Introduction

The National Institute of Standards and Technology (NIST) facilitated the development of the Fire Investigation Process Map through a collaboration between the NIST Forensic Science Research Program and the NIST-administered Organization of Scientific Area Committees (OSAC) for Forensic Sciences (specifically OSAC's Fire & Explosion Investigation Subcommittee). Process mapping visually represents the critical steps and decision points of a workflow, allowing others to understand a process and its components more clearly and revealing areas of improvement. Process maps use standard symbols to describe each element in the process – e.g., inputs, outputs, decisions, and steps – making it easier to communicate a process than long-form documentation.

The Fire Investigation Process Map captures the decision-making and process flow details most frequently encountered in the discipline of forensic fire investigation. It was developed by a diverse group of practitioners and ***is intended to reflect current practices*** *within the field, although not every step in this process map may be applicable to every fire or explosion incident. The Fire Investigation Process Map depicts variations in practice that may be influenced by agency size, agency type (public vs. private), agency policies, geographical location and jurisdiction. Certain processes represented in the map have a required sequence while other components may vary. For this reason, it is important to state that the OSAC Fire Investigation Subcommittee does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.*

Process Map Applications:

The Fire Investigation Process Map is intended to be used to help improve efficiencies while reducing errors, highlight gaps where further research or standardization would be beneficial, and assist with training new investigators. It may also be used to develop specific investigative policies and identify best practices.

Scope of the Fire Investigation Process Map:

The scope of the Fire Investigation map is limited to core processes within the discipline of fire investigation such as data collection, data analysis, and origin and cause determination. Several forensic fire investigation related activities were not mapped including evidence disposition, the development of supplemental reports, and trial preparations. These topics may covered in future process mapping exercises.

OSAC
Organization of Scientific Area Committees for Forensic Science

Mission Received

1000 Pre-Scene Activities

- Assignment
- Property Information
- Safety Assessment
- Notifications
- Initial Witness Information
- Scene Access

2000 Data Collection

- General Observations
- Fire Effects
- Witness Information
- Effects Due to Fire Suppression Activities
- Results of Evidence Analysis (physical)
- Results of Reconstruction
- Other scene, Location, and Event-related Data
- Cause Specific Data
- Research, General Information, and/or Additional Non-case Specific Data Obtained
- Data from Outside Report for Review

3000 Origin Determination

- Data Analysis
- Fire Pattern Analysis
- Damage Evaluation: Fuel Controlled vs Ventilation
- Fire Dynamics Analysis
- Witness Information Analysis
- Evidence Analysis (physical)
- Reconstruction
- Timeline Analysis
- Hypothesis Development
- Hypothesis Testing
- Area of Origin Determination

4000 Cause Determination

- Data Analysis
- Heat Source
- First Fuel
- Oxidizer
- Circumstances That Brought Heat Source, First Fuel, Oxidizer Together
- Hypothesis Development
- Hypothesis Testing
- Cause Determination
- Fire Classification

5000 Reporting

- Prepare Report
- Technical Review
- Administrative Review
- Issue Report
- Archive

6000 Other - Not covered in this map*

- Deposition and Trial
- Supplemental Reports
- Evidence Disposition
- Scene Release

OSAC Organization of Scientific Area Committees for Forensic Science

Underlined Word
Word that will be defined in the glossary

Linkage TO/FROM another page

Linkage TO/FROM within the same page

Technology Assist
Technology that aids in the steps on this page

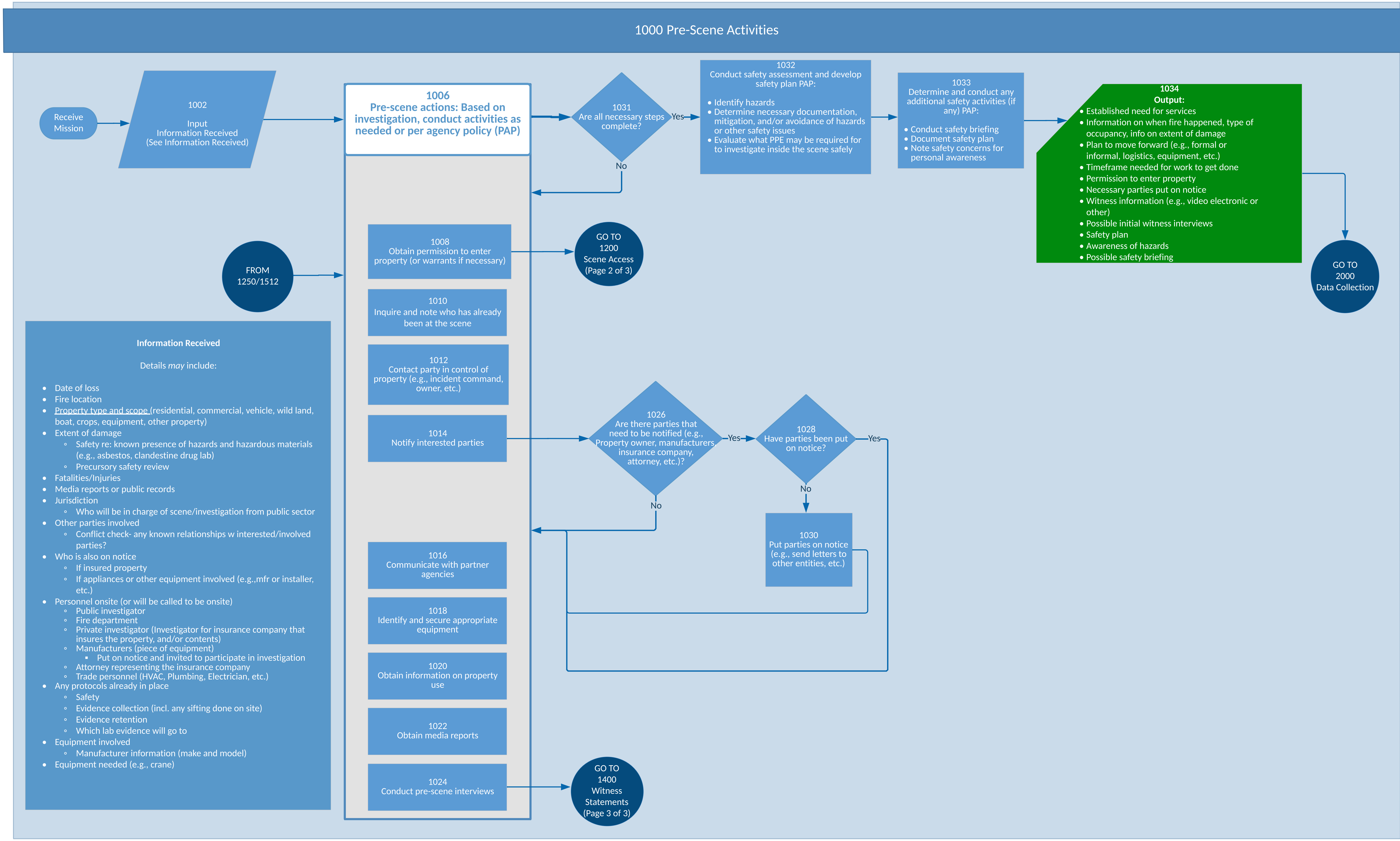
Input Box
Outlines the inputs at the beginning of each section

Output Box
Describes an output of the steps on the page

Discontinuation of Assessment or Examination

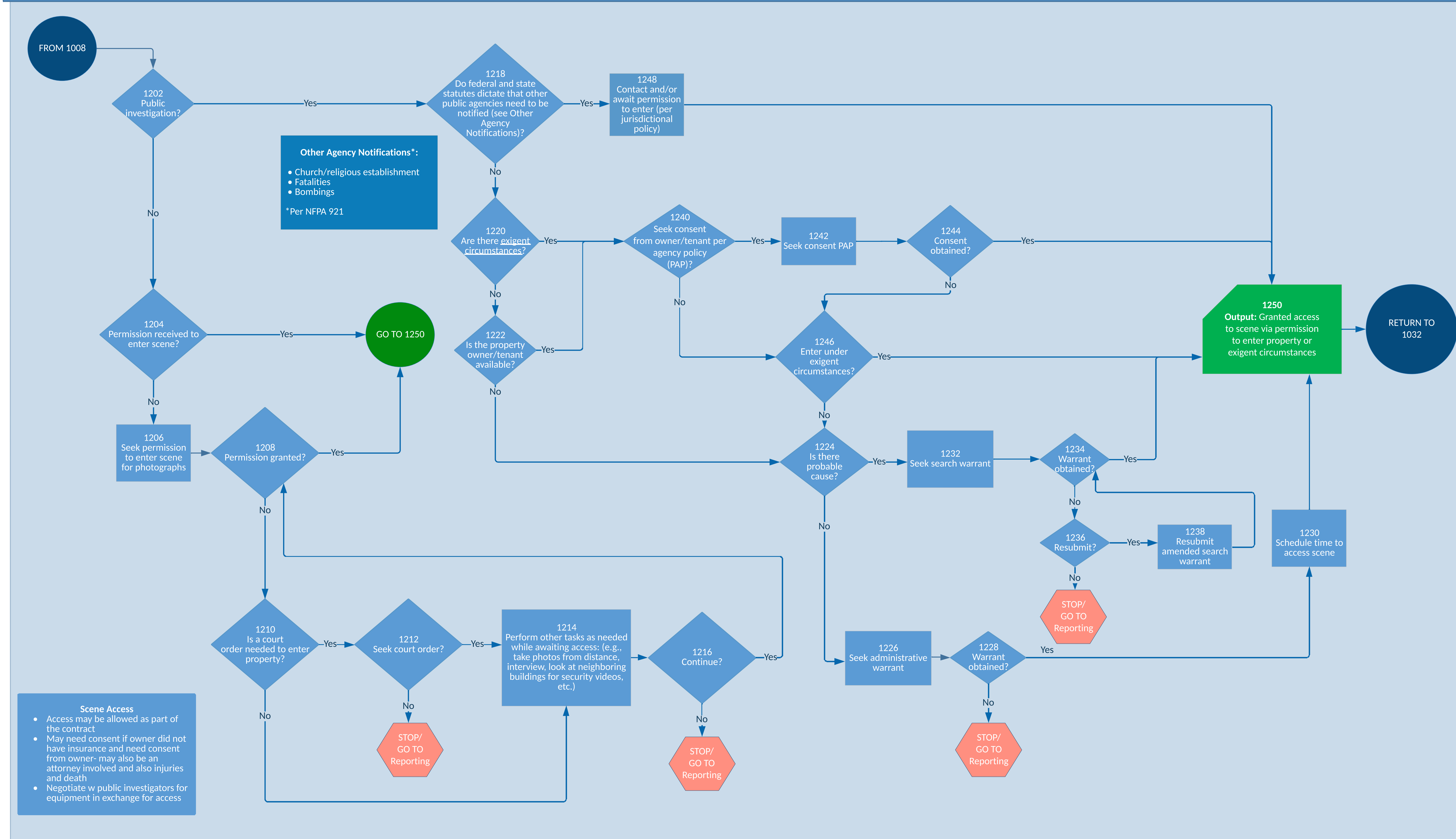
Legend

- Process start/end
- Process
- Decision
- Subprocess
- Document


1000 Pre-Scene Activities
Receive Mission
1002
Input
Information Received
(See Information Received)
1006
Pre-scene actions: Based on investigation, conduct activities as needed or per agency policy (PAP)
1031
Are all necessary steps complete?
Yes
No
1032
Conduct safety assessment and develop safety plan PAP:
• Identify hazards
• Determine necessary documentation, mitigation, and/or avoidance of hazards or other safety issues
• Evaluate what PPE may be required for to investigate inside the scene safely
1033
Determine and conduct any additional safety activities (if any) PAP:
• Conduct safety briefing
• Document safety plan
• Note safety concerns for personal awareness
1034
Output:
• Established need for services
• Information on when fire happened, type of occupancy, info on extent of damage
• Plan to move forward (e.g., formal or informal, logistics, equipment, etc.)
• Timeframe needed for work to get done
• Permission to enter property
• Necessary parties put on notice
• Witness information (e.g., video electronic or other)
• Possible initial witness interviews
• Safety plan
• Awareness of hazards
• Possible safety briefing
GO TO 2000 Data Collection
FROM 1250/1512
1008
Obtain permission to enter property (or warrants if necessary)
GO TO 1200 Scene Access (Page 2 of 3)
1010
Inquire and note who has already been at the scene
1012
Contact party in control of property (e.g., incident command, owner, etc.)
1014
Notify interested parties
1026
Are there parties that need to be notified (e.g., Property owner, manufacturers, insurance company, attorney, etc.)?
Yes
No
1028
Have parties been put on notice?
Yes
No
1030
Put parties on notice (e.g., send letters to other entities, etc.)
1016
Communicate with partner agencies
1018
Identify and secure appropriate equipment
1020
Obtain information on property use
1022
Obtain media reports
1024
Conduct pre-scene interviews
GO TO 1400 Witness Statements (Page 3 of 3)
Information Received
Details may include:
• Date of loss
• Fire location
• Property type and scope (residential, commercial, vehicle, wild land, boat, crops, equipment, other property)
• Extent of damage
◦ Safety re: known presence of hazards and hazardous materials (e.g., asbestos, clandestine drug lab)
◦ Precursory safety review
• Fatalities/Injuries
• Media reports or public records
• Jurisdiction
◦ Who will be in charge of scene/investigation from public sector
• Other parties involved
◦ Conflict check- any known relationships w interested/involved parties?
• Who is also on notice
◦ If insured property
◦ If appliances or other equipment involved (e.g.,mfr or installer, etc.)
• Personnel onsite (or will be called to be onsite)
◦ Public investigator
◦ Fire department
◦ Private investigator (Investigator for insurance company that insures the property, and/or contents)
◦ Manufacturers (piece of equipment)
▪ Put on notice and invited to participate in investigation
◦ Attorney representing the insurance company
◦ Trade personnel (HVAC, Plumbing, Electrician, etc.)
• Any protocols already in place
◦ Safety
◦ Evidence collection (incl. any sifting done on site)
◦ Evidence retention
◦ Which lab evidence will go to
• Equipment involved
◦ Manufacturer information (make and model)
• Equipment needed (e.g., crane)

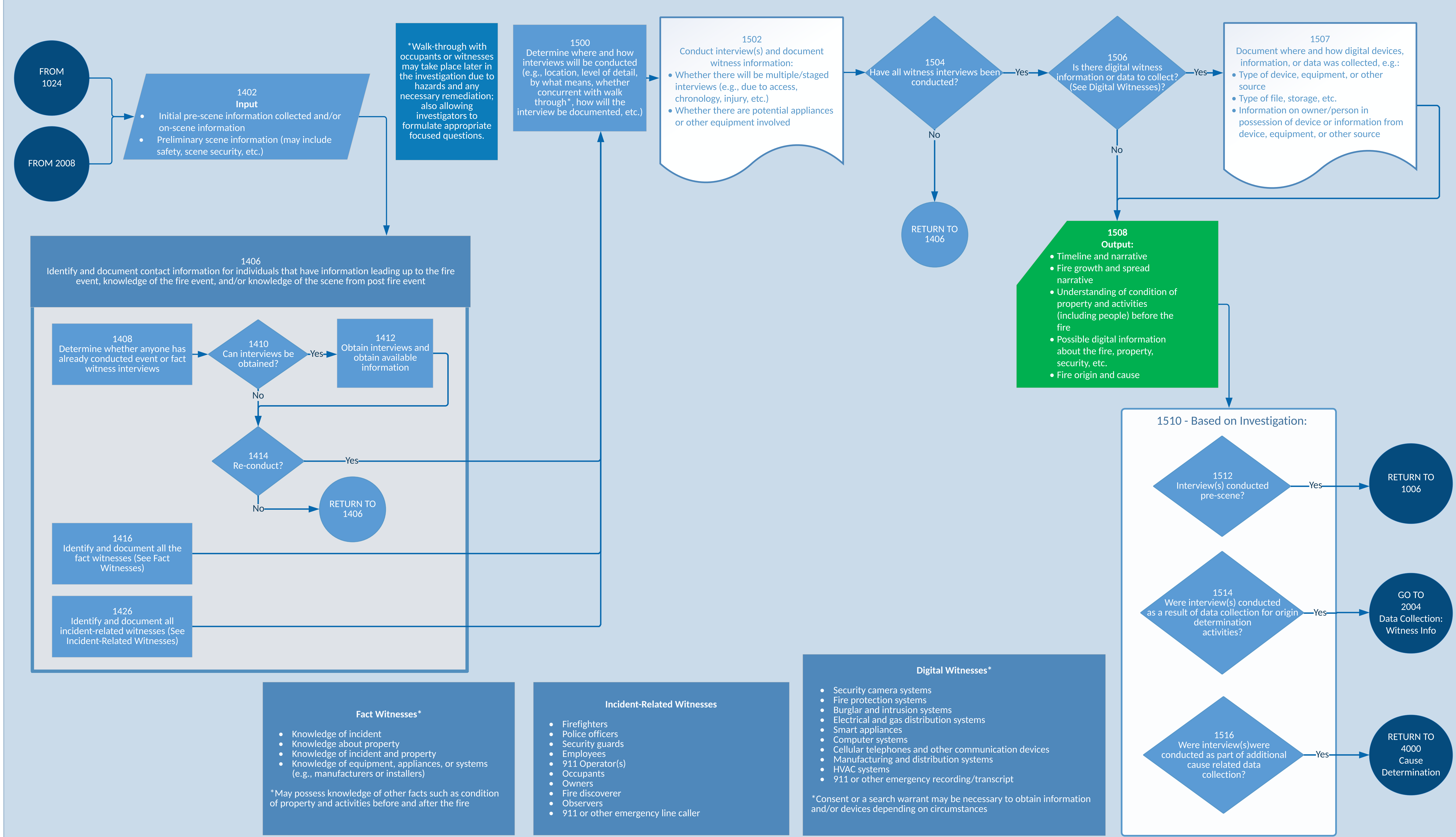
Return to Overview

1200 Scene Access



1400 Witness Information

Return to Overview



Return to Overview

2000 Data Collection (1 of 4)

FROM 1034

2002
Input
- Established need for services
- Information on: when fire happened, type of occupancy, info on extent of damage
- Witness information (e.g., video electronic or other)
- Plan to move forward (e.g., formal or informal, logistics, equipment, etc.)
- Timeframe needed for work to get done
- Permission to enter property
- Necessary parties put on notice
- Possible initial witness interviews

2003
Initiate walk-through

FROM 1510/2034/2038/2064/2066/2074/2076 2080/2090/2092/2094/2096/2100 2120/2130/2140

FROM 3060

FROM 4004/4028/4348

FROM 5138/5142

2004
Conduct data collection activities as needed per stage of investigation*:

*Data collection is ongoing irrespective of investigatory stage and the data contained in this bin represents all data from any investigative stage

2006
General observations

2008
Witness information, including electronic data
→ GO TO 1406 Witness Information

GO TO Data Collection:

2010
Fire effects
→ GO TO 2050 Fire Effects (Page 2 of 4)

2012
Effects due to fire suppression activities
→ GO TO 2080 Fire Suppression Activities (Page 2 of 4)

2014
Results of analyses: physical, laboratory, reconstruction, etc.
→ GO TO 2090/2092/2094 2096 Results

2016
Other scene, location, and event-related data
→ GO TO 2100 Other Scene, Location, and Event-Related Data (Page 4 of 4)

2018
Cause-specific data
→ GO TO 2120 Cause-Specific Data (Page 4 of 4)

2020
Data from outside report under review
→ GO TO 2130 Data from Outside (Page 4 of 4)

2022
Research, general information, and/or additional non-case specific data obtained
→ GO TO 2140 Research, general information, etc. (Page 4 of 4)

2036
Assess data collection:
- Observe, and determine how to best document data collected, e.g., saved, photographed, noted, maintained or otherwise preserved in some way
- Begin to assess whether data is relevant to the investigation at this time (reserving the right to return to any data for re-assessment further in the investigation)

2038
Have all known and available potentially relevant data been identified and collected?
No → RETURN TO 2004
Yes →

2040
Choose appropriate path based on investigation:
- GO TO 3000 Origin Determination: Data Analysis/ Interpretation
- RETURN TO 4000 Cause Determination
- RETURN TO 5036 Tech Review (Reporting)

General Observations

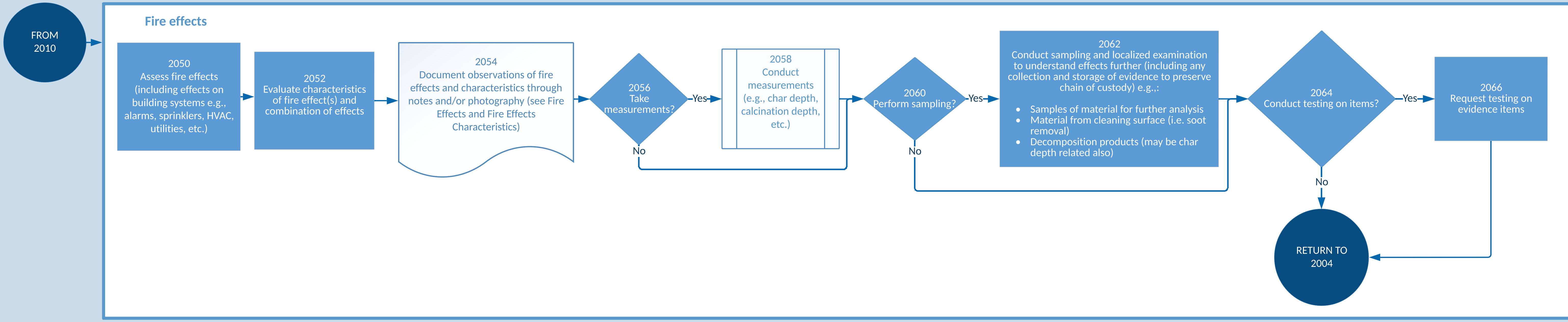
2030
During walk-through document observations e.g.,:
- Olfactory
- Audible
- Visual:
  - Ventilation sources: location and condition of vents for exhaust and intake, e.g., windows, doors, etc.
  - Building and room characteristics
  - Dimensions
  - Fuels (things that may have or could have burned)
  - Contents
    - Things moved out
    - Bare home
  - Lining materials
    - surfaces of the room and assemblies (e.g., wall type and material used, etc.)
  - What has been disturbed
- Building systems (may be olfactory, audible, and visual)

2032
If a warrant has not already been obtained, are there indications that a warrant is needed to continue?
Yes → GO TO 1220 Scene Access
No →

2034
Continue with walk through and/or scene investigation activities PAP
→ RETURN TO 2004

Return to Overview

2000 Data Collection (2 of 4)



Fire Effects

- Discoloration/color change
  - Oxidation
  - Rainbow effect
  - Staining of glass
- Deformation
  - Structural deformation
  - Alloying
  - Breaking of glass
  - Collapsed furniture springs
  - Distorted light bulbs
  - Melting
  - Thermal expansion
  - Blistering
- Deposition
  - Deposition of smoke on surfaces
  - Smoke alarms
    - Enhanced soot deposition
- Mass loss
  - Measurement of:
    - Calcination depth
    - Char depth
    - Mass loss (e.g., weight or other measurement to evaluate how much of an item has burned)
    - Spalling (e.g., chipping, crumbling)

- Arc sites/arcing events and artifacts
- Arc mark
  - Beading of the metal
  - Severing the conductor
  - Corresponding notches in conductors
    - Mass loss/deformation- connected to these features
- System fire effects (on alarm, HVAC systems, etc.):
  - Failure pattern
  - Building systems affected
    - History of alarm conditions (e.g., activation or failure of device)
- Thermal decomposition:
  - Photos, diagrams, notes, where things occur
  - Characteristics; color changes, mass loss, melting, etc.
- Absence of soot:
  - Possibly from "clean burn" (e.g., enough heat to burn off soot- no soot on wall as it has been burned off, thermally effected but no soot there; also protected so there is also an absence of soot

Fire Effects Characteristics

- Magnitude
- Properties of material
- Circumstantial context
- Gradient
- Size
- Color
- Location
- Shape
- Geometry
- Orientation
- Timing or sequence of events related to system
- Depth
- Proximity to other feature(s)

Return to Overview

2000 Data Collection (3 of 4)

FROM 2012

Effects Due to Fire Suppression Activities

2080
Assess effects due to firefighting operations, fire suppression activities, and overhaul including any resulting sources of ventilation (See Effects due to Suppression/Overhaul)

RETURN TO 2004

FROM 2014

Results of Analyses

Consider all that apply:

2090
Pre-fire conditions/content analysis (may be based on observations, interviews, reconstruction, photos, videos, witnesses, electronic data from systems)

2092
Laboratory Data (Off Scene)

- Metallurgical data
  - Crystal structure (metals), what elements are present
- Chemical and materials science data
- Physical measurements (gauge of wires, etc.)
- Temperature measurements
- Electrical measurement
- Destructive (may need permission or get concurrence of parties) and non-destructive (e.g, CT scans of an item or equipment/device)
- Mechanical testing
  - Stress testing
- Electrical artifacts- localized damage indicating electrical failure)
- Materials analysis
- Ignitability of a fuel

2094
Results of modeling for hypothesis testing, subsequent modeling, scale testing, or other analyses

2096
Results of fire scene reconstruction

RETURN TO 2004

Effects Due to Firefighting Suppression/Overhaul (including sources of ventilation):

- Penetrations into walls or ceilings
  - Drive fire from one portion of building to another
- Offensive vs. defensive
- Salvage (e.g., protecting contents)
  - Ex. Salvage cover: tarps over items to prevent destruction; can also be used as water shoots
- Overhaul (e.g., ensure fire is extinguished)
  - Items that were in the room/other rooms may have been moved by the fire department or an investigator, crew, etc. and may be mixed together outside or in another area.
- Forced entry
- Opened doors
- Holes in roof
- Knocked down walls during suppression
- Broken windows
- Disconnection of utilities; (also may be related to arc mapping)
  - Turning off breakers
- Bringing equipment into building- can be destructive to patterns
  - Gas powered equipment, equipment with oil coating, etc.

Return to Overview

2000 Data Collection (4 of 4)

FROM 2016

Other scene, location, and event-related data

2100
- Maps
- Digital/electronic evidence (e.g., phone, video, smart home appliances, etc.)
- Blueprints/building permit information
- CCTV information
- Weather
- GPS tracking
- Building utility maps and status
- Dispatch information
- Communication logs
- Injuries
- Autopsy results

RETURN TO 2004

FROM 2020

Data from Outside Report for Review

2130
May contain data including but not limited to:

- Observations
- Fire effects
- Firefighting operations effects
- Witness statements
- Non-scene data
- Results of analysis
- Cause-related data
- Other

RETURN TO 2004

FROM 2018/4352/5140

Subset of Data Related to Cause

2120

- Human activity around the time and location of fire
- Potential ignition sources *(consider all potential ignition sources in area of origin)*
  - Heating device
  - Smoking materials
  - Electrical
  - Appliances
  - Mechanical equipment
  - Open flame devices
  - Lightning
  - Fire Debris Analysis (e.g., gas, lighter fluid, fuels)
  - Consumer products
  - Chemicals
  - Materials related to spontaneous combustion or self-ignition
- Damage patterns
  - Self-heating (internal to object)
  - Damage to devices or lack thereof- damage inside or outside
- Fuel considerations
  - Fuels present in area of origin (and ignitability via ignition sources)
  - Intentions
  - Source placement
  - Source location
  - Types
  - Atypical (not normally present)
- Oxidants
  - Proximity
  - Re pyrolysis- dependent on what the oxidant is (air vs a chemical vs 99% O_2, etc.)
  - Concentration of the oxidant- normal air vs pure oxygen
  - Amount
  - Failure modes (e.g., pure liquid oxygen escaped from pipe, etc.)
- Physical proximity of potential ignition source to fuels within the area of origin
- Timeline analysis of fire event

2121
Are there any notifications that need to take place due to cause-specific data?

Yes → 2022
Put parties on notice (e.g., send letters to other entities, etc.) → RETURN TO 2004

No → RETURN TO 2004

FROM 2022

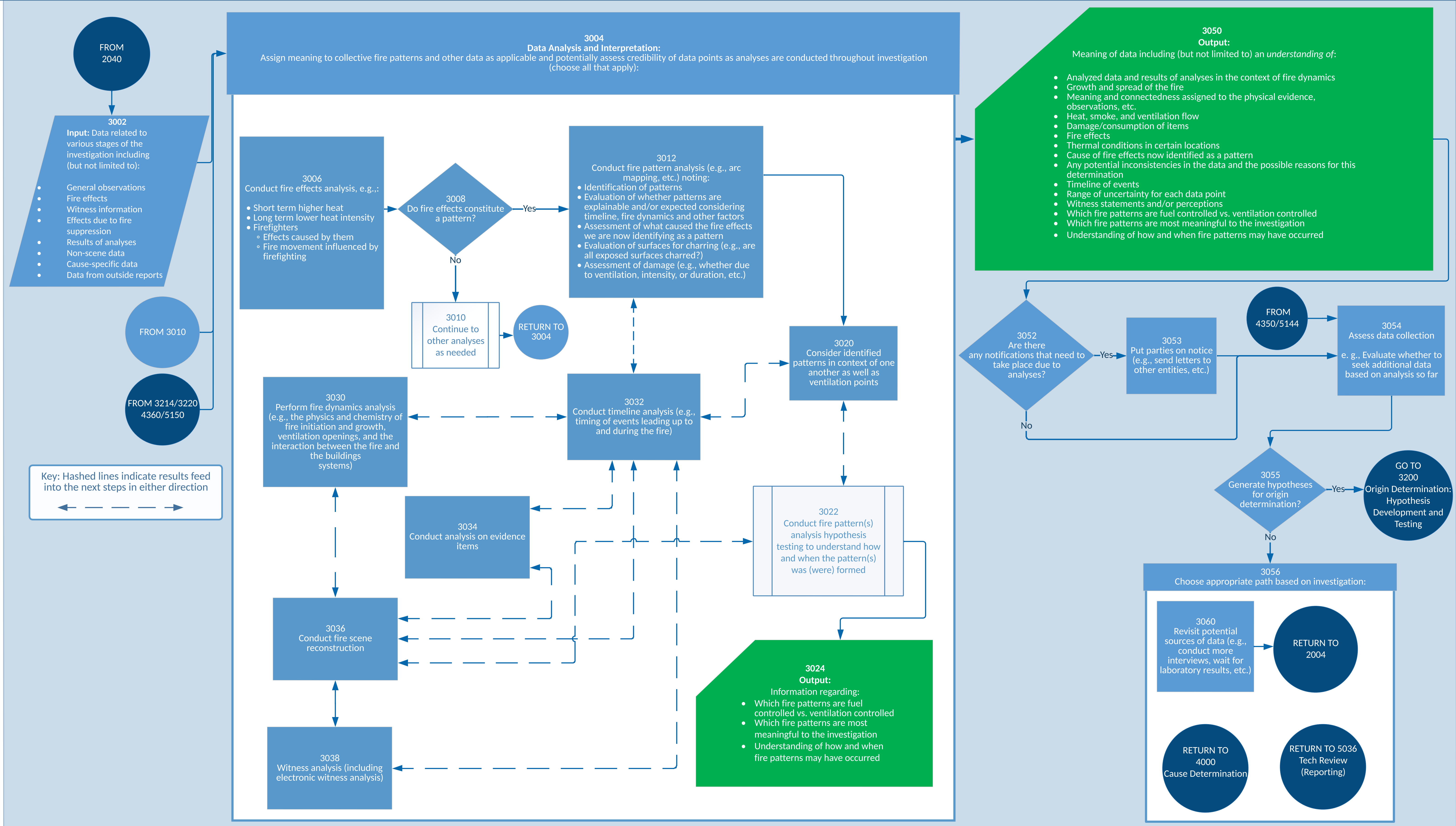
Research, general information, and/or additional non-case specific data obtained

2140
Research (e.g., Literature review; sources of information: magazines, scholarly research, peer reviewed journal, ATF, Ignition Handbook, Consumer Product Safety Commission (CPSC), manufacturer information, product manuals, etc.)

RETURN TO 2004

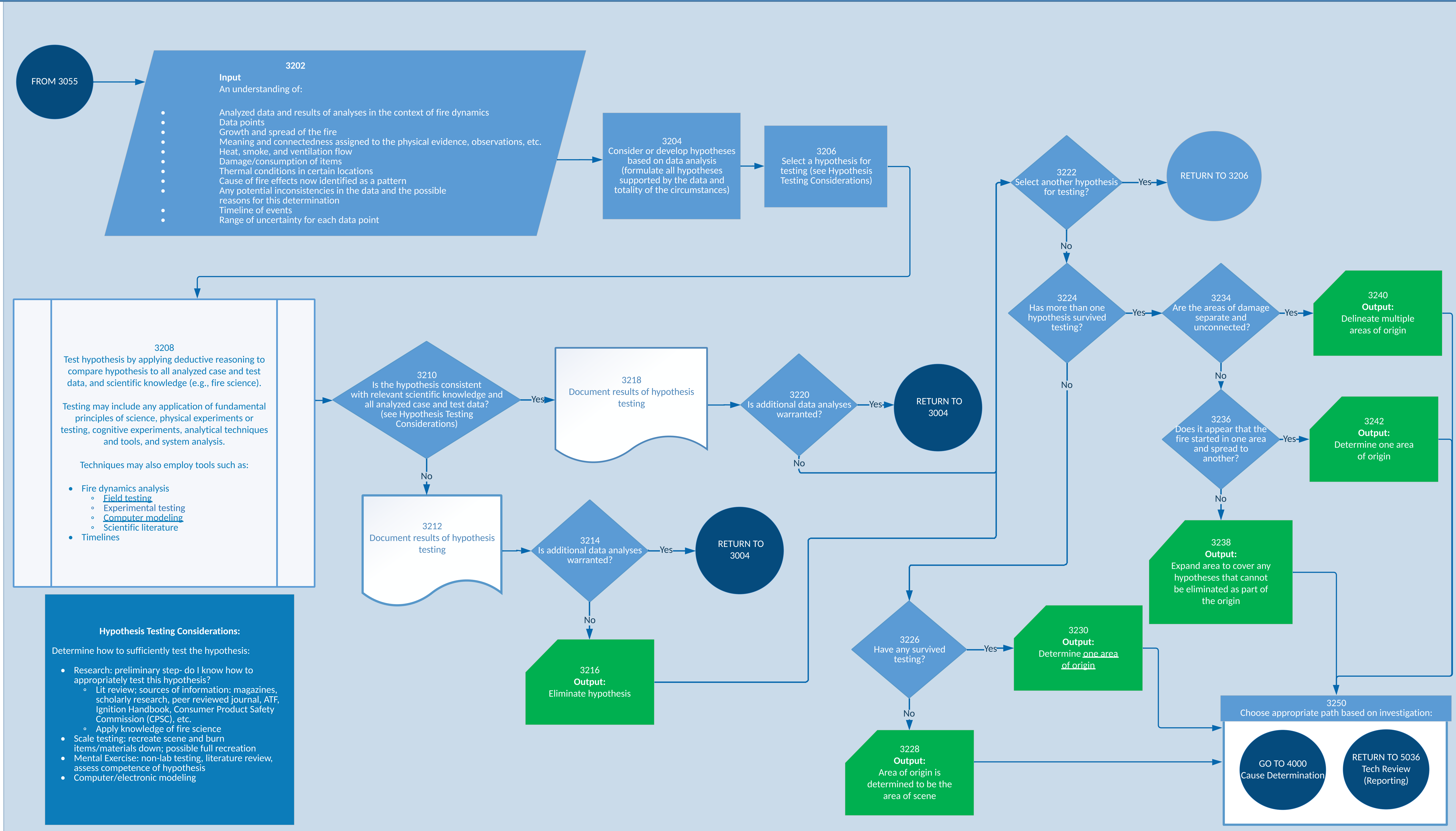
Return to Overview

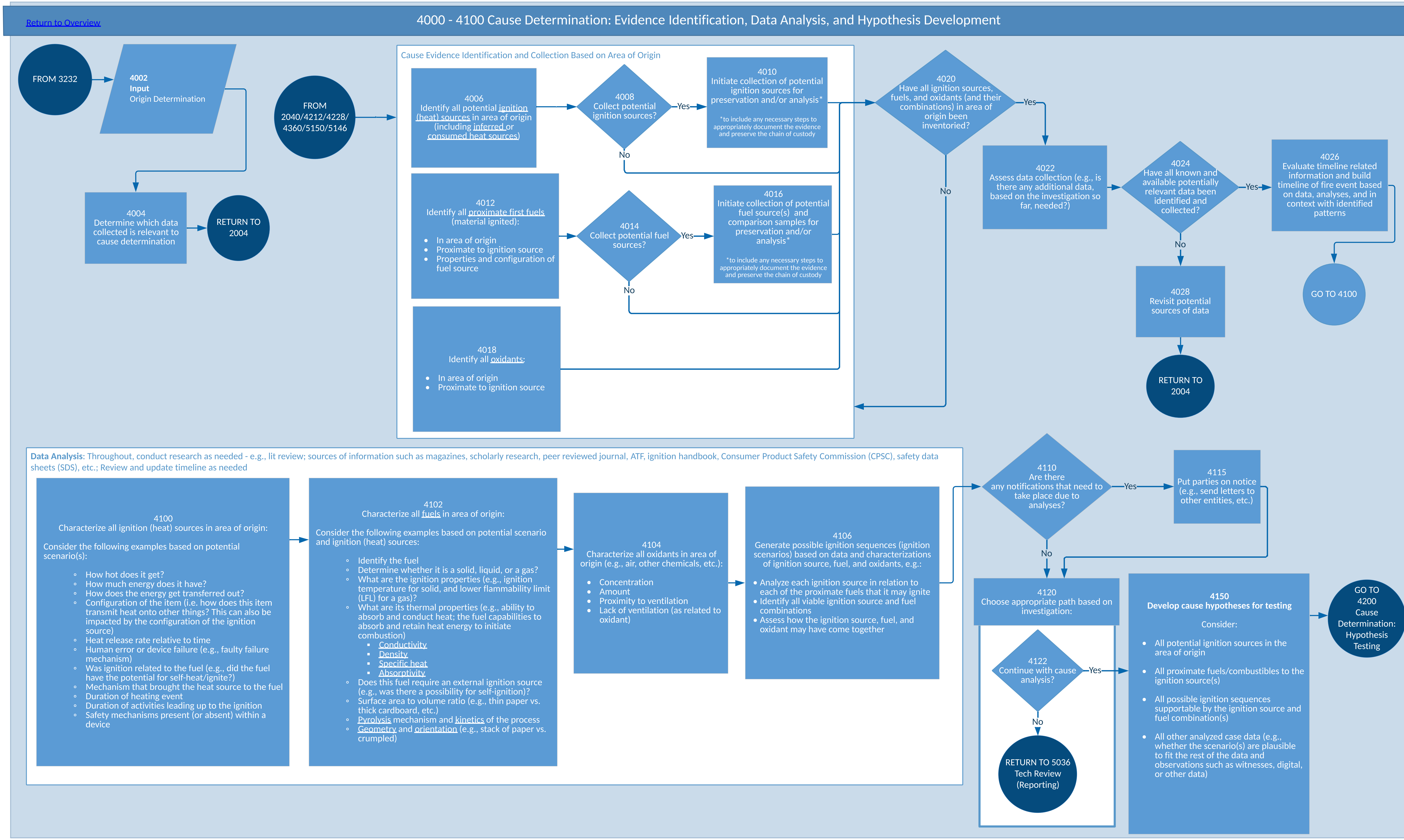
3000 Origin Determination: Data Analysis



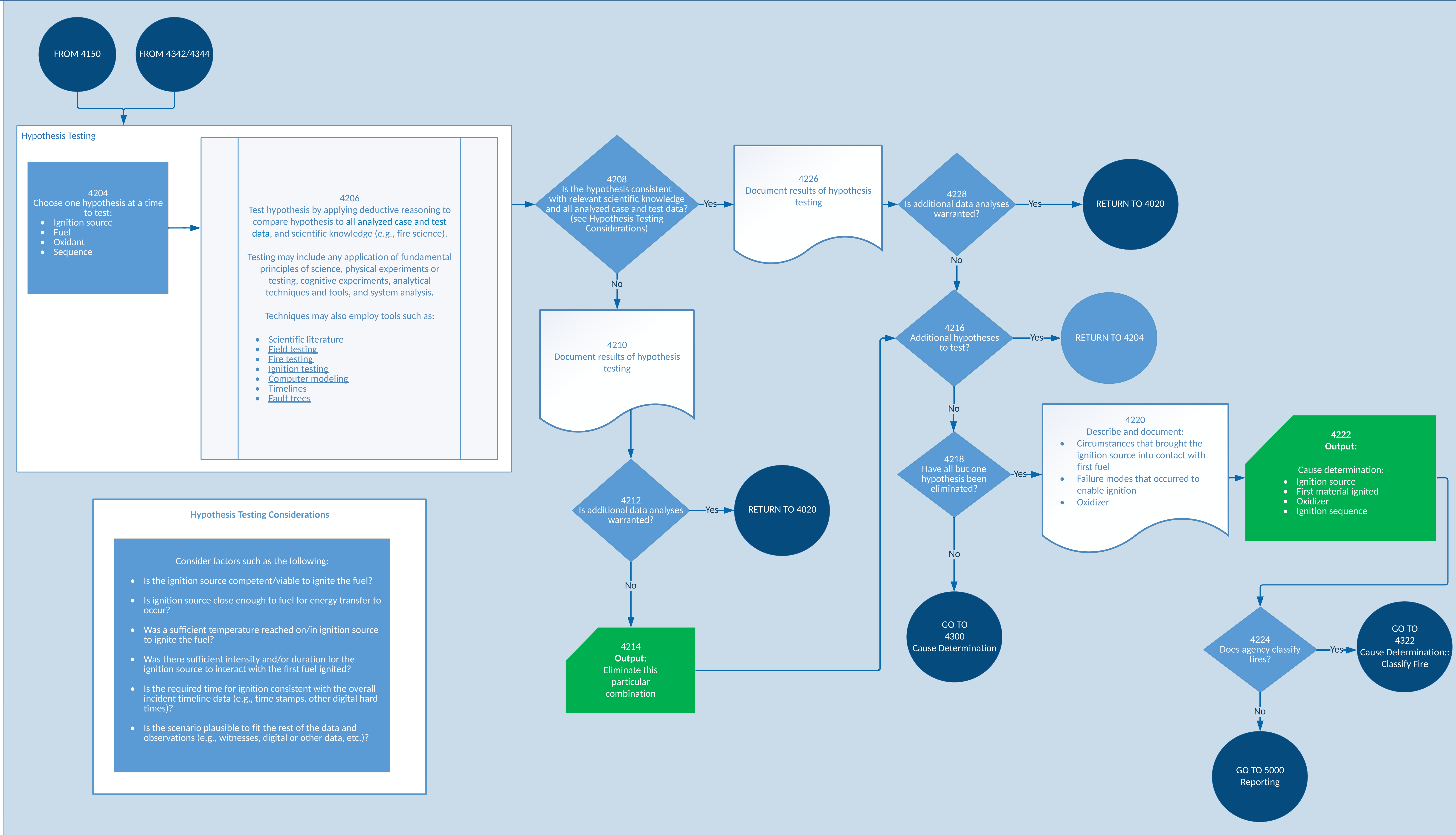
Return to Overview

3200 Origin Determination: Hypothesis Development and Testing



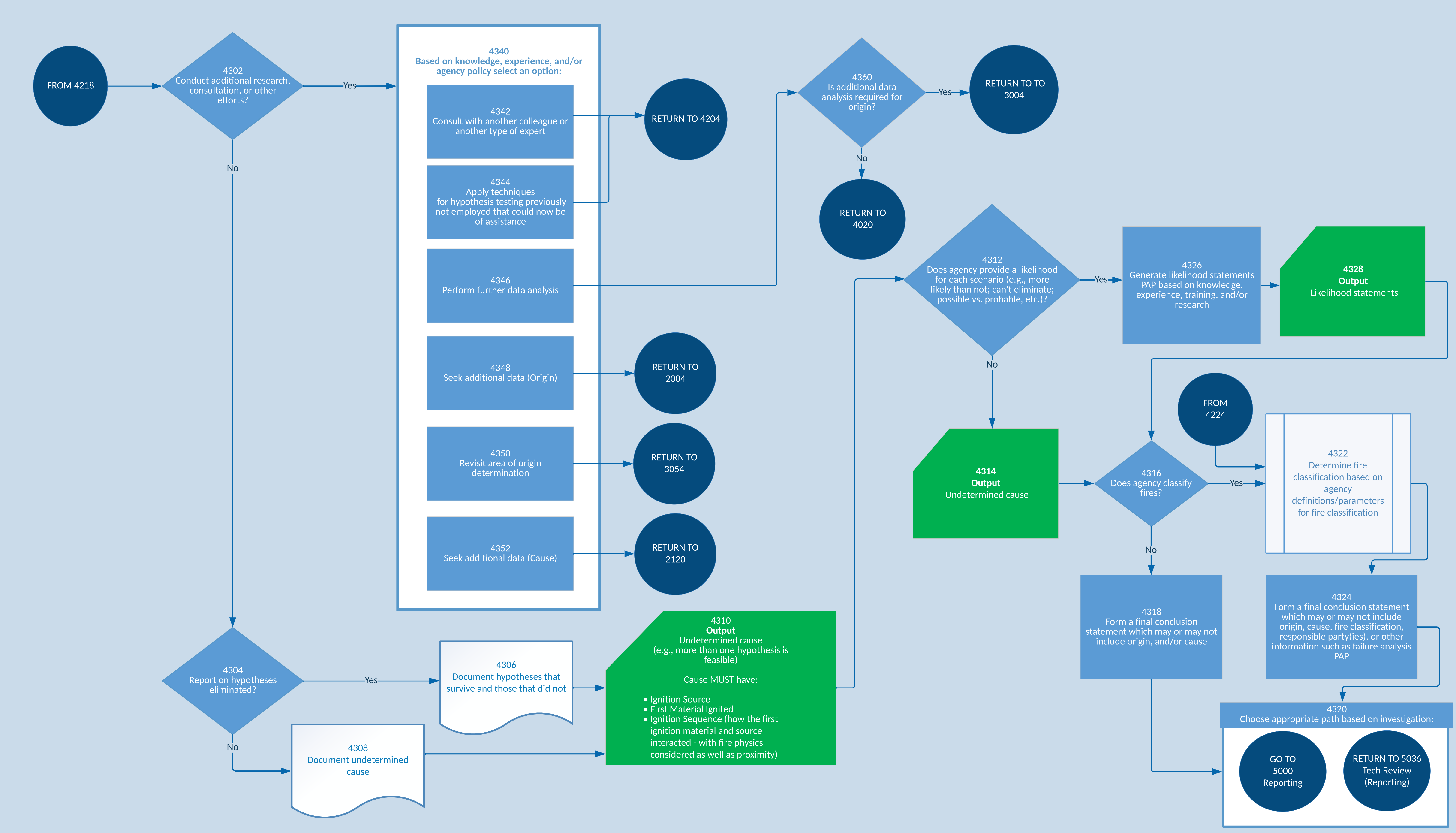

Return to Overview
4000 - 4100 Cause Determination: Evidence Identification, Data Analysis, and Hypothesis Development
FROM 3232
4002
Input
Origin Determination
4004
Determine which data collected is relevant to cause determination
RETURN TO 2004
FROM 2040/4212/4228/4360/5150/5146
Cause Evidence Identification and Collection Based on Area of Origin
4006
Identify all potential ignition (heat) sources in area of origin (including inferred or consumed heat sources)
4008
Collect potential ignition sources?
Yes
No
4010
Initiate collection of potential ignition sources for preservation and/or analysis*
*to include any necessary steps to appropriately document the evidence and preserve the chain of custody
4012
Identify all proximate first fuels (material ignited):
In area of origin
Proximate to ignition source
Properties and configuration of fuel source
4014
Collect potential fuel sources?
Yes
No
4016
Initiate collection of potential fuel source(s) and comparison samples for preservation and/or analysis*
*to include any necessary steps to appropriately document the evidence and preserve the chain of custody
4018
Identify all oxidants:
In area of origin
Proximate to ignition source
4020
Have all ignition sources, fuels, and oxidants (and their combinations) in area of origin been inventoried?
Yes
No
4022
Assess data collection (e.g., is there any additional data, based on the investigation so far, needed?)
4024
Have all known and available potentially relevant data been identified and collected?
Yes
No
4026
Evaluate timeline related information and build timeline of fire event based on data, analyses, and in context with identified patterns
GO TO 4100
4028
Revisit potential sources of data
RETURN TO 2004
Data Analysis: Throughout, conduct research as needed - e.g., lit review; sources of information such as magazines, scholarly research, peer reviewed journal, ATF, ignition handbook, Consumer Product Safety Commission (CPSC), safety data sheets (SDS), etc.; Review and update timeline as needed
4100
Characterize all ignition (heat) sources in area of origin:
Consider the following examples based on potential scenario(s):
How hot does it get?
How much energy does it have?
How does the energy get transferred out?
Configuration of the item (i.e. how does this item transmit heat onto other things? This can also be impacted by the configuration of the ignition source)
Heat release rate relative to time
Human error or device failure (e.g., faulty failure mechanism)
Was ignition related to the fuel (e.g., did the fuel have the potential for self-heat/ignite?)
Mechanism that brought the heat source to the fuel
Duration of heating event
Duration of activities leading up to the ignition
Safety mechanisms present (or absent) within a device
4102
Characterize all fuels in area of origin:
Consider the following examples based on potential scenario and ignition (heat) sources:
Identify the fuel
Determine whether it is a solid, liquid, or a gas?
What are the ignition properties (e.g., ignition temperature for solid, and lower flammability limit (LFL) for a gas)?
What are its thermal properties (e.g., ability to absorb and conduct heat; the fuel capabilities to absorb and retain heat energy to initiate combustion)
Conductivity
Density
Specific heat
Absorptivity
Does this fuel require an external ignition source (e.g., was there a possibility for self-ignition)?
Surface area to volume ratio (e.g., thin paper vs. thick cardboard, etc.)
Pyrolysis mechanism and kinetics of the process
Geometry and orientation (e.g., stack of paper vs. crumpled)
4104
Characterize all oxidants in area of origin (e.g., air, other chemicals, etc.):
Concentration
Amount
Proximity to ventilation
Lack of ventilation (as related to oxidant)
4106
Generate possible ignition sequences (ignition scenarios) based on data and characterizations of ignition source, fuel, and oxidants, e.g.:
Analyze each ignition source in relation to each of the proximate fuels that it may ignite
Identify all viable ignition source and fuel combinations
Assess how the ignition source, fuel, and oxidant may have come together
4110
Are there any notifications that need to take place due to analyses?
Yes
No
4115
Put parties on notice (e.g., send letters to other entities, etc.)
4120
Choose appropriate path based on investigation:
4122
Continue with cause analysis?
Yes
No
RETURN TO 5036 Tech Review (Reporting)
4150
Develop cause hypotheses for testing
Consider:
All potential ignition sources in the area of origin
All proximate fuels/combustibles to the ignition source(s)
All possible ignition sequences supportable by the ignition source and fuel combination(s)
All other analyzed case data (e.g., whether the scenario(s) are plausible to fit the rest of the data and observations such as witnesses, digital, or other data)
GO TO 4200 Cause Determination: Hypothesis Testing

4200 Cause Determination: Hypothesis Testing



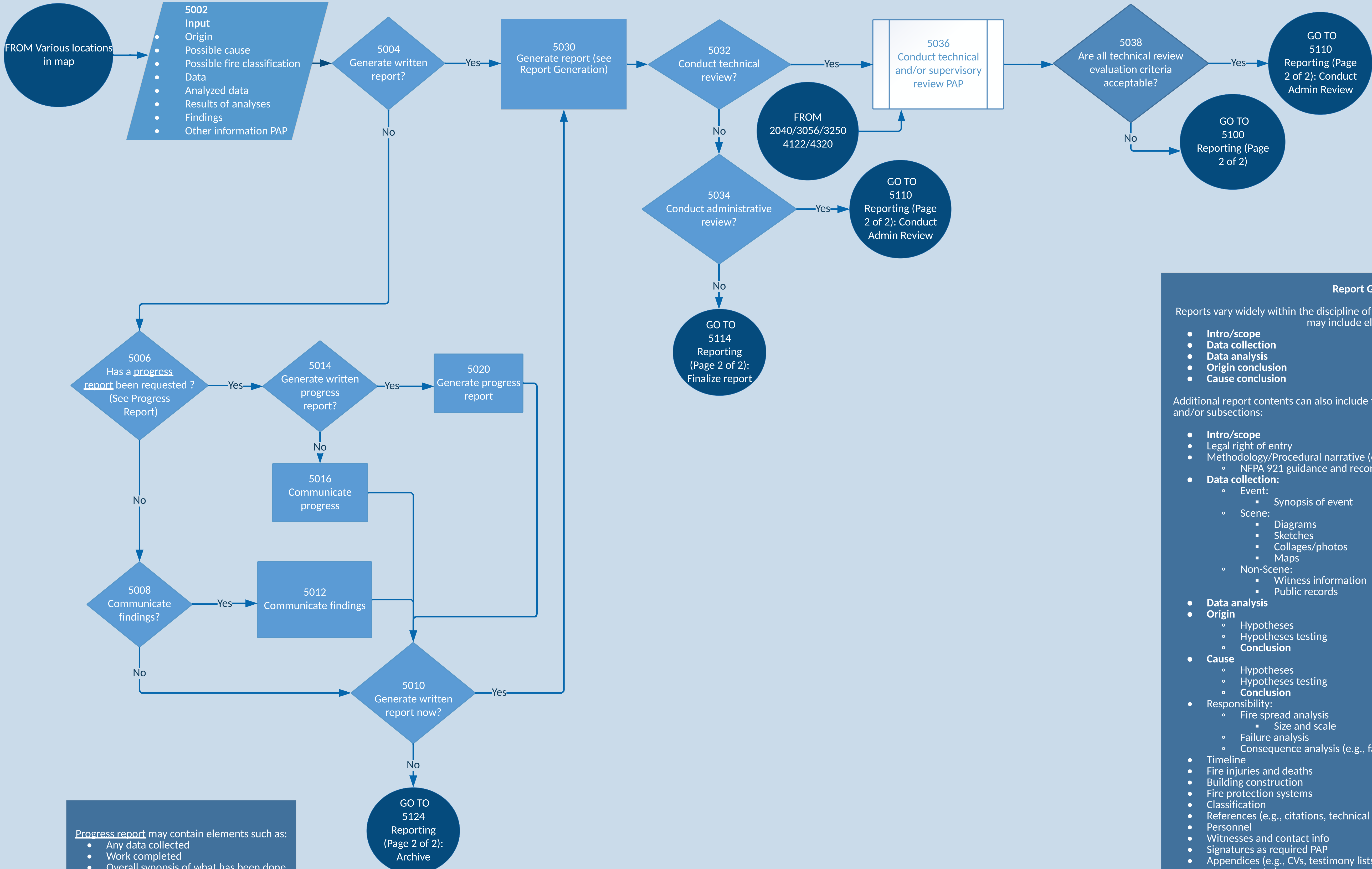
Return to Overview

4300 Cause Determination



Return to Overview

5000 – Reporting (1 of 2)



Progress report may contain elements such as:

- Any data collected
- Work completed
- Overall synopsis of what has been done so far on the case

Report Generation

Reports vary widely within the discipline of fire investigation; however, reports generally may include elements such as:

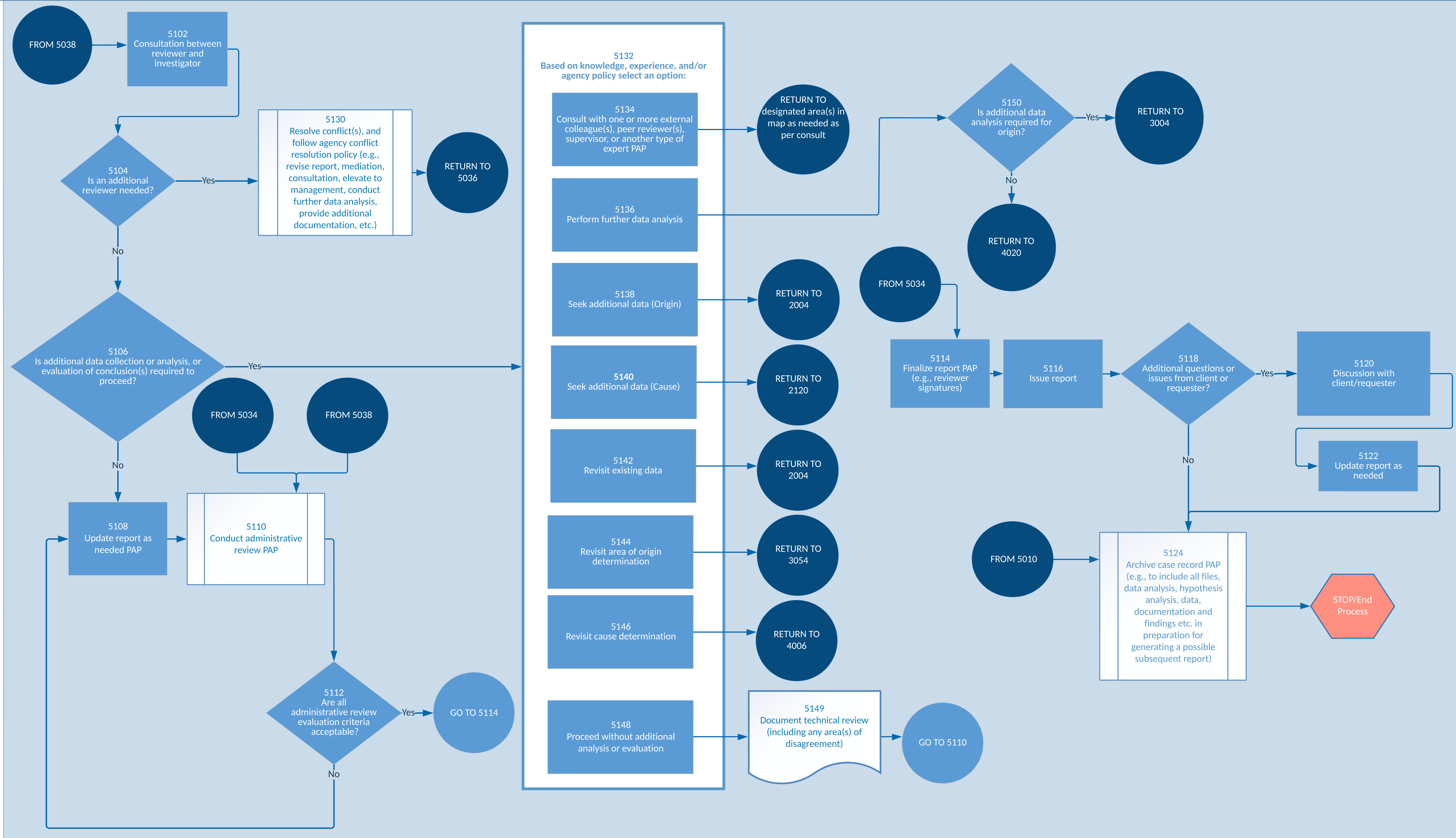
- **Intro/scope**
- **Data collection**
- **Data analysis**
- **Origin conclusion**
- **Cause conclusion**

Additional report contents can also include the above, along with supplementary context and/or subsections:

- **Intro/scope**
- Legal right of entry
- Methodology/Procedural narrative (e.g., reconstruction)
  - NFPA 921 guidance and recommended procedures
- **Data collection:**
  - Event:
    - Synopsis of event
  - Scene:
    - Diagrams
    - Sketches
    - Collages/photos
    - Maps
  - Non-Scene:
    - Witness information
    - Public records
- **Data analysis**
- **Origin**
  - Hypotheses
  - Hypotheses testing
  - **Conclusion**
- **Cause**
  - Hypotheses
  - Hypotheses testing
  - **Conclusion**
- Responsibility:
  - Fire spread analysis
    - Size and scale
  - Failure analysis
  - Consequence analysis (e.g., fatalities or injuries)
- Timeline
- Fire injuries and deaths
- Building construction
- Fire protection systems
- Classification
- References (e.g., citations, technical references, journal articles, recalls, etc.)
- Personnel
- Witnesses and contact info
- Signatures as required PAP
- Appendices (e.g., CVs, testimony lists, billing rates, activity reports from various personnel, etc.)
- Materials reviewed (e.g., info provided by additional personnel)
- Additional reports/analyses/testimony reviewed (e.g., for evaluation for defense, appeals, depositions, etc.)

Return to Overview

5100 – Reporting (2 of 2)



Glossary of Terms and Definitions*

Area(s) of Origin[1]: A structure, part of a structure, or general geographic location within a fire scene, in which the *"point of origin"* of a fire or explosion is reasonably believed to be located.

Absorptivity: The fraction of incident radiation absorbed by a surface

Alloying[4]: The formation of a substance from the combination of two or more metals through mechanical, heat and mass transfer, and chemical phenomena.

Arcing[1]: High temperature luminous electric discharging across a gap or through a medium such as charred insulation.

Building Systems[3]: Systems of a building or facility such as the electrical, HVAC, security, life safety, lighting, utilities, telecom, and energy management; these may depend on each other to operate.

Computer Modeling: Mathematical model of a physical system intended to approximate the dynamics of the system.

Conductivity (adapted from NFPA 921)[1]: The ability of a material to transfer heat to another body by direct contact.

Consumed Heat Source[5]: An object that produces or radiates heat that has been consumed by the fire or explosion.

Density[1]: The mass of a substance per unit volume, usually specified at a standard temperature and pressure.

Exigent Circumstances[6]: The principle established by the courts that the fire department has the legal authority to enter a property to extinguish a fire and determine the origin and cause of the fire (an act that is considered to be a protection of the public welfare). Exigent circumstance is extended to a reasonable timeframe to extinguish a fire and determine its origin and cause.

Failure Analysis[1]: A logical, systematic examination of an item, component, assembly, or structure and its place and function within a system, conducted in order to identify and analyze the probability, causes, and consequences of potential and real failures.

Fault Tree Analysis[7]: A logic diagram based on the principle of multi-causality, which traces all branches of events which could contribute to an accident or failure.

Field Testing: Testing of an ignition source, fuel(s), a component, or system at the scene of a fire or explosion. Such testing of a component or system is done in situ if disconnection or removal of the item would negate future testing.

Fire Dynamics[1]: The detailed study of how chemistry, fire science, and the engineering disciplines of fluid mechanics and heat transfer interact to influence fire behavior.

Fire Effects[1]: Observable or measurable changes in or on a material or a system that have occurred as a result of fire actions.

Fire Patterns[1]: The visible or measurable physical changes, or identifiable shapes, formed by a fire effect or group of fire effects.

Fire Scene Reconstruction[1]: The process of recreating all or some of the physical scene during fire scene analysis investigation or through the removal of debris and the placement of contents or structural elements in their pre-fire positions.

Fire Testing: Tests to determine such things as ignition characteristics, fire growth and development, heat release, etc.

First Fuel Ignited (aka Material First Ignited) - adapted from NFPA 921[1]: The first fuel ignited is that which first sustains combustion beyond the ignition source, e.g., the fuel that is first set on fire by the heat of ignition; to be meaningful, both a type of material and a form of material should be identified.

Fuel[1]: A material that will maintain combustion under specified environmental conditions.

Geometry: The shape, form, and orientation of a fuel that affects its ignition and burning characteristics.

Ignition (Heat) Source (adapted from NFPA 921)[1]: A source of heat that enables the process of initiating self-sustained combustion.

Ignition Testing (adapted from NFPA 921)[1]: The process of testing the initiation of self-sustained combustion; including the ignition time, ignition temperature, and ignition energy required for a substance to burn.

Inferred Heat Source (adapted from NFPA 921)[1]: A source of heat, which may no longer be visible or present, that enables the process of initiating self-sustained combustion (e.g., cigarette or other heat source that may have been consumed by the fire).

Kinetics: Rate of chemical reaction

Non-Scene Data: That which is relevant to some aspect of the fire origin and cause investigation but is not contained within the actual fire scene. Investigators collect "non-scene data" and may use it to help establish the fire or explosion timeline, identify an area of origin, document the growth and spread of the fire, identify suppression efforts which may have affected fire growth and spread, provide context to another piece of data, or to establish evidence of causation (e.g., lightning, intentional human acts).

Orientation: The position and form of a fuel source; this can influence the response of a material to heat from an ignition source e.g., using a solid block of wood vs. kindling to start a campfire.

Oxidants: Reactant that oxidizes or removes electrons from other reactants during a redox reaction.

Property Type and Scope: The occupancy and construction of a property.For non-buildings it means things like vehicle or equipment type, land use, structure use (tower, antenna, etc.)

Pyrolysis[1]: A process in which material is decomposed, or broken down, into simpler molecular compounds by the effects of heat alone; pyrolysis often precedes combustion.

Specific Heat: The quantity of heat required to raise the temperature of one gram of a substance by one degree Celsius.

Suppression Activities[1]: The sum of all the activities done to extinguish a fire

Thermal Decomposition (adapted from NFPA 921)[1]: The chemical decomposition of a surface or body caused by a rise in temperature.

References

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