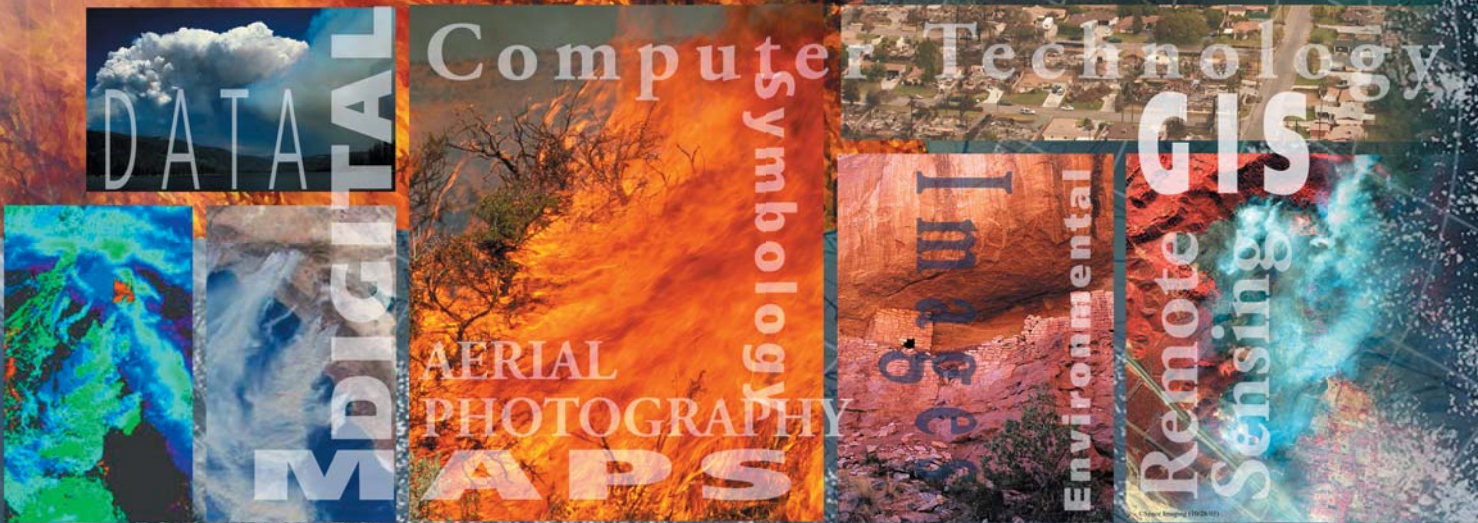


Geographic Information System
Standard Operating Procedures on Incidents Project

Draft
GIS

STANDARD OPERATING
PROCEDURES

June 2005—Draft



Produced by the

GIS Standard Operating Procedures Project (GSTOP)
June 2005

Sponsored by the
National Wildfire Coordinating Group
Geospatial Task Group

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

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Note: When providing comments, please refer to Chapter and Page numbers

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EXECUTIVE SUMMARY

Background

This document summarizes the NWCG Geographic Information System (GIS) Standard Operating Procedures (SOPs) on Incidents Project (GSTOP). The GSTOP project is responsible for clarifying the GIS business needs and functional standards for incidents. SOPs were developed for the work performed to fulfill the GIS needs of the Plans Section of the Incident Management Teams. The project focuses on the GIS needs of wildland fire incident management, including wildland fire use. Although the SOPs produced by this project may be useful for other types of events, such as all-risk incidents, the development of SOPs for these types of incidents is beyond the scope of this project.

Objectives

1. Examine the various GIS operating procedures presently being used at incident base camps in support of incident management.
2. On the basis of an analysis of those findings, deliver draft guidelines (in both paper and digital format) of geospatial standard operating procedures (SOPs).
3. Provide recommendations for implementing the draft GIS SOPs for Incidents, including any suggestions for rollout, training, and ongoing maintenance of the SOPs.

Standard Operating Procedures

Standard Operating Procedures were developed for the following:

1. GIS Minimum Expectations
2. File Naming and Directory Structure
3. Map Symbology
4. Map Products
5. Minimum Essential Datasets
6. Data Archiving and Sharing
7. Documentation and Metadata
8. Team Transition

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Guidance

This document contains draft SOPs that are being reviewed and tested during the 2005 summer fire season. Final SOPs are scheduled for release in spring 2006. The standard procedures identified in the final SOPs will be met by all participating agencies. However, it is acknowledged that under some extenuating circumstances it may not be possible to comply with these standards. Guidelines are also specified throughout the SOPs and are highly recommended, but not mandatory.

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 GSTOP project team is composed of representatives from all NWCG member organizations and the U.S. Geological Survey. The primary objective of GSTOP is to create SOPs for the use of GIS on wildland fire incidents. Before this project, there were no GIS SOPs for wildland fire incidents. The absence of SOPs has created data management problems for incident management teams—especially during team transition periods.

GIS SOPs are needed on incidents for the following reasons: to provide people with all the safety, health, environmental, and operational information necessary to perform a job properly, to ensure that production operations are performed consistently, to maintain quality control of processes and products, to ensure that processes continue uninterrupted and are completed on a prescribed schedule, to serve as a training document for teaching users about the process for which the SOP was written, and to serve as a historical record of the “how, why, and when” steps in an existing process so there is a factual basis (not hearsay) for revising those steps when a process or technology changes. In addition, SOPs ensure the future utility of data generated on wildland fire incidents.

Draft SOPs have been developed for the following application areas:

1. GIS Minimum Expectations
2. File Naming and Directory Structure
3. Map Symbology
4. Map Products
5. Minimum Essential Datasets
6. Data Archiving and Sharing
7. Documentation and Metadata
8. Team Transition

The draft SOPs identified in this document are being reviewed and tested during the 2005 summer fire season. A set of final SOPs is scheduled to be released in spring 2006. A Change Management Process will be included in the set of final SOPs for future revisions of this document.

CHAPTER 1. GIS MINIMUM EXPECTATIONS

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

Effective Date:

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Page:

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Subject: GIS Minimum Expectations

Purpose: To describe the requirements for the **fulfillment of the minimum GIS function** on an incident, including:

- Knowledge and abilities required of the individual 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 incident changes

Scope/Overview: This document explains the work and purpose of the GIS Specialist on a Wildland Fire Incident. Numerous references are made to other SOPs.

The primary audience for this document is the GIS Specialist, other members of the Planning Section, and other personnel reliant on the Planning Section. Other parties who may coordinate with or interpret work of the GIS Specialist may be interested in some of the specifications included in the SOPs, but these SOPs are intended primarily for use by the people who are actually doing the GIS work on a wildland fire incident.

Critical Items for GIS Equipment Kit:

Follow the Draft GIS Specialist PTB, specifically, “Obtain and assemble information and materials needed for kit.”

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)

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Software:

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

Specific Software and Extension standards can be found at <http://gis.nwcg.gov>

Power:

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

Media:

- USB jump drives/memory sticks
- Blank CDs

Data:

Refer to the SOP for GIS Minimum Essential Datasets

GIS Specialist Knowledge, Skills, and Abilities:

Specific tasks are outlined in the GIS Specialist PTB (March 2005 Draft)

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 a variety of projections and datums including geographic coordinates (latitude/longitude) and be able to reproject data in multiple formats
- Answer questions such as number of acres burned, acres by ownership or other questions requiring basic GIS analysis functions, such as clipping, erasing, intersecting, or summarizing areas.
- Troubleshoot hardware and software problems sufficient to keep the GIS Equipment Kit 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 both external to and within the Situation Unit (e.g., GIS Specialists, SITL, Infrared Interpreters (IRIN), Field Observers (FOBS), Display Processors (DPRO), local hosting agency personnel or cooperating agency personnel)
 - ◆ to explain technical issues/concerns
 - ◆ to train others in basic map reading

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- ◆ to exchange technical information
- Perform the role of GIS Specialist in “incident conditions,” which may include:
 - ◆ long hours (12–16-hour shifts, day and night)
 - ◆ close quarters shared with other personnel
 - ◆ working in stressful conditions
 - ◆ traveling (away from home base) for 14 days or longer
 - ◆ fire camp conditions (sleeping on the ground, lots of dust and smoke, showers may not be available, and food as arranged by the incident command staff)
 - ◆ working around fire camp personnel, which may include agency, contract, military, or prison crews

GIS Specialist 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) sufficient to operate within the chain of command on an incident
 - ◆ Know the organizational structure, and whom to go to for issues or support
 - ◆ Be familiar with the fire camp culture and general expectations of the SITL
- Work/Rest standards and other pertinent standards as outlined in the Interagency Standards for Fire and Fire Aviation Operations manual¹

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.”² 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 work practices and procedures, as well as identify and report unsafe working conditions using the appropriate chain of command

¹Interagency Standards for Fire and Fire Aviation Operations, January 2005, NFES 2724, Chapter 6 Safety

²Interagency Standards for Fire and Fire Aviation Operations, January 2005, NFES 2724, Page 06-1

Incident Procedures:

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

Follow the mobilization tasks in the GIS Specialist PTB (March 2005 Draft)

- If possible, contact the Situation Unit Leader or any GIS Specialist presently assigned to the incident to inquire about the current situation. Inquire about hardware and software presently being used, any special needs or conditions, location of incident, what data are already available, and any transition needs (media, timing, etc.)
- Recognize what resources are lacking (e.g., is there a plotter available?) and handle the need. This could include such things as obtaining permission and logistics for using the hardware–software network of a local unit. It may be necessary to rent a plotter or other necessary equipment. This must always be done through proper chain of command and proper ordering processes.

Setting up the GIS function 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, planning timeline for map product production
- Establish physical work space
- Do an analysis of data, hardware, personnel, and supplies available and order what you need. Orders are submitted through your superior (SITL) using an ICS-213 General Message form. The request is then delivered to the Ordering Manager, which allows the incident to rent plotters or other equipment as needed for effective GIS productivity.
- Set up network and shared drives and electronic workspace(s), coordinating with the Computer Technical Specialist (CTSP)
- Set up the file directory structure in accordance with the SOP for File Naming and Directory Structure
- Initiate ICS Form 214 Unit Log in accordance with the SOP for GIS Documentation and Metadata
- 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

When serving on an incident, the GIS Specialist is responsible for the following:

- Maintain the standardized filing structures according to the SOP for File Naming and Directory Structure
- Collect and maintain the Minimum Essential Datasets in accordance with the SOP for Minimum Essential Datasets
- Create new data as needed for incident operations:
 - ◆ Incorporate data from (GPS) units and other sources.
 - ◆ Digitize fire perimeter and other incident data

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- Produce first Incident Action Plan (IAP) map during first operational period under extreme deadlines if requested by the SITL
- Create necessary plots as identified in the SOP for Standard Map Products using the SOP for GIS Map Symbology
- Properly document data and archive work according to the SOP for GIS Documentation and Metadata and according to the SOP for Data Archiving and Sharing
- Comply with security data management agreement as outlined in the SOPS for Data Archiving, Metadata, and Team Transition
- Transfer GIS data to and from various locations, which may include FTP sites or Web sites as requested by the SITL while adhering to the SOP for Data Archiving and Sharing
- Transfer fire perimeter data to interagency mapping sites (e.g., www.geomac.gov) or other data transfer locations (e.g., ftp.nifc.gov) as requested by the SITL, while following the SOP for Data Archiving and Sharing
- Effectively transfer the products, projects, and data created in GIS to other personnel on the incident or in the hosting agency according to the SOP for Team Transitions
- Comply with demobilizations procedures as required by the incident

Responsibilities:

GIS Specialist is responsible for the following:

- Keep informed of any known hardware or software difficulties and concerns
- Provide maps as requested by the SITL, focusing on the basic maps
- Collect, process, and disseminate incident related-data

Situation Unit Leader is responsible for the following:

- Direct and prioritize all tasks of the GIS Specialist, especially those requested by others (e.g., public information officers, cooperators, and others)
- Request map products
- Monitor the workload
- Authorize uploading perimeter data
- Order necessary equipment or people to accomplish the GIS work most effectively (computer support, power, equipment)

Others are responsible for the following:

- People collecting data with GPS units are responsible for knowing how to use their GPS units and to have GPS download cables with them for downloading the data

Communications:

The GIS Specialist needs to maintain timely and effective exchange of information among the Situation Unit and all affected agencies and organizations. When communicating with other technical staff from outside the incident, it is imperative that the GIS Specialist maintain a professional demeanor when performing duties. When communicating within the incident it is essential that the GIS Specialist follow the Incident Command System chain of command at all times. Most incident communications such as requests for materials, maps, or information will be tracked by using the ICS-213 General Message form.

Selection Criteria/Rationale:

When considering whether to set Standards by Type 1, 2, or 3, in general, the basic requirements are similar for hardware and software and basic function of the GIS Specialist. Among the types (1, 2, or 3), there may be differences in staffing levels and the number and type of products requested, but these would not significantly alter this SOP. Local resources (from home unit or a nearby unit) generally handle the GIS needs for type 3 wildland fire incidents. This SOP is generally aimed at the GIS function on type 1 or type 2 wildland fire incidents. As the size or complexity of a wildland fire incident increases to a type 1 incident, the data needs are often expanded to adequately portray information relevant to the protection of life, property, and resources. More expertise may be required for GIS among different types of incidents, but presently only one GIS Specialist position is in the ICS system.

For Wildfire Use Fires, the specifications for hardware, software, and skill set for GIS expertise may be slightly different from those needed for other incidents and may require a higher skill level for processing and analyzing raster-based data.

This SOP does not address GIS needs on all risk incidents or for Burned Area Emergency Response (BAER).

Methodology:

Literature review for quotes that indicated the need or demands on GIS function at incidents tempered with personal experience. The literature quotes were selected, consolidated, and aggregated into categories classifications of common technical traits, output traits, and personal traits usually required on an incident. An attempt was made not to tie procedures to any specific vendor software or versions.

CHAPTER 2. FILE NAMING AND DIRECTORY STRUCTURE

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

Effective Date:

Revised Date:

Revision Number:

Page:

Approved By:

Subject: File Naming and Directory Structure

Purpose: This SOP gives GIS Specialists an efficient, 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 function (people, hardware, software, data, and physical location) and those with whom it cooperates.

Scope/Overview:

This SOP addresses a national interagency GIS information management issue. This SOP is intended to provide a technology-independent standard. While over time changes in technology will lead to different actual structures, the design parameters that represent business needs should remain constant.

The incident directory structure provides a framework for storing and using GIS data and documents, efficiently and in an organized way. The directory structure is designed to facilitate the job of the personnel on an incident. Ensuring that all incident GIS files are stored within a standardized directory structure is important because it promotes an efficient workflow and data archival process.

This document is intended to provide standardized file naming and directory filing structure guidelines for GIS data and related documents created and used on incidents managed under the Incident Command System (ICS). 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 basic incident-specific identification information.

File names cannot be longer than 255 characters.

File and folder names must not contain spaces.

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.

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The following are required name elements for various file types and listed in sequence they should be shown 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)

- Year (yyyy) of the incident
- Incident name
- Type of map
- Page size
- Orientation of page

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

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

Master Incident geospatial data file (could be a personal geodatabase)

- 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)
- Time the file was saved (hhmm 24-hour clock)
- 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)
- Time of data collection (hhmm using 24-hour clock)
- Incident name
- Incident number including 5-digit Unit ID
- Incident data type

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- Coordinate system
- Datum

Incident geospatial theme data files and GPS data files (could be shapefile or coverage or any other data type)

- Date including year (yyyymmdd)
- Time of data collection (hhmm using 24-hour clock)
- 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)
- Time the map was produced (hhmm use 24-hour clock)
- Shift the map will be produced for
- Incident name
- Type of map
- Page size
- Orientation of page

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

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

Examples:

Incident Directory Structure

{yyyy_incident_name} {i.e., 2005_dog, where yyyy = the year the incident started}

- **base_data** {base data not created on the incident}
 - ❖ **images** {raster data such as orthoimagery or scanned quads}
 - ❖ **vector** {vector data file types}
 - ❖ **logos** {agency logos, typically in nongeospatial raster format}
- **documents** {spreadsheets, text documents, unit log, etc.}
- **incident_data** {data created on the incident stored by date}
 - ❖ **{yyyymmdd}** {contains date/time stamped incident spatial data files backed up from incident spatial data file}
 - **gps** {optional, contains GIS data from field GPS downloads}

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- ❖ **progression** {workspace to create progression data}
- ❖ **incident spatial data file** {the master incident spatial data file}
- **products** {contains GIS product files produced on the incident}
 - ❖ {yyyymmdd} 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}
 - ❖ {yyyymmdd} {contains backup map document files copied from master map document files}
 - ❖ **master map document files** {the master map document files, one for each map product}
- **tools** {extensions, tools or other software tools and used on the incident}

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, 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 SOP specifies a national interagency standard, which should not be overridden at the incident level.

Definitions:

Master Incident geospatial data file: The primary geospatial database used on the incident.

Appendixes:

- 1—Common Abbreviations
- 2—Sample Directory Structure.
- 3—Sample File Names

Selection Criteria:

These are the guidelines used to create the specifications for File and Folder Naming and Directory Structure provided in this SOP.

The file naming and directory structure should meet the following requirements:

- Clear identification of incident name and year
- Unambiguous folder and file names
- Consistent organization
- Consistent identification of temporal data
- The number of directory levels should be minimized
- The number of directory or files within an individual directory should be minimized
- The directory structure should be easily archived
- Enable exchange with other organizations
- Flexibility to enable multiple GIS Specialists working together
- Minimize the length of names wherever possible, limited to 255 characters
- Every file has an appropriate predefined location within the standard directory structure

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Rationale:

Current approach to file naming and directory structure evolved organically. This SOP was derived from documents prepared by FIREScope, GTAG, and PNWCG.

Although upon approval this SOP is an ICS standard, there are no external business specifications to dictate what the specifics of the directory structure should be.

Rethink from a fresh viewpoint the specifications contained in the SOP above to ensure internal consistency of the standard.

These guidelines are developed with the understanding that there are many personal opinions on the subject and compromises are inevitable.

Clear identification of incident name and year: It is important to use the name of the incident and the year it was initiated in the top level directory to ensure that the data are clearly identified for use in the host unit or regional organization for historical purposes.

Unambiguous folder and file names: Folder or file names that could be mistaken for something else will lead to inconsistent use leading to wasted effort or lost data.

Consistent organization: The files and folders are organized in a similar fashion so that users can quickly understand where a given file might be.

Consistent identification of temporal data: The date and time incident data were collected or when a map was produced is a critical concern for the GIS Function on an incident. The file naming and directory structure should enable that process.

The number of directory levels should be minimized: The more levels within a directory structure an individual has to search through within a directory structure the less efficient the work flow will be.

The number of directories or files within an individual directory should be minimized: If an individual directory contains too many files it can be confusing for individuals and will lead to a less efficient work flow.

The directory structure should be easily archived: Archiving is a critical part of the documentation process on an incident. The directory structure and file naming should help enable the archiving process.

Enable exchange with other organizations: GIS staff at organizations away from the incident may not be familiar with the local practices on an incident, but can determine the information they need from the file names.

Flexibility to enable multiple GIS Specialists working together: When two or more GIS specialists are working together on an incident it is important that they share GIS resources. The directory structure and file naming should help GIS specialists work together in a networked environment.

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Minimize the length of names wherever possible, limited to 255 characters: Shorter names tend to be easier to use; however, clear identification of what a file contains is important. Present technology limits file names to 255 characters.

Every file has an appropriate predefined location within the standard directory: The directory structure should be clear enough for users to quickly determine the logical location for any given GIS file type.

CHAPTER 3. MAP SYMBOLOGY

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

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Revised Date:

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Page:

Approved By:

Subject: Map Symbolology

Purpose: This SOP provides guidance in the use of wildland fire incident GIS symbology for map products.

The use of standard symbols in mapping wildfires facilitates quick and consistent interpretation of mapping products. Standard map symbols are required to avoid ambiguous map interpretation, which can become a safety issue in the field.

Scope/Overview:

In addition to their usefulness to the GIS Specialist assigned to wildland fire incidents, the GIS map symbols standards may also be useful to other ICS personnel who produce ICS map products, such as the SITL, Display Processor (DPRO), Infrared Interpreter (IRIN), Fire Behavior Specialist (FBAN), Field Observer (FOBS), and other GIS professionals, technicians, and cartographers.

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

Procedures/Specifications:

When using map symbology, use the NWCG Fireline Handbook (410-1) map symbols. This SOP proposes digital versions of those symbols defined in 410-1 Map Symbols section.

Accompanying text must be given for Drop Point (“DP”) and Helispot (“H”). These map symbols look identical displayed as black/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.). Hotspot symbols also look like Drop Points and Helispots when displayed in black and white. However, these features 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 symbol features.

Caution is 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.

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Recommended map features for standard GIS ICS symbology can be found in Appendix 4—Map Symbology Samples.

Recommended Map Symbols that are presently not in the 410-1:

Safety Zone Symbol



When there is an occasion to map these important safety features, the use of these standard map symbols is recommended.

There presently are no established NWCG map symbol standards for Lookouts, Escape Routes, or Safety Zones. These are three of the four components of LCES, with Communications making up the fourth. It can be argued that Lookouts and Escape Routes are too dynamic by nature to warrant placement of these features on field maps. However, the establishment of a Safety Zone symbol is deemed appropriate since these features are often chosen or developed with consideration of possible changes in weather and fire behavior conditions.

A word of caution: Although Safety Zone symbols are believed to be valid map features, care should be taken when displaying them on maps. It is possible that field conditions can change, making an outdated Safety Zone location on a map dangerously misleading. It is recommended that the SITL be briefed when Safety Zones are displayed on field maps.

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. A triangle shape was chosen for two main reasons. First, the triangle shape is unique in ICS symbology. This makes the Safety Zone symbol easy to identify and distinguish between other ICS symbols. Second, the FGDC DHS (FEMA) symbol for temporary emergency response is a solid triangle within a circle. Since a Safety Zone is a temporary refuge during times of emergency, the triangle shape was deemed a logical choice to maintain a somewhat consistent approach between the incident response systems.

Proposed Point (marker) symbols not in the Fireline Handbook (410-1):

Aerial Hazard
Drop Point
Safety Zone
Zone

Proposed Line symbols not in the Fireline Handbook (410-1):

- Aerial Hazard
- Air Tanker Foam
- Air Tanker Retardant
- Explosive Line
- Helitanker Foam
- Helitanker Water
- Plow Line
- Heat Line (IRIN)

Proposed Fill (polygon) symbology not in the Fireline Handbook (410-1):

- Intense Heat areas (IRIN)
- Progression Map

It is recommended that Progression Maps have a continuous color scheme (color ramp). The color should run consistently for the incident to avoid confusion about the actual ground conditions or the burn intensity. Progression map color ramps should be approved by the SITL.

In three instances, the symbols in the 410-1 do not satisfy the acceptance criteria defined in this SOP for digital symbols. For these situations, this SOP recommends that new symbols be adopted.

Fire Origin—

The original symbol for Fire Origin is not distinguished from miscellaneous Hazards or Mobile Weather Units when the symbols are displayed in black and white, even though text accompanies the Fire Origin symbol. The recommended Fire Origin symbol retains the same look, but is bolded for significance.



Use

Instead of



Mobile Weather Unit—

The original Mobile Weather Unit symbol can be confused with Hazards and Fire Origin when displayed in black and white. The recommended symbol utilizes the common “Wx” mnemonic for weather. The Wx combination is designed to minimize confusion with the symbol for water source, which is a single W surrounded by a circle.



Use

Instead of



(Water Source)

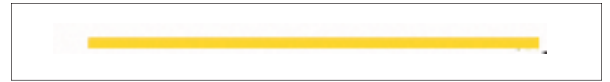
Fire Spread Predication—

The original Fire Spread Prediction line looks exactly like a Completed Line under present ICS symbology when displayed in black and white. The recommended Fire Spread Prediction line retains the familiar color and accompanying text, but is given a unique line type.

Use



Instead of



Example:

See Appendix 4— Map Symbology Samples

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, along with instructions for loading the symbology, can be found on the GSTOP Web page of the GTG Web site (<http://gis.nwcc.gov>). The symbols will also be available individually as graphics files to be incorporated into any GIS software that allows custom symbols.

Responsibilities:

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

The GIS Specialist 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:

Lookouts—Person(s) assigned to vantage points that allow observation of operations and surrounding conditions for safety reasons.

Plowline—Fireline created by using a tractor plow.

Fire Location (for Fire Location symbol)—Fire location to be used on large, small-scale maps such as vicinity maps

Draft

Acceptance Criteria:

The following acceptance criteria are 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 both color and black and white
5. Symbols must be designed to allow field personnel to easily hand draw the symbols on hard-copy map

Rationale:

Process for standard symbol selection:

1. Identify which ICS Symbols relate to the Standard Map Products
2. Evaluate the symbols using the acceptance criteria
3. Identify symbols that are deemed to be required by the Standard Map Products, but do not meet the acceptance criteria
4. Develop alternatives for required symbols that fail the acceptance criteria as outlined above

A decision matrix is used for multiple valid map symbols (those that pass the acceptance criteria) that represent the same map feature. The decision matrix is defined as follows:

Rank the following on a scale of 1 to 3:

- a. Is the symbol widely used by the wildland fire community? (weight = 3)
- b. Rank the quality of the symbol as it pertains to Acceptance Criteria 3 above (weight = 2)
- c. Rank the quality of the symbol as it pertains to Acceptance Criteria 4 above (weight = 1)

Potential Standard Symbols:

A collection of incident map symbols was taken from various sources such as the five Federal land management agencies with wildland fire management responsibilities (FS, BLM, NPS, FWS, and BIA) as well as FEMA (DHS) and FAA. Potential standard symbols developed by individuals were also collected.

Although the scope of this SOP is limited to wildand fire incidents, it is recognized that the NWCG is increasingly involved in All-Risk incidents. As a result, there has been a genuine attempt to incorporate symbology from FEMA (DHS), another national incident response organization, where applicable.

CHAPTER 4. MAP PRODUCTS

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

Effective Date:

Revised Date:

Revision Number:

Page:

Approved By:

Subject: Map Products

Purpose: This SOP describes the production of the Standard Map Products that have been defined as used often during ICS Incidents. The intention here is to provide 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.

Scope/Overview/Background: The map products listed here originated from one of four sources—the draft taskbook for GIS Specialist, the DPRO course training materials, work done by the PNWCG on map products objectives and the GTAG training materials, and draft materials for a field guidebook. The products and standards from these four sources were organized into a matrix for comparison and then a subset was chosen because they were either one of the Standard Map Products or considered optional map products because they were produced frequently enough to warrant a common definition.

The objective is not to create an impossible standard, or 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 Situation Unit leaders and other end-users may have specific needs or preferences.

Background documentation and map examples are available on the GTG website (<http://gis.mwcc.gov>).

General Procedures:

Maps produced on an incident should communicate the intended message clearly. All map products produced should follow these standards where applicable. Although some maps may be by special request and there will be no standard to follow, include the following elements:

- Incident Name and Number
- STANDD: Scale, Title, Author, North Arrow, Date of Data, Datum (required if coordinates are shown)
- Legend

Also map products should adhere to:

- ICS Symbology standards
- Use of standardized colors for maps printed in color (ref. USGS standards), blue for water, green for vegetation, etc.

Other Procedural Considerations:

- Situation Unit Leader approves all maps
- Use of logos shall be directed by the Situation Unit Leader
- 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 (ref. Fire Line Handbook)

Responsibilities: Timelines for map production need to be established with the Situation Unit Leader (SITL). It is the responsibility of the GIS Specialist to produce all products in time for scheduled briefings and other meetings. Map definitions should be used as general guidelines, and Situation Unit Leaders have the authority to direct variations of the standards.

Communications: All map requests go through the SITL. This keeps the SITL informed of the GIS unit 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.

Appendixes:

- Map Product Definitions
- Map Product Template
- Map Samples

Acceptance Criteria:

New map products should be submitted through the change management process. New Map products are defined using the Map Products template. These criteria are used to select a new map product for definition and to ensure that a map product’s definition is complete.

1. All products should address some particular ICS business need.
2. All products should originate at the request of a clearly defined end-user.
3. The purpose and objectives for the map product are defined.
4. The elements and guidelines for the map product are specified. The data layers should be specified along with guidelines such as page size and color.
5. The map product definition can be adhered to nationwide.

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Rationale/Methodology:

In the development of this SOP the PNWCG materials and made some modifications and documented those in interim version. Reviewed with GSTOP team.

CHAPTER 5. MINIMUM ESSENTIAL DATASETS

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

Effective Date:

Revised Date:

Revision Number:

Page:

Approved By:

Subject: Minimum Essential Datasets (MEDs)

Purpose: This document describes the minimum base datasets (other than incident data) that are needed to meet the business needs to make GIS maps or perform analyses on wildland fire incidents. Also, this document addresses where to obtain data and how to evaluate whether the data are suitable for use.

Scope/Overview: This document is intended to be used by the GIS Specialist, but may be of value to other positions on an incident that may use GIS data, such as SITL, DPRO, FBAN, IRIN, and the GIS staff of the local unit.

Procedures:

Datasets are used to develop 1) Standard Map Products or 2) other products and deliverables, which includes optional maps, WFSA/Wildland Fire Implementation Plan (WFIP) preparation, and providing data for analysis.

This SOP distinguishes three classes of datasets:

- A. Those which provide “required elements” for the Standard Map Products
- B. In addition to those in A, those which provide “required elements” for optional map products and other deliverables
- C. In addition to those in B, those which provide “optional elements” data to any of the defined map products or other deliverables.

(ref. SOP for Map Products)

GIS Specialist is responsible for gathering and evaluating all datasets to be used on an incident. Class A datasets should be gathered before arrival on an incident, and as many of the Class B datasets as possible.

Specific information regarding preordering will be 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 where the incident is located and request data to be sent to the Situation Unit.

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 scale (i.e., roads digitized off small scale State transportation maps may not be usable at 1:24000 scale IAP maps).
- *Currency.* Determine that the dataset is the most current dataset available. For example, aviation sectionals are updated at least annually 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 in order 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 needs to contain metadata according to the requirements specified in the *SOP for Documentation and Metadata*.

Responsibilities:

There may be shared responsibilities with other positions (IRIN, FBAN, BAER, MAC, Area Command) or individuals. Identify those individuals, agencies, or groups emphasizing the responsibilities of GIS Specialist.

Communications:

Important contacts:

- SITL regarding available map layers, needed map layers, potential sources, etc.
- Computer Technical Specialist 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.

Appendixes:

- *Map Products Datasets:* contains a matrix of the datasets that are needed for each standard and optional map products and other deliverables.
- *Essential Optional Datasets Specification* contains a listing of datasets with recommended sources and required fields.
- *Map Product and Deliverables Matrix* contains the business needs analysis matrix of required and optional maps and products.

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Acceptance Criteria:

Changes to the SOP will be according to a Change Management process. When determining whether to revise this SOP:

- 1) The dataset must be needed for a specific deliverable required for a specific task.
- 2) The dataset must be readily obtainable in an incident.

Evaluation Process/Rationale:

The first step in this process was to determine a list of tasks that required an input of GIS data. Subteam members determined this list and then the list of deliverables needed for each task. The list was then compared to the list of maps produced by the GSTOP Standard Products subteam. Because the two lists generally matched, it was determined that this phase was completed. The one noted exception at this point is the MED subteam inclusion of an “Evacuation Plan.”

A list of datasets needed for each deliverable was then compiled. Input from a slightly larger audience was solicited. This included members from other GSTOP subteams and a SITL, references cited in the referenced section, and the draft SOP for Standard Products. Datasets were weighted according to whether they were required or optional for required map products and whether they were required or optional for optional map products and other deliverables.

CHAPTER 6. DATA ARCHIVING AND SHARING

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

Effective Date:

Revised Date:

Revision Number:

Page:

Approved By:

Subject: Data Archiving and Sharing

Purpose: The purpose of this document is to provide procedures for the sharing and archiving of GIS data developed on an incident.

The purpose of archiving data is to capture incident data in a digital format. In addition, data archiving allows the GIS unit to recover a recent status of the incident in case of computer failure or data corruption.

This document is intended to be used by the GIS Specialist, but may be of value to other personnel on an incident that may use GIS data, such as FBAN, IRIN, and the GIS staff for the local unit.

Scope/Overview:

This SOP covers the archiving and sharing of incident data and products for all uses. Handling of sensitive data is subject to restrictions.

For base data, this SOP covers only archiving.

Specifications:

All vector incident data shall be exported 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 datasets. This data can be posted on a designated ftp or website such as GEOMAC and [ftp.nifc.gov](ftp://nifc.gov).

Other incident-specific data or base data layers that have been edited for the incident must be archived.

Procedures:

Data Sharing: At the end of each operational period in which the Fireline and Fire Perimeter data are updated, upload these files to [ftp.nifc.gov](ftp://nifc.gov). This allows the data to be accessed by local agencies and other interested parties. File names must adhere to *SOP for File Naming and Directory Structure*. Reference GTG website (<http://gis.nwccg.gov>) for list of the current upload sites and acceptable file formats (may need to export to shapefiles before sharing the data).

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The posting of map products on a standard ftp site is done as a courtesy to other users and done whenever possible.

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

Guidelines:

(ref. SOP for File Naming and Directory Structure)

- At the end of each operational period, “incident_data,” and “products” and “projects” directories shall be archived to a different location than the operational computers
- For incident data, export to shapefiles before any archive task; also archive the geodatabase
- 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 Unit 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 Unit leader for safekeeping

Responsibilities:

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

Communications:

As a courtesy GIS staff, may communicate with interested parties as to the location where the data and current map products have been posted.

Definitions:

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).

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 file’s continued existence on your local disk. Archived files may be removed from the local disk on your computer if required (for example, for space reasons).

The main features of archive policy are:

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- 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 in the first instance and can be renewable.
- Multiple versions of the same file may be archived; this is not recommended unless the contents of files are different and required.

Data sharing is 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 (*see SOP Team Transition*)

Selection Criteria/Rationale:

Data archiving guidelines are designed to support being able to re-create the necessary data for a particular date on an incident.

Data sharing guidelines minimize the workload on the GIS Specialist by having data made available in a central location, known by all interested parties.

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

CHAPTER 7. DOCUMENTATION AND METADATA

Effective Date:

Revised Date:

Revision Number:

Page:

Approved By:

Subject: Documentation and Metadata

Purpose: The purpose of this SOP is to provide procedures for the daily documentation of incident GIS data and to provide information (metadata) about the data that have been created. This SOP also provides procedures for further documentation to aid the local unit in creation of FGDC-compliant metadata.

Scope/Overview: The primary scope of this SOP is the incident data documentation, which the GIS Unit develops throughout the duration of the incident for the use of the DOCL (Documentation Unit Leader) and the GIS Specialist of the local managing agency.

For SOP on documentation developed for sharing of data to other organizations, ref: *Data Archiving and Sharing SOP*.

This SOP 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:

The following items are in SOP for GIS File Naming and Directory Structure

- Date including year (*yyyymmdd*)
- Time of data collection (*hhmm*, using 24-hour clock)
- Type of feature portrayed by the data (see *Appendix: list of abbreviations for SOP for File and Folder Structure*)
- Source of data (the ICS position or name of person who collected the data)
- Feature type (point, line, polygon)
- Coordinate system
- Datum
- Incident name

The following attributes are **PROPOSED** by the GTG as file attributes for the Daily Fire Perimeter data standard:

Item Name	Type	Length	Required	Example	Comments	Attribute Definition Source
UNIT_ID	String	7	Yes	AK-FAF	Administrative unit at the fire's point of origin	http://www.nwcg.gov/teams/pmol/products/standards/unit_id/cover.htm
FIRE_NUM	String	8	Yes	193	Number assigned to the fire by the field area	Submitted to NWCG Data Administrators Working Group
FIRE_NAME	String	50	Yes	Boundary	Name of fire; assigned by responsible land management unit	Submitted to NWCG Data Administrators Working Group
DATE	Date	8	Yes	YYYYMMDD	Collection date for the fire perimeter	http://www.nwcg.gov/teams/pmol/products/standards/datel/cover.htm
TIME	String	4	Yes	1600	Collection time in 24-hour military	
COMMENTS	String	50	Yes	See Discussion Item 1	Fire perimeter related comments	

Other items that would be useful and would add to the accuracy of final Metadata documentation (These can be documented in the Unit Log, as attributes or as a “Read Me” file):

- **Agency:** Perimeter Collection Agency.
- **Collection Method:** Select “GPS” if the fire perimeter was developed using GPS data. Select “Digitized” if the fire perimeter was digitized. Selecting either of these will affect which of the following fields appear (i.e., differential correction is only pertinent to GPS collected data).
- **Source:** If the perimeter was collected using a GPS, enter the type of GPS used. If the perimeter was digitized, enter the map source. Selecting “Other” allows the user to manually enter in new GPS units or map sources.
- **Differential Correction:** If the perimeter was collected using a GPS, enter the method used for differential correction. Selecting “Other” allows the user to manually enter in other differential correction methods.
- **Travel Method:** If the perimeter was collected using a GPS, enter the method used to circumnavigate the fire perimeter. Selecting “Other” allows the user to manually enter in other travel methods.
- **Map Scale:** If the perimeter was digitized, enter the scale of the map source or of the scale used in digitizing. Selecting “Other” allows the user to manually enter in other map scale values.
- **Contact:** Enter the name of the person who collected or created the fire perimeter.

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- **Phone:** Enter the phone number of the person who collected or created the fire perimeter.
- **Email:** Enter the email of the person who collected or created the fire perimeter.
- **Comments:** Enter any comments associated with the fire perimeter in question. Sample comment: “West side of fire perimeter not mapped accurately because of smoke.”

Example: *see Appendix 11—Unit Log for GIS*

Procedures: Documentation is kept on a Unit Log (ICS 214) by units operating in 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 shift. This provides a record of significant changes to the incident data and the products produced.

If base data are used or edited they become Incident data; then metadata are required to be fulfilled by the GIS unit on the incident.

Responsibilities:

The SITL (Situation Unit Leader) is responsible for ensuring that the GIS Unit is functioning and properly supported and that it fulfills its obligations to the Plans Section. SITL authorizes what documentation the GIS Unit will provide.

GIS Unit is responsible for providing agreed-upon documentation to the Documentation Unit Leader (DOCL) and managing agencies.

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

Communications: GIS Unit supplies documentation to customers as directed by SITL.

Definitions:

(Ref: Glossary)

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.

Documentation: Methods of 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.

Selection Criteria/Rationale:

This SOP attempts to ensure that the GIS function of the IMT is properly documenting procedures and datasets collected and created on the Incident. Efforts were made to develop SOPs for Metadata following basic FGDC standards. It is recognized that time and resources do not allow the collection of full FGDC metadata. To provide for quick and efficient metadata collection, the file name is used to capture the most basic and important metadata components. Additional metadata about the data can be stored as attributes or as an HTML file.

CHAPTER 8. TEAM TRANSITION

Overall Title: Geographic Information System Standard Operating Procedures on Incidents

Effective Date:

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Page:

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Subject: Team Transition

Purpose: This SOP provides the GIS function an effective and consistent method of transitioning from one operational GIS group to another. The objective of this SOP is to provide the methods of work and direction to ensure that all data and products—plus other related information—are transferred successfully.

Scope/Overview: This document is intended to provide transition guidelines and procedures to GIS Specialists working within the ICS. Presently, there are draft IMT transition standards and templates. This SOP will provide additional documentation related to GIS on Wildland Fire Incidents.

Specifications:

Transition of the GIS function refers to any hardware purchased by the incident GIS plus all relevant GIS data and media. It is important that all data are transferred and remain in their current directory structure per *SOP for GIS File Naming and Directory Structure*.

Procedures:

Transition is marked by a time of chaos and relief. It is always important for the GIS unit to remain focused and follow procedures when operating during this time period.

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

GIS units use a variety of media when operating on an Incident. These storage devices range from basic shared drives on computers utilizing workgroups; shared portable hard drives; and advanced computer networks utilizing switches, hubs, DHCP, and Snap Servers. Several methods can be used (Peer to Peer, DVD, extendable 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 permanent media. (ref. SOP for GIS Data Archiving and Sharing).
- 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 one or more GIS Specialists remains on the Incident, he or she should work with the SITL to describe the skill sets of the individual GISTs to better utilize them with the incoming team and advise of their schedule 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 Incident Management Teams (IMTs) or GIS Specialists.
- The outgoing GIS Specialist will include this map symbology information with incoming GIS Specialists or the SITL during transition briefings. This is to facilitate consistency in the use of map symbols throughout the life of an incident.

To ensure transition is complete, use the following checklist:

- Are there enough GISTs and is workload appropriate?
- Are the incoming GISTs able to reproduce products by the existing unit?
- Are the needs of the local unit and other entities being met?
- Is the local unit able to work with the new GIS Unit to continue to access the GIS data? (e.g., sharing of perimeter data)

Responsibilities:

It is the responsibility of the outgoing GIS Specialist to:

- Ensure that the incoming GIS Unit has a clean, usable, and documented copy of the Incident Data.
- Satisfy requirements for the handling of sensitive data.

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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 Unit to:
- Test and verify that all data have been transferred successfully and are fully usable (access, read, and edit) from the target storage device to which the data were moved.

Communications:

If any Sections and Units on the Incident want maps, requests should be made to the SITL directly.

The CTSPs of the outgoing and incoming teams should be made aware of the status of the GIS Unit, including its network, hardware, and software usage.

Selection Criteria:

Changes or additions to Transition procedures should follow the change management process established by the GTG. Guidelines and checklist are established in this SOP. These guidelines and procedures ensure a complete and thorough transfer of GIS data, personnel, hardware, documentation, and GIS Unit responsibilities.

Rationale:

The GIS Unit Transition is based on the Incident Management Team Transition Template. All attempts were made to meet the needs of all NWCG agencies.

This SOP provides guidance and procedures for assisting teams in the process of transitions. Although the scope of this SOP focuses on the transition of the GIS Unit from IMT to IMT, it can be used when teams transition back to the local agency. It is intended that this SOP will provide procedures that will ease the exchange of data and information during times of transition.

APPENDIX 1. COMMON ABBREVIATIONS

Incident Data Types

per = Raw Perimeter
dzt = Dozer line
prog = Progression Perimeter
origin = Point of origin
uncfire = Uncontrolled Fireline
ctlfire = Controlled Fireline
contin = Contingency line
burn = Burned area, area affected in a given time period
wfsa = Wildland Fire Situation Analysis
damage = Damage caused by incident or suppression efforts
icp = Incident Command Post
ics_fln = ICS fireline symbolized with ICS symbology
ics_pt = ICS points symbolized with ICS symbology
ics_div = ICS division breaks symbolized with ICS symbology

Source Codes

gps_name = Global Positioning System (add collectors 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)

u10n27 = Universal Transverse Mercator (UTM) Zone 10, NAD 27
u13n83 = UTM Zone 13, NAD 83
ll = Latitude/Longitude; i.e., geographic (Note: there is no datum)
{st}sp5n27 = {state abbreviation} State Plane Zone 5, NAD 27

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Product Type

airops = Aviation map

brief = Briefing 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

Page Orientation

land = Landscape

port = Portrait

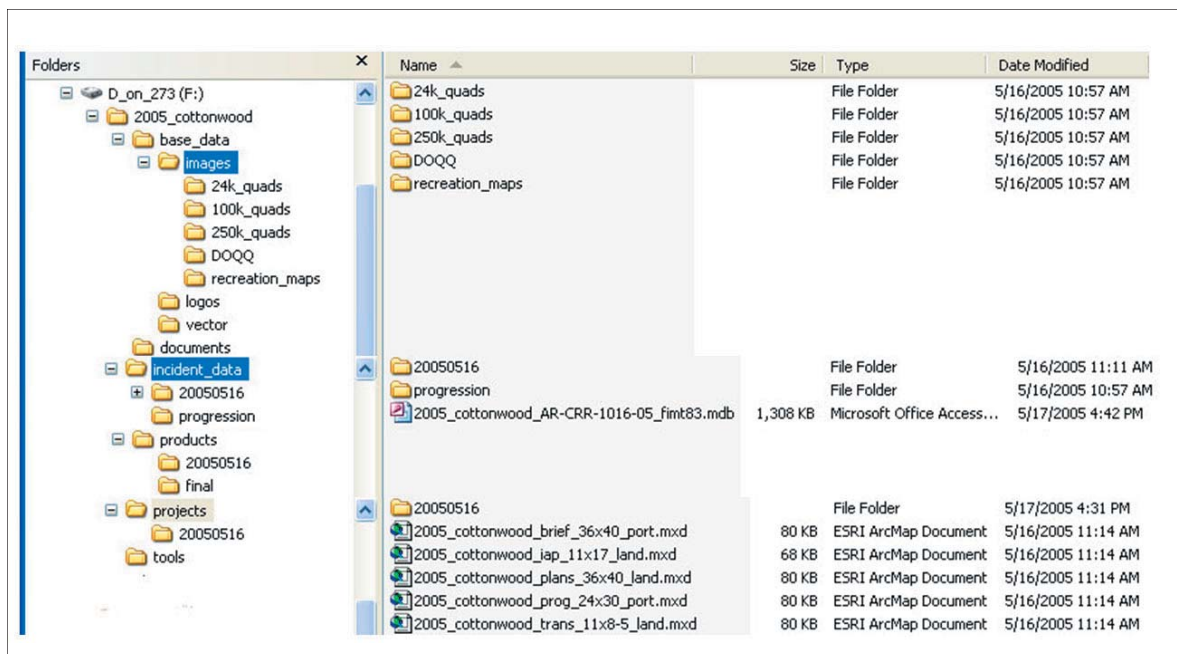
Date Format

yyyy = Year in which incident began, e.g., 2005

yyyymmdd = Year, month, and day, e.g., 20051207

hhmm = Hour and minutes, 24-hour clock, e.g., 0945

APPENDIX 2. SAMPLE DIRECTORY STRUCTURE (COTTONWOOD INCIDENT)



APPENDIX 3. SAMPLE FILE NAMES

Example from Cottonwood Incident:

Master map document:

2005_cottonwood_iap_11x17_land.mxd

Map document backup file:

20051605_2120_20050517day_cottonwood_iap_11x17_land.mxd

Master incident geospatial data file:

2005_cottonwood_AR-CRR-1016-05_fmt83.mdb

Incident geospatial data backup file:

20050516_2230_cottonwood_AR-CRR-1016-05_fmt83.mdb

Incident perimeter export file:

20050516_2230_cottonwood_AR-CRR-1016-05_per_u15n83.zip

Incident geospatial theme data file:

20050516_2230_cottonwood_per_fobs_ln_u15n83.shp

Map product file:

20051605_2120_20050517day_cottonwood_iap_11x17_land.pdf

Non spatial Document:

20051605_1923_cottonwood_ownership.xls

APPENDIX 4. MAP SYMBOLOGY SAMPLES

Proposed Changes to Existing Symbols:

Fire Origin

Proposed

(Date, Time)



Existing

(Date, Time)



Mobile Weather Unit

Proposed

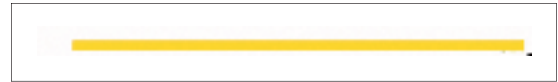
Existing



Fire Spread Prediction

Proposed

Existing



Proposed Marker Symbols:



Aerial Hazard



Branch Break












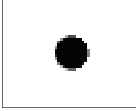



Division Break



Zone Break

GIS Standard Operating Procedures

Draft

	Incident Base	
	Camp	
	Fire Station	
	General Hazard	(Type)
	Helibase	
	Repeater	
	Staging Area	
	Telephone	
	Water Source	(Type)
	Drop Point	DP-1
	First Aid Station	
	Helispot	H-1
	Incident Command Post (ICP)	

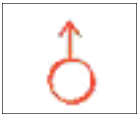
Draft



Infrared (IR) Downlink



Safety Zone



Spot Fire

Proposed Line Symbols:



Aerial Hazard



Air Tanker Foam



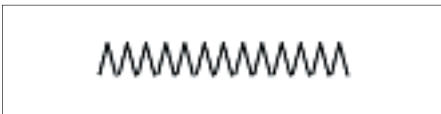
Air Tanker Retardant



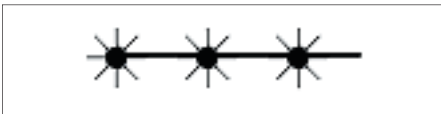
Completed Line



Completed Dozer Line



Completed Line Break



Explosive Line



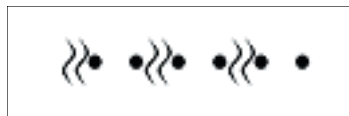
Hand Line



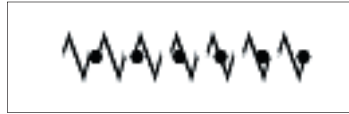
Heatline (IRIN)

GIS Standard Operating Procedures

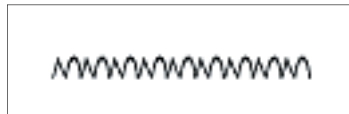
Draft



HeliTanker Foam



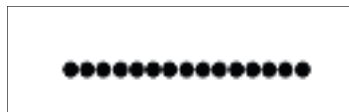
HeliTanker Water



Planned Fire Break



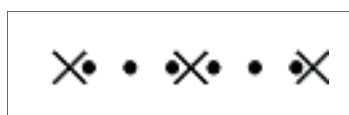
Planned Fireline



Planned Secondary Line



Plow Line



Proposed Dozer Line



Ridge/Geographic Feature



Uncontrolled Fire Edge

APPENDIX 5. MAP PRODUCT DEFINITIONS

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.

Primary Customer

Situation Unit Leader

Target Audience

Incident operations personnel

Objective

The objective of the *IAP Map* is to effectively communicate geographic feature relations and incident management objectives on an incident. The *IAP Map* is a tool used by operations staff to show field assignments, crew instructions, and division concerns at the shift 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
- Prepared for shift 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
- Shift (day–night)

Data

- Incident Perimeter and Fireline
- Division/Branch breaks and labels
- Topography (usually DRGs with green turned off)
- ICS points (Drop points, aviation features, camps, ICP, spot fires, Safety Zones, and others)

Optional Elements

- Index map (when multiple sheets are required)
- Geographic reference (usually Latitude/Longitude)
- Data source citation (if special data or requested)
- Disclaimer language (when incident information is estimated or changing quickly, or upon request)
- Magnetic declination and date

Draft

Product Name

Transportation Map

STANDARD

Product Description

A small planimetric map showing the access routes to the incident.

Primary Customer

Situation Unit Leader

Target Audience

Operations, logistics, crews, runners

Objective

The objective of the *Transportation Map* is to provide an overview of the transportation network in the incident vicinity to support safe transportation. This map is used to facilitate 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 shift 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 and Fireline
- Division/Branch breaks and labels
- Major roads and names, type of route (dirt, 4wd only, one-way, etc.)
- ICS features on map such as drop points, ICP, helibase

Optional Elements

- Geographic reference (Latitude/Longitude, Public Land Survey)
- Landmarks
- Vicinity map(s)
- Label distances along travel routes
- Mile markers
- Disclaimer language
- Administrative boundaries
- Hydrographic features such as rivers and lakes
- County boundaries
- Route restrictions

Draft

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 shift.

Primary Customer

Situation Unit Leader

Target Audience

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

Objective

The *Incident Briefing Map* objective is to communicate sufficient incident detail to enable operations staff to brief personnel assigned to the upcoming shift.

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
- Other 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, Initial Attack Area, Containment WFSA area)

Draft

Product Name

Progression Map

STANDARD

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Fire Information Officer, Fire Behavior Analysts

Objective

The purpose of the *Progression Map* is to graphically show 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, shade color ramps are effective to show trends rather than discrete values. (*Ref: SOP for GIS Map Symbolology*)
- 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 Origin
- Origin date and time
- Key geographic features
- Differing colors for each perimeter time period

Optional Elements

- Acreage affected each time period
- Shaded relief base
- Administrative Boundaries
- Vicinity map(s)

Draft

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.

Primary Customer

Situation Unit Leader

Target Audience

Planning Section, Incident Command General Staff

Objective

The objective of the *Situation/Plans Map* is to provide a geographic tool for the Plans Meeting to develop incident strategies and alternatives. This is also the map 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

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

Data

- Incident Perimeter and Fireline
- ICS points
- Division/Branch breaks and labels
- Transportation routes
- Safety hazards, if available
- Safety zones
- Escape routes

Optional Elements

- Orthoimagery base
- Shaded relief base
- Vicinity map(s)
- Topographic base (usually Digital Raster Graphics)

Draft

Product Name

Ownership/Land Status Map

Product Description

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

Primary Customer

Situation Unit Leader

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 map(s)
- Topographic base (usually DRG)
- Ortho imagery base
- Administrative boundaries, if different from ownership
- Disclaimer (if requested, or accuracy issues with data sources)

Draft

Product Name

Aviation Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Pilots, air operations staff

Objective

The purpose of the *Aviation Map* is to provide 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
- Aviation hazards
- ICS Points
- Key landmarks
- 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

Draft

Product Name

Damage Assessment Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Structural Liaison, Information Officer, Public

Objective

The purpose of the *Damage Assessment Map* is to be a tool to track buildings and resources damaged in the incident. This product will be used in operational planning and public meetings.

Guidelines

- Should be done at a scale to distinguish individual structures.
- May be made early in an incident to serve as a triage tool.

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

- Incident Perimeter
- Structures symbolized based on type or extent of damage
- Roads—including names and addresses

Optional Elements

- Latitude/Longitude indicator
- Taxlot base
- Topographic base
- Vicinity map(s)
- Ortho imagery base
- Shaded relief
- Key geographic features

Draft

Product Name

Structural Protection Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Structural Liaison, Information Officer, Public

Objective

The purpose of the Structural Protection Map is to be a tool to track buildings and resources that could be impacted by the incident. This product will be used in operational planning and public meetings.

Guidelines

- Should be done at a scale to distinguish individual structures.
- 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 based on type or triage
- Structure addresses or ID numbers
- Trigger points and evacuation routes
- Roads—including names and addresses

Optional Elements

- Latitude/Longitude indicator
- Taxlot base
- Topographic base
- Vicinity map(s)
- Ortho imagery base
- Key geographic features

Draft

Product Name

Public Information Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Information Officer, Public

Objective

The purpose of the *Public Information Map* is to keep 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 at a scale large enough for 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

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 indicator
- Topographic base
- Vicinity map(s)
- Ortho imagery base
- Shaded relief
- Key geographic features

Draft

Product Name

Rehabilitation Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

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

Objective

The purpose of the *Rehabilitation Map* is to be a tool to assist 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 Elements

- Incident Perimeter and Fireline
- Treatments—uniquely symbolized

Optional Elements

- Acreage affected for each treatment
- Shaded relief base
- Topographic base
- Ortho imagery base
- Latitude/Longitude indicator
- Vicinity map(s)
- Key geographic features

Draft

Product Name

Facilities Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

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

Objective

The purpose of the *Facilities Map* is to assist 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 facilities

Optional Elements

- Vicinity map(s)

Draft

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.

Primary Customer

Situation Unit Leader

Target Audience

Situation Unit, Planning Section, Incident Command General Staff

Objective

The objective of the *Infrared Information Map* is to provide 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

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 map(s)
- DOQQ base

Draft

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.

Primary Customer

Situation Unit Leader

Target Audience

Operations, FBAN, LTAN

Objective

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

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 fire line
- Usually on topographic base

Optional Elements

- Shaded relief
- DOQQ

Draft

Product Name

Vegetation Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Operations, FBAN, LTAN

Objective

The purpose of the *Vegetation Map* is to show the vegetation in the area of the present fire perimeter. It 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
- Present fire perimeter and fire line

Optional Elements

- Shaded relief

Draft

Product Name

Fuels Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Operations, FBAN, LTAN

Objective

The purpose of the *Fuels Map* is to show the fuels in the area of the present fire perimeter. It may be used by fire behavior analysts to help predict fire behavior, to develop suppression strategies. It may also be used to develop rehabilitation strategies.

Guidelines

- Standard ICS symbology
- Color fuel types

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

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

Optional Elements

- Shaded relief

Draft

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.

Primary Customer

Situation Unit Leader

Target Audience

Operations, Resource Advisor, Archaeologist

Objective

The purpose of the *Areas of Special Concern Map* is for 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 fire line
- Incident points
- Usually on topographic base

Optional Elements

- Shaded relief
- DOQQ

Draft

Product Name

WFSA/Contingency Map

Product Description

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

Primary Customer

Situation Unit Leader

Target Audience

Operations

Objective

The purpose of the *WFSA/Contingency Map* is for operational planning to identify contingency lines and areas at risk.

Guidelines

- Standard ICS symbology

Required Elements

Cartographic Elements

- 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 Elements

- Contingency lines or Maximum Manageable Areas (MMAs)
- Present fire perimeter and fire line
- Incident points
- Usually on topographic base

Optional Elements

- Shaded relief
- Wilderness
- Values at Risk (forage areas, timber plantations, cultural resources, recreational resources, structures, safety concerns, and others)

APPENDIX 6. MAP PRODUCT TEMPLATE

Product Name:

Generic Fire Map

Product Description:

The *Generic Fire Map* is the primary map used by operations personnel in completion of their mission.

Primary Customer:

Situation Unit Leader

Target Audience:

Incident operations personnel

Objective:

The objective of the Generic Fire Map is to effectively communicate geographic feature relations and incident management objectives on an incident.

Guidelines:

- Standard ICS symbology
- Black and white or color
- Page size
- Scale of data (if standard)
- Time cycle (ready for shift briefings or planning meetings)

Required Elements:

Cartographic

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

Data

- Data layers—list

Optional Elements:

- Index map (when multiple sheets are required)
- Disclaimer language (when requested)
- Data source citation—if special data
- Coordinates

APPENDIX 7. MAP PRODUCT SAMPLES

Map product samples are posted on the following Web site:

<http://gis.nwcg.gov/gstop>

APPENDIX 8. MAP PRODUCT DATASETS

	Required Map Products					Optional Map Products												Other Deliverable		
	IAP Map	Progression Map	Situation/Plans Map	Briefing Map	Transportation Map	Aviation Map	Public Information Map	Rehabilitation Map	Structural Protection Map	Wildfire Situation Analysis Map	Areas of Special Concern Map	Fire Perimeter History Map -	Infrared Intelligence Map	Facilities Map	Fuels Map	Ownership/Land Status Map	Vegetation Map	Damage Assessment Map	Evacuation Plan	Fansite Layers
DATASET																				
Class A - Datasets Required for Required Products+A20																				
Roads	Opt	R	R	R	R		R		R	Opt		Opt					R	R		
Topographic Base (usually DRG)	R	Opt	Opt	Opt		Opt	Opt	Opt	Opt	R		Opt	R		R	Opt	R	Opt		
Water (rivers/lakes)	Opt	R	Opt		Opt	R	Opt	Opt	Opt							Opt				
GNIS Geographic Names Information System		R						Opt	Opt							R	Opt			
Class B - Datasets Required for Optional Products																				
Structures				Opt					R	Opt	Opt						R	R		
Fuels															R					R
Administrative Boundaries/Ownership/Land Status		Opt		Opt	Opt		Opt		Opt	Opt	Opt				R	Opt				
Subdivisions				Opt															R	
Communities (GNIS Populated Places)						R			Opt	Opt										
Land Parcels								Opt							R	Opt				
Vegetation									Opt	Opt						R				
Fire Occurrence Polygons										Opt	R									
Airports/Helibases						R														
Aviation Hazards (including DADIF and DVOF)						R														
Canopy Cover																				R
DEMs (Elevation, Slope, Aspect)																				R
Class C - Optional Datasets																				
Shaded Relief		Opt	Opt			Opt	Opt	Opt			Opt	Opt	Opt		Opt	Opt	Opt	Opt		
Public Land Survey			Opt	Opt	Opt		Opt											Opt		
Ortho Imagery (usually DOQ)			Opt				Opt	Opt	Opt		Opt	Opt	Opt			Opt	Opt			
Political Boundaries (County/State)					Opt					Opt	Opt					Opt	Opt			
Wilderness	Opt									Opt										
Other Scanned maps					Opt															
Response Areas (Direct Protection Areas)				Opt																
Archaeological Sites										Opt	Opt									
Cultural Resources										Opt	Opt									
Schools										Opt	Opt									
Threatened and Endangered Species (T&E)										Opt	Opt									
Wildland Urban Interface (WUI)										Opt	Opt									
Aviation Sectional						Opt														
Infrastructure										Opt										
Condition Class																				
Fire Regime																				

Legend
 R - Required layer for product
 Opt - Optional layer--may be added if available
 Other requirements
 Coordinate information and datum must be included with all datasets

APPENDIX 9. ESSENTIAL AND OPTIONAL DATASET SPECIFICATIONS

DATASET	Data Content and Specifications	Suggested Source
Response Areas (Direct Protection Areas)	Name	Local Unit
Topographic Base (usually DRG) - optional	Source Date, USGS Standard Color scheme--13 or 256 colors, Revision Date, Collar removed, scan resolution 200-1000 DPI (USGS standard)	Preorder
Roads	Road Names, Road Class, Road Surface, Lookup tables with descriptions of coding. Accurate for use at 1:24000 scale.	Preorder
Fire Occurrence Polygons	Fire Name, Year	Local Unit
GNIS Geographic Names Information System	Name, Type	Download
Structures	Address, Risk Assignment (Optional)	Preorder
Public Land Survey	Township, Range, Section	Preorder
Water (rivers/lakes)	Name (Optional)	Preorder
Administrative Boundaries/Ownership/Land Status	Agency/Owner Name, contact info	Preorder
Vegetation	Forest Type, Age, Basal Area, Height	Local Unit
Subdivisions	Name	Preorder
Shaded Relief	N/A	Preorder
Land Parcels	Parcel ID, Contact info (Optional)	Local Unit
Fuels	Fuel Model	Local Unit
Canopy Cover		Local Unit
DEMs (Elevation, Slope, Aspect)	Resolution	Preorder
Aviation Hazards (including DADIF and DVOF)	Hazard Type, Elevation, Lat, Long	DADIF Data Preorder, Local Unit
Airports/Helibases	Name, Type, Lat, Long	DADIF Data Preorder, Local Unit
Wildland Urban Interface (WUI)	Type	Local Unit
Wilderness	Name	Local Unit
Threatened and Endangered Species (T&E)	Type	Local Unit
Schools	Name	Local Unit
Other Scanned maps	Source, Source Date	Local Unit
Ortho Imagery (usually DOQ)	Source Date, Resolution	Preorder
Political Boundaries (County/State)	Name	Preorder
Infrastructure	Name, Type	Local Unit
Fire Regime	Type	Local Unit
Cultural Resources	Contact info	Local Unit
Condition Class	Type	Local Unit
Communities (GNIS Populated Places)	Name	Download
Aviation Sectional	Source Date	Download from GSTC
Archaeological Sites	Contact info	Local Unit

APPENDIX 10.

MAP PRODUCT AND DELIVERABLES

BUSINESS NEED MATRIX

<u>Incident Command Section+A25</u>	<u>Task</u>	<u>Deliverable</u>
Command	Safety	IAP Map - SP
Command	Public Information	Public Information Map - O
Command	Public Information	Road Closure Map - O
Command	Public Information	Evacuation Plan - O
Command	Public Information	Progression Map - SP
Command	Public Information	Rehabilitation Map - O
Operations	Initial Attack	Transportation Map
Operations	Extended Attack	IAP Map - SP
Operations	Extended Attack	Aviation Map - O
Operations	Extended Attack	Structural Protection Map - O
Planning	Situational Awareness	Situation/Plans Map - SP
Planning	Incident Briefings	Briefing Map - SP
Planning	Fire Behavior	Farsite Layers - O
Planning	Modeling/Prediction	Fuels
Planning	Modeling/Prediction	Vegetation Map
Planning	WFSA/WFIP Prep	Wildfire Situation Analysis Map - O
Planning	WFSA/WFIP Prep	Areas of Special Concern Map - O
Planning	Fire History	Fire Perimeter History Map - O
Planning	Fire History	Infrared Intelligence Map - O
Logistics	ICP support	Facilities Map - O
Logistics	Transportation	Transportation Map - SP
Finance	Cost Allocation	Ownership/Land Status* Map - O
Finance	Damage Assessment	Damage Assessment Map - O

*Land Status depicts ownership, except that on Federal Lands, the people own the land or the agency manages the land

O - Optional Product

SP - Standard Product

ACRONYMS

APR—(file format) ArcView Project

BAER—Burned Area Emergency Response

BIA—Bureau of Indian Affairs

BLM—Bureau of Land Management

CD—Compact Disk

COTS—Commercial off-the-shelf software

CTSP—Computer Technical Specialist

DHCP—Dynamic Host Configuration Protocol

DHS—Department of Homeland Security

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 videodisc

DVOF—Digital Vertical Obstruction File

ECC – Emergency Coordination Center

GIS Standard Operating Procedures

Draft

ESRI—Environmental Systems Research Institute

FBAN—Fire Behavior Specialist

FEMA—Federal Emergency Management Agency

FGDC—Federal Geographic Data Committee

FIRESCOPE—Firefighting Resources of California Organized for Potential Emergencies

FOBS—Field Observer

FTP—File Transfer Protocol

GACC —Geographic Area Coordination Center

GAO—Government Accountability Office

GEOMAC—Geospatial Multi-Agency Coordination

GIS—Geographic Information System

GNIS—Geographic Name Information System

GPS—Global Positioning System

GSTOP—Geographic Information System Standard Operating Procedures on Incidents Project

GTAG—Geospatial Training Advisory Group

GTG—Geospatial Task Group

HTML—Hypertext Markup Language

IAP—Incident Action Plan

IMT—Incident Management Team

IR— Infra-Red

IRIN—Infrared Interpreter

JPG – (file format) Joint Photographic Group

GIS Standard Operating Procedures

Draft

LCES—Lookouts, communications, escape routes, safety zones

LTAN—Long Term Fire Analyst

MED—Minimum Essential Dataset

MMA—Maximum Manageable Area

MOA—Memorandum of Agreement

MTR—Military Training Route

MXD—Multiple XML Documents (file)

NFES—National Fire Equipment Systems

NTM—National Technical Means

NWCG—National Wildfire Coordinating Group

OGC—Open GIS Consortium

OMB—Office of Management and Budget

PDF—(file format) Portable Document Format

PTB—Position Task Book

PMS—Publication Management System

PNWCG—Pacific North West Coordinating Group

RAM—Random Access Memory

ROSS—Resource Ordering and Statusing System

SITL—Situation Unit Leader

SOP—Standard Operating Procedure

STANDD—Scale bar, Title, Author, North Arrow, Date of Data, Datum

T&E—Threatened and Endangered

Draft

TFR—Temporary Flight Restriction

UNC—Universal Naming Convention

TXT—(file format) Text only

UPS—Uninterruptible Power Supply

UNC—Universal Naming Convention

USB—Universal Serial Bus

UTM—Universal Transverse Mercator

VFR—Visual Flight Rules

WFIP—Wildland Fire Implementation Plan

WFSA—Wildland Fire Situation Analysis

WUI—Wildland Urban Interface

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)

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)

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

Dongle [sentinel key]—the sentinel key is a parallel or USB port hardware dongle 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

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

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)

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

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)

Draft

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)

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)

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

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)

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)

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

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

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

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