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Chemical Agent Incident-Response and Recovery Decision Process

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Instructions

Click to
Continue

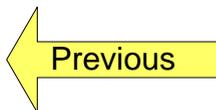
The Chemical Agent Incident-Response and Recovery Decision Process tool is an interactive document using a web browser to step through and link processes.

Each page is linked to following pages.

- To move forward, click on the arrow in the upper right-hand corner of each page.



- To move backward, click on the arrow in the upper left corner.

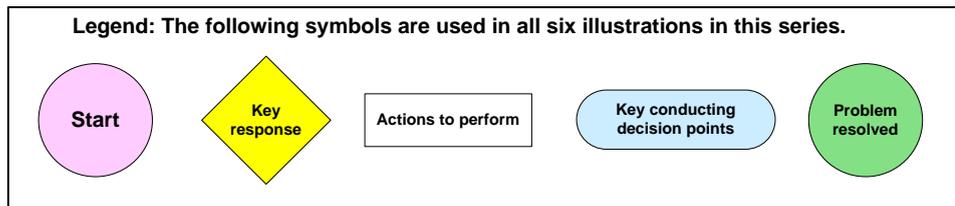
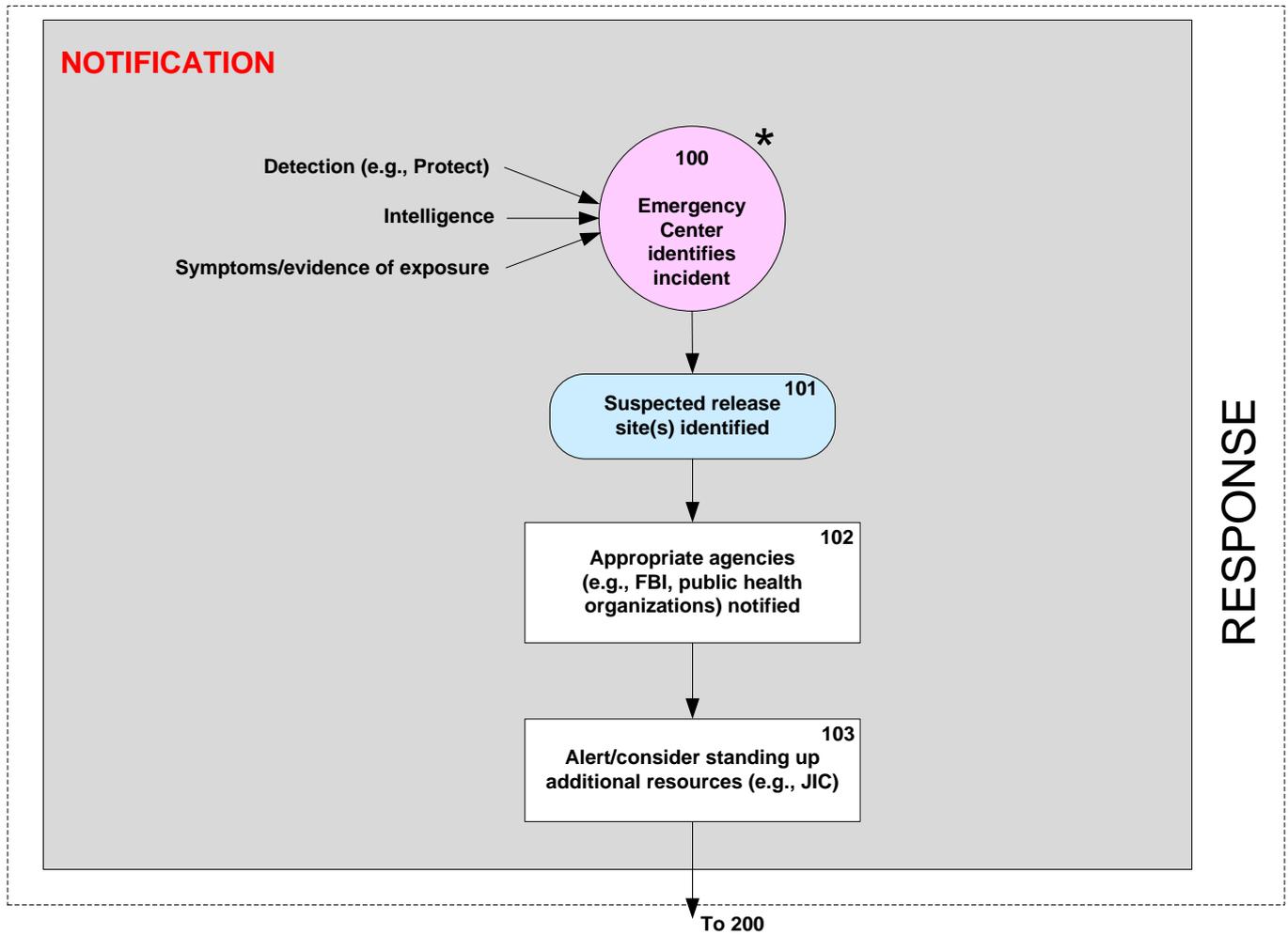


Many of the process blocks have been expanded to show more detail. These blocks are indicated with an asterisk.

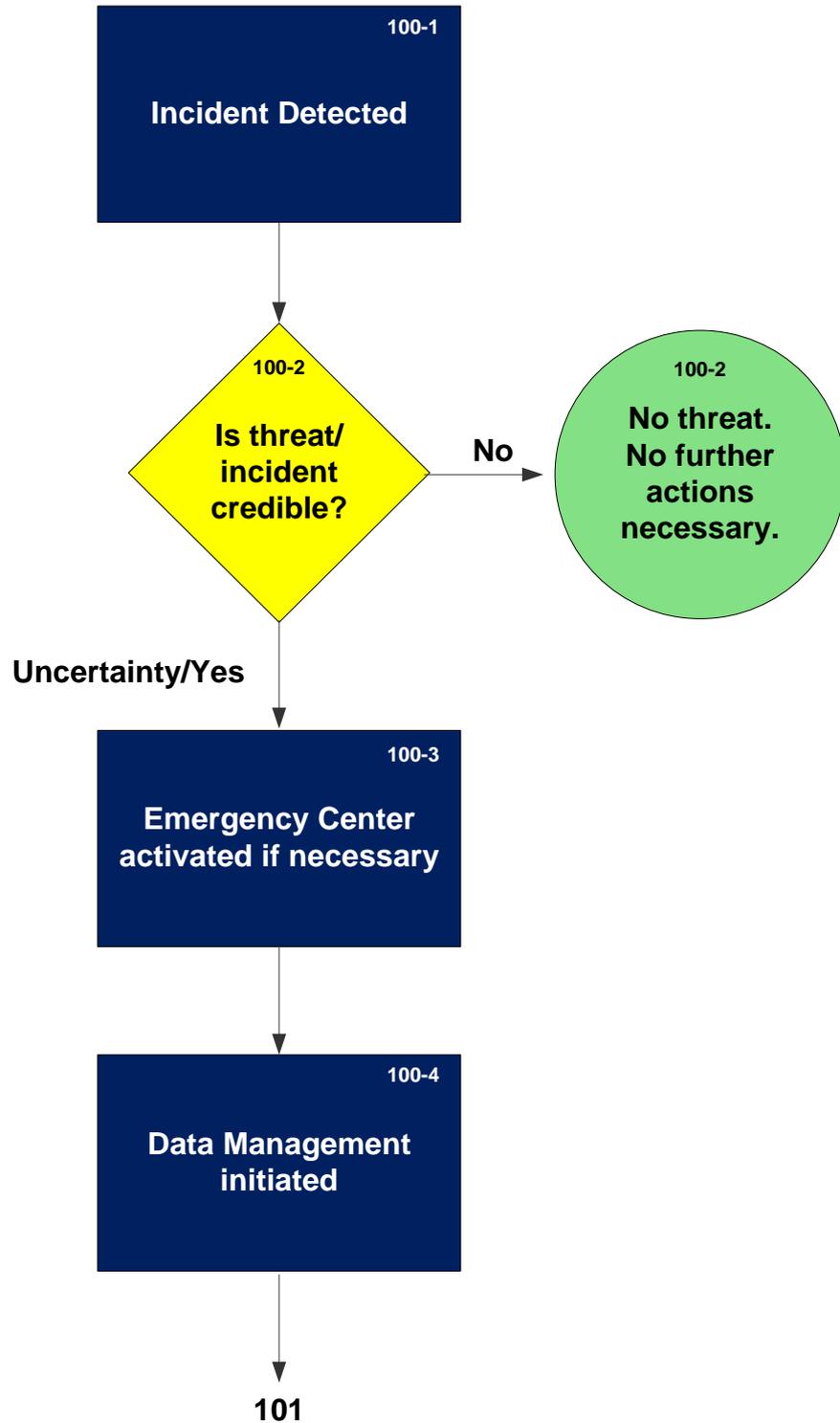
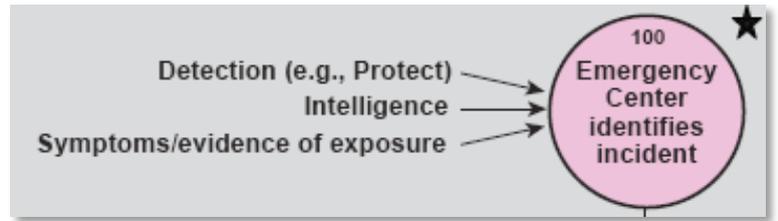
- Clicking on these blocks will open an expansion page. The block that is expanded will be duplicated in the upper right corner.
- To return to the original diagram, simply click on that block.
- As an alternative, there is an up-arrow button on the lower right corner which will also cause a return



Chemical Agent Incident-Response Decision Process (1 of 5)

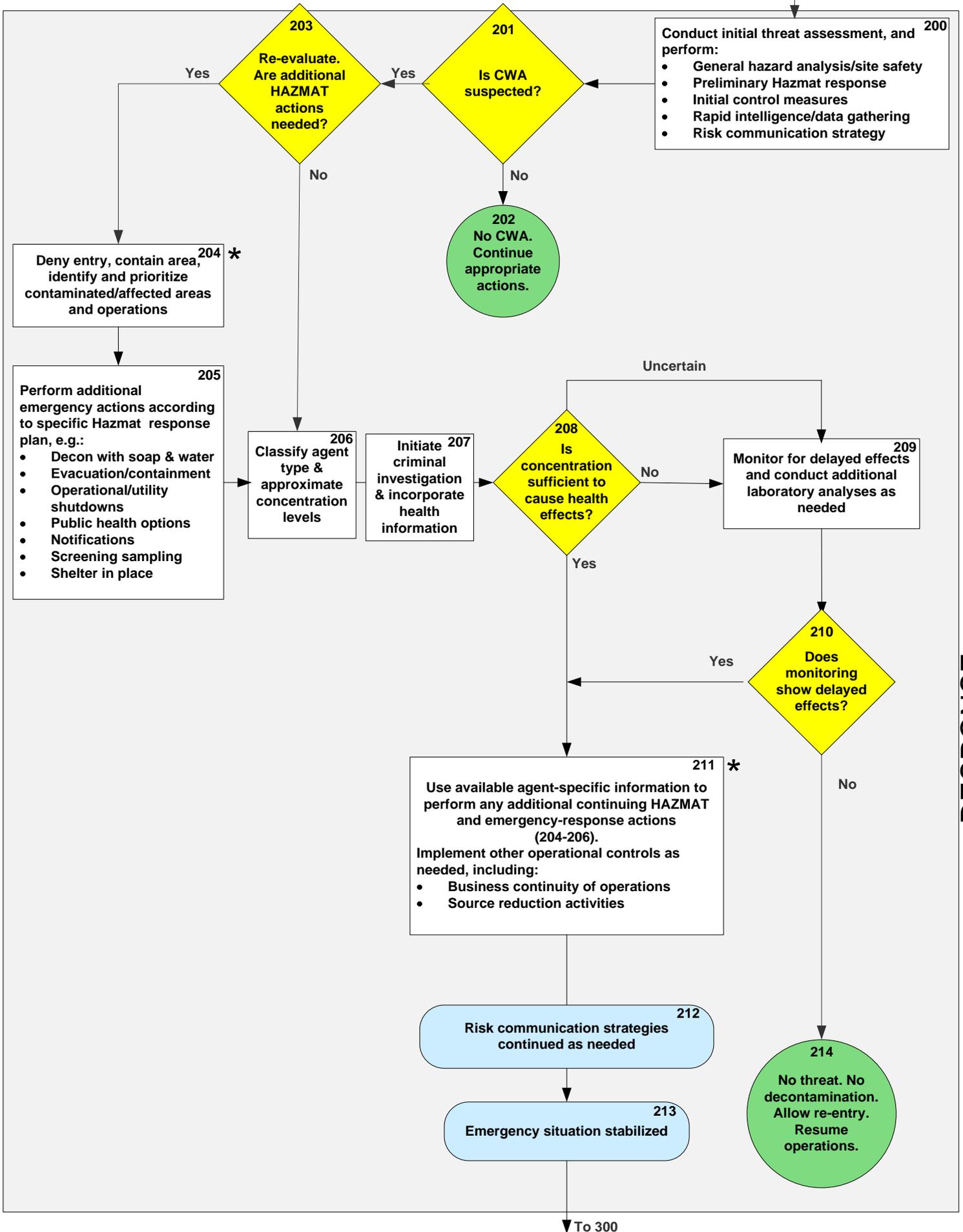


NOTIFICATION (expanded 100)



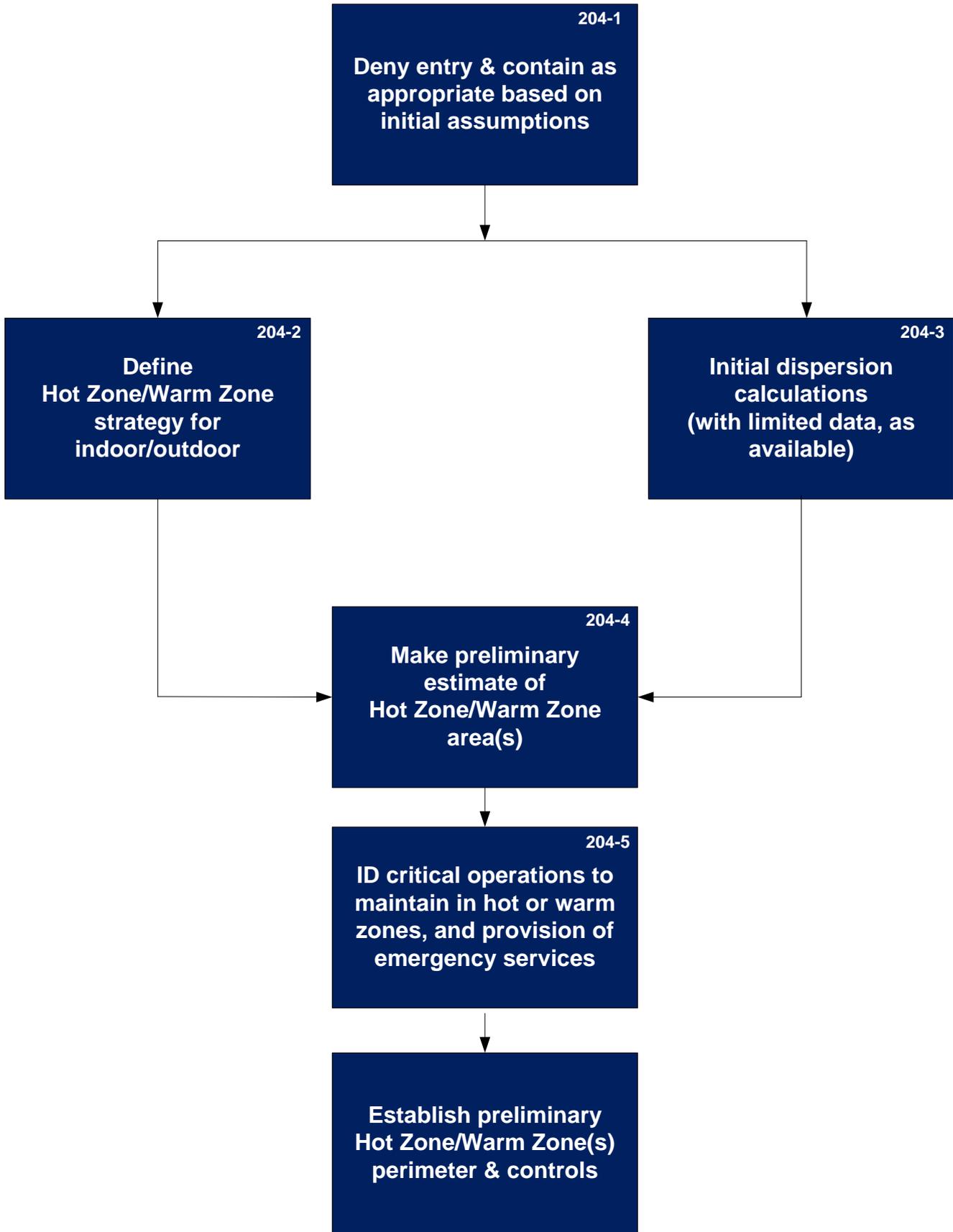
Chemical Agent Incident-Response Decision Process (2 of 5)

FIRST RESPONSE



**FIRST RESPONSE
(expanded 204)**

204
Deny entry, contain area,
identify and prioritize
contaminated/affected
areas and operations



FIRST RESPONSE (expanded 211)

211
Use available agent-specific information to perform any additional continuing HAZMAT and emergency-response actions (204–206).
Implement other operational controls as needed, including:
• Business continuity of operations
• Source reduction activities

211-1
Refine hot zone hypothesis & determine any other necessary actions, including procedures for providing emergency services in the hot zone(s)

211-2
Assess & determine any necessary public health actions
• Special populations
• General population

211-3
Order evacuation or shelter in place?

211-4
Issue shelter in place warning and instructions on protective measures and personal self-remediation

211-5
Execute evacuation plans

211-6
Establish and operate evacuee decontamination sites

211-7
Establish temporary shelters, if necessary

211-8
Decontaminate evacuees and essential belongings and pets

211-9
If necessary, implement medical countermeasures

212



Chemical Agent Incident-Response Decision Process (3 of 5)

CHARACTERIZATION

From 213

300
Agent release confirmed;
initial remediation activities

301
Identify and prioritize areas,
operations, and/or facilities for
detailed characterization/remediation

302 *
Conduct detailed characterization for remediation purposes
(including information collected during First Response Phase)

- Time since release
- Concentration of agent
- Extent of contamination
- Estimation of exposure via all routes
- Characteristics of chemical agent

303 *
Determine site-specific characteristics

Enclosed/Semi-enclosed	Outdoor Areas	Water
e.g., Size of facility ventilation systems, humidity, temperature, airflow, height of walls, specific building materials	e.g., Meteorological conditions, building intakes, soil type(s), surface run-off	e.g., Potential for contamination of drinking water facilities and sources, pH, redox potential, temperature, effects of dilution, flow rate

309
Is there potential
impact to
property/
environment?

310
Determine media affected

Enclosed/ Semi-enclosed	Outdoor Areas	Water
e.g., HVAC system, building materials	e.g., Agricultural crops, property	e.g., Distribution systems, ponds, reservoirs

304 *
Evaluate initial containment;
improve as necessary

305 *
Conduct characterization
environmental sampling and analysis

306 *
Conduct environmental risk
assessment for remediation purposes

307
Clearance goals established

312
Are regulatory
and stakeholder
needs
addressed?

311
Are
there areas
of unacceptable
residual and/or
environmental
contamination?

313
Is natural
attenuation
adequate to
address
environmental
concerns?

308
Is natural
attenuation
adequate to
eliminate human
health impacts?

314
No decon necessary.
Allow re-entry and resume operations as appropriate.

REMEDICATION

To 500

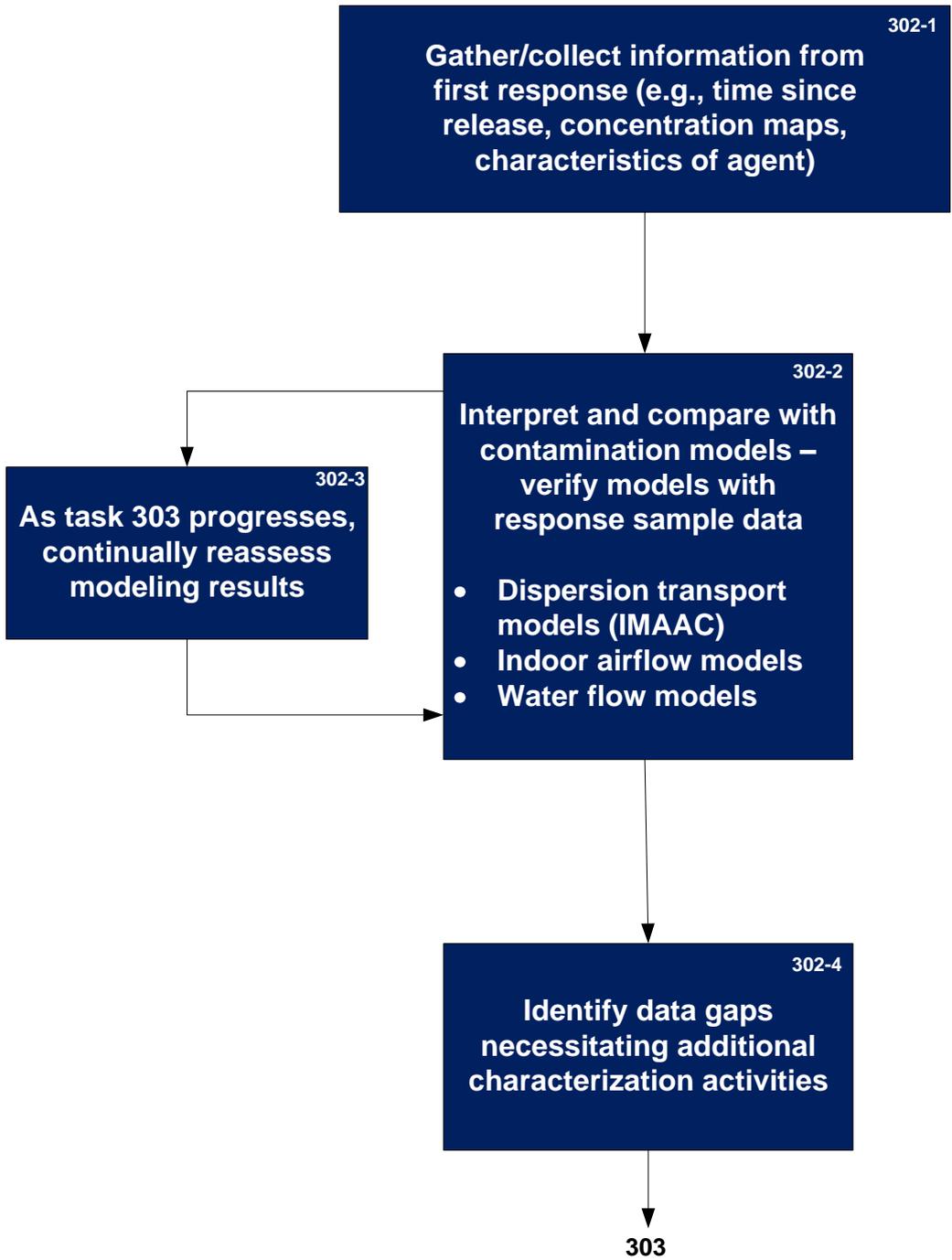
To 400

To 400

From 508

CHARACTERIZATION (Expanded 302)

302
Conduct detailed characterization for remediation purposes (including Information collected during First Response Phase)
<ul style="list-style-type: none">• Time since release• Concentration of agent• Extent of contamination• Estimation of exposure via all routes• Characteristics of chemical agent



CHARACTERIZATION (expanded 303)

Determine site specific characteristics 303		
Enclosed/Semi-enclosed	Outdoor Areas	Water
e.g., Size of facility ventilation systems, humidity, temperature, airflow, height of walls, specific building materials	e.g., Meteorological conditions, building intakes, soil type(s), surface run-off	e.g., Potential for contamination of drinking water facilities and sources, pH, redox potential, temperature, effects of dilution, flow rate

Determine contamination vulnerabilities and characteristics for all components within affected areas based on understanding of transport mechanisms 303-1		
Enclosed/Semi-enclosed Structures	Outdoor Areas	Water
<ul style="list-style-type: none"> • Exposure pathways • Facility transport systems • Porous/nonporous surface areas • Characteristics of materials • Soil presence • Potential contamination reservoirs 	<ul style="list-style-type: none"> • Soil types • Surfaces • Vegetation • Environmental conditions • Transport mechanisms • Vaporization or reaerosolization potential 	<ul style="list-style-type: none"> • All connections and components of the drinking water system • All connections and components of the surface water handling system, to include runoff maps and flow rates • Physico-chemical characteristics of water in both drinking water and runoff systems • All connections and components of the waste water system

303-2
Compile a list of potential contamination sites

303-3
Map potential contamination sites/areas

303-4
Update models in 302 as appropriate

303-5
Develop characterization priorities, coordinating outdoor and enclosed/semi-enclosed areas



**CHARACTERIZATION
(expanded 304)**

Evaluate initial containment;
improve as necessary

304

Update hot zone(s)
boundaries

304-1

Adjust warm zone(s)
boundaries

304-2

Adjust boundary controls
as necessary

304-3

Seal buildings &
HVAC systems within
hot zone(s)

304-4

Implement methods to
minimize spread of
contamination

304-5

Isolate water distribution,
wastewater, & storm drain
systems within hot zone

304-6

Continue to reassess hot and warm
zone boundaries as characterization
and clearance progress

305



CHARACTERIZATION (expanded 305)



305-1

Develop comprehensive characterization sampling strategies

- Consider a phased approach to rapidly refine the limits of contamination
- Develop data quality objectives
- Consider statistical and judgmental criteria
- Employ iterative modeling approach to optimize sampling
- Establish minimum characterization sampling requirements
- Consider employing a zonal approach for sampling
- Consider surface and air sampling
- Address all necessary information requirements for risk assessment (including inhalation, ocular, dermal, and ingestion risks)

305-2

**Write incident specific
Characterization Sampling and Analysis Plan(s) (SAP)**

- Select sampling methods
- Select sampling locations
- Select analytical methods
- Identify resource limitations and optimize implementation

Enclosed/ semi-enclosed	Outdoor	Water
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305-3

Conduct characterization sampling and analysis

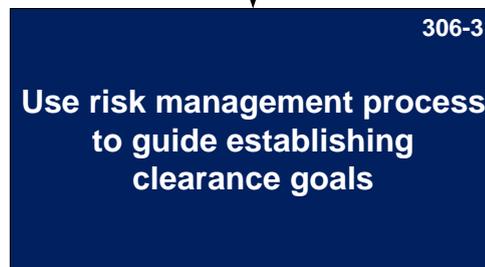
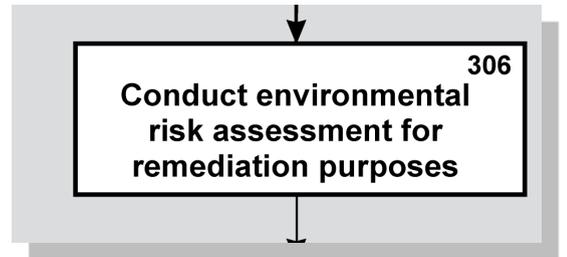
Enclosed/ semi-enclosed	Outdoor	Water
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305-4

**Re-evaluate and adjust sampling
strategy, plans, and methods
as necessary**



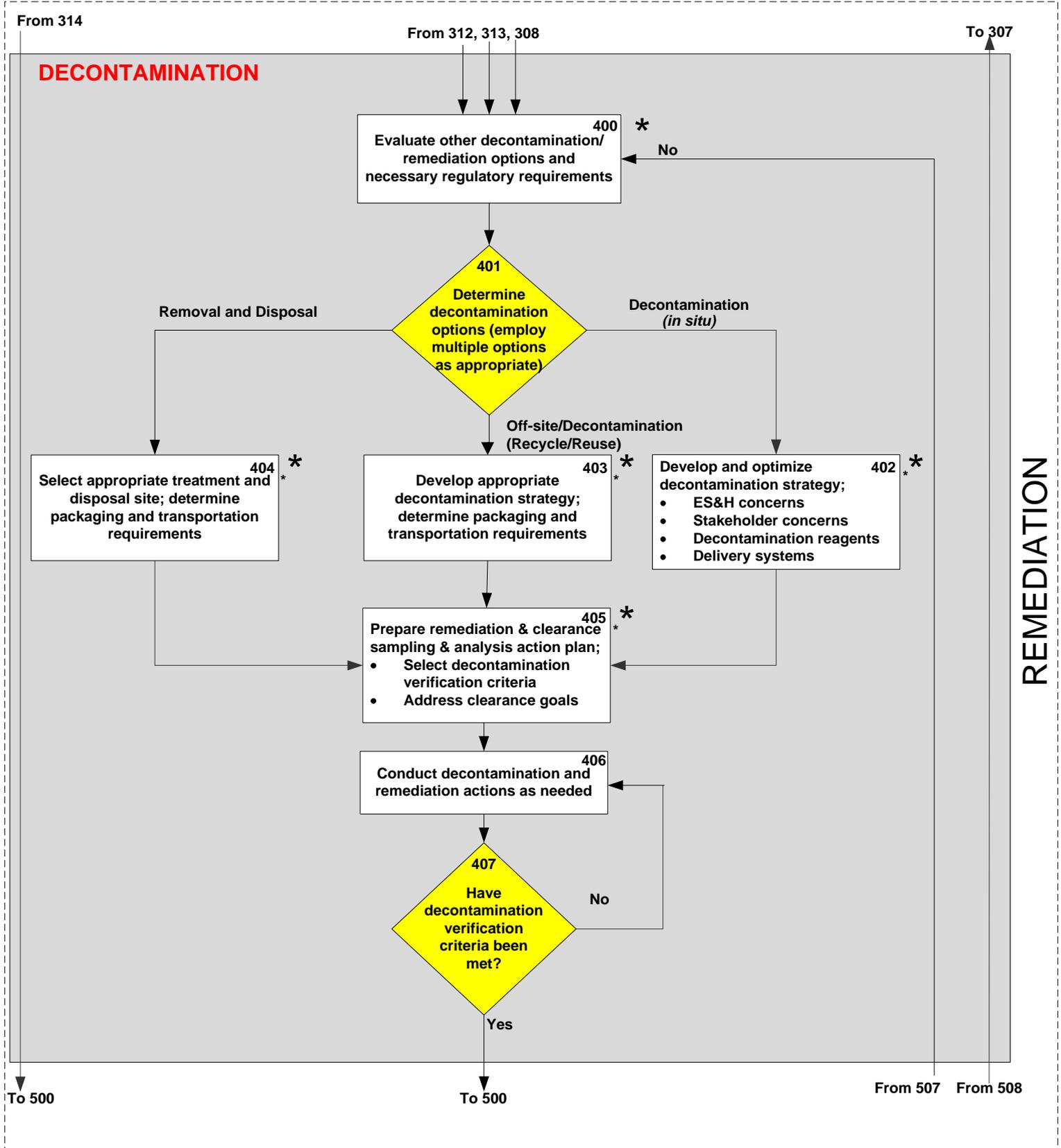
**CHARACTERIZATION
(expanded 306)**



307



Chemical Agent Incident-Response Decision process (4 of 5)



DECONTAMINATION (expanded 400)

Evaluate other decontamination/remediation options and necessary regulatory requirements 400

400-1

Evaluate decontamination options for media affected, considering for example:
Volume, Extent of contamination, Availability of resources, Accessibility, Weather

Enclosed/ Semi-enclosed	Outdoor Areas		Water
e.g., HVAC system, building materials, fixed & moveable property, sensitive equipment, rolling stock	Natural e.g., soil, vegetation, agricultural crops, livestock	Man-made e.g., building exteriors, pavement structures, fixed and moveable property, sensitive equipment, rolling stock	e.g., Distribution systems, ponds, reservoirs, recreational water, surface run-off

400-2

Identify and asses consistency of decon options with regulatory requirements

401



DECONTAMINATION
 (expanded 402)

402-1
 Select decontamination methods including specific reagents and reagent delivery systems for media affected, considering for example:
 Effectiveness, Volume, Extent of contamination,
 Availability of resources, Accessibility, Weather

Enclosed/ Semi-enclosed	Outdoor Areas		Water
e.g., HVAC system, building materials, fixed and moveable property, sensitive equipment rolling stock Considering: • Surface treatment • Volumetric methods	Natural e.g., soil, vegetation, agricultural, crops, livestock	Man-made e.g., building exteriors, pavement structures, fixed and moveable property, sensitive equipment, rolling stock	e.g., distribution systems, ponds, reservoirs, recreational water, surface run-off Considering: • Treatment • No treatment and monitor
	Considering: • Localized treatment • Wide area treatment • Wash down and treat • Monitored natural attenuation		

402-2
 Develop emergency response plans to address potential uncontrolled reagent release(s)

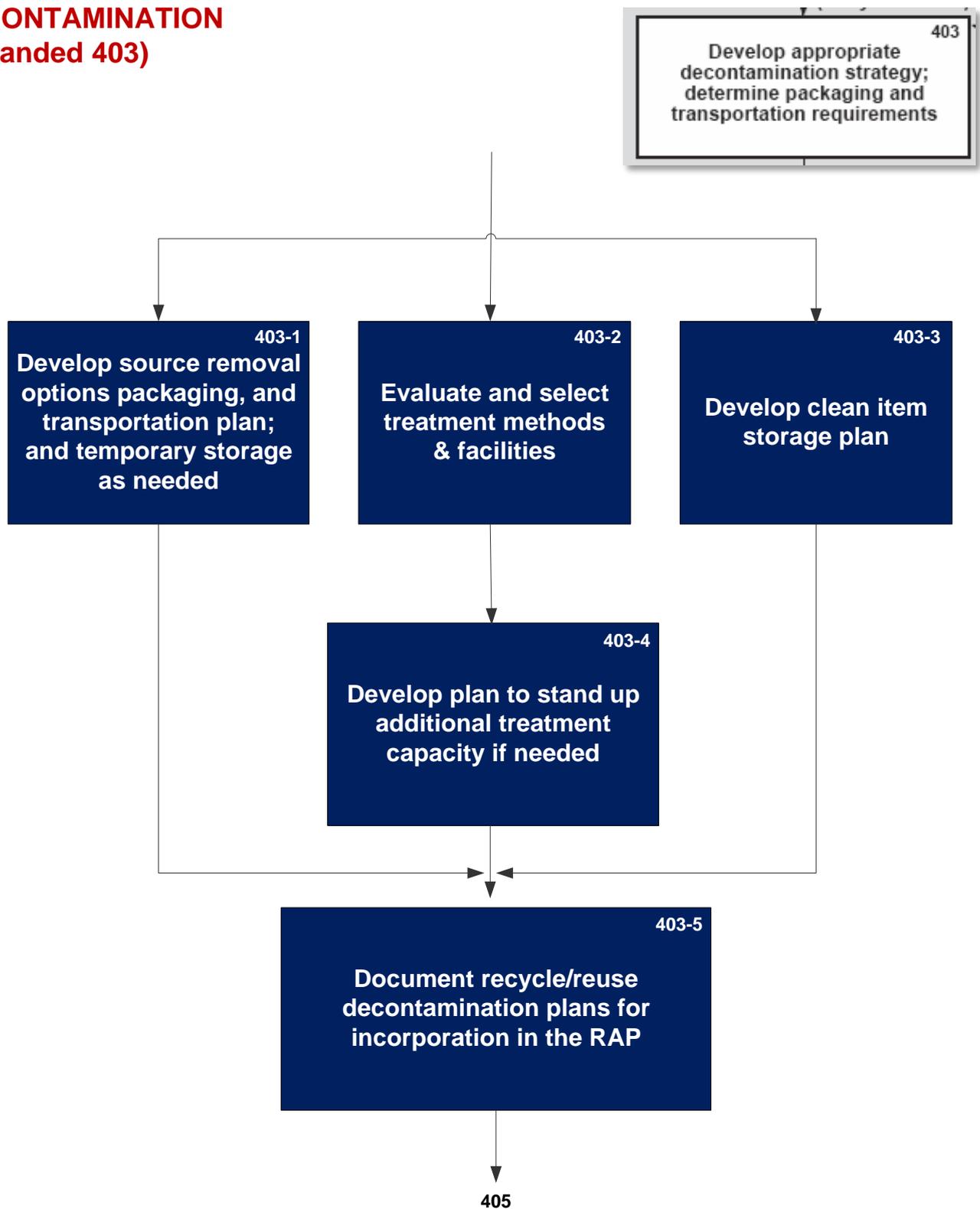
402-3
 Develop worker safety strategies for each method

402-4
 Identify stakeholder concerns for each decon method selected

402-5
 Document comprehensive decontamination plans for incorporation in the RAP including prioritization of decontamination activities

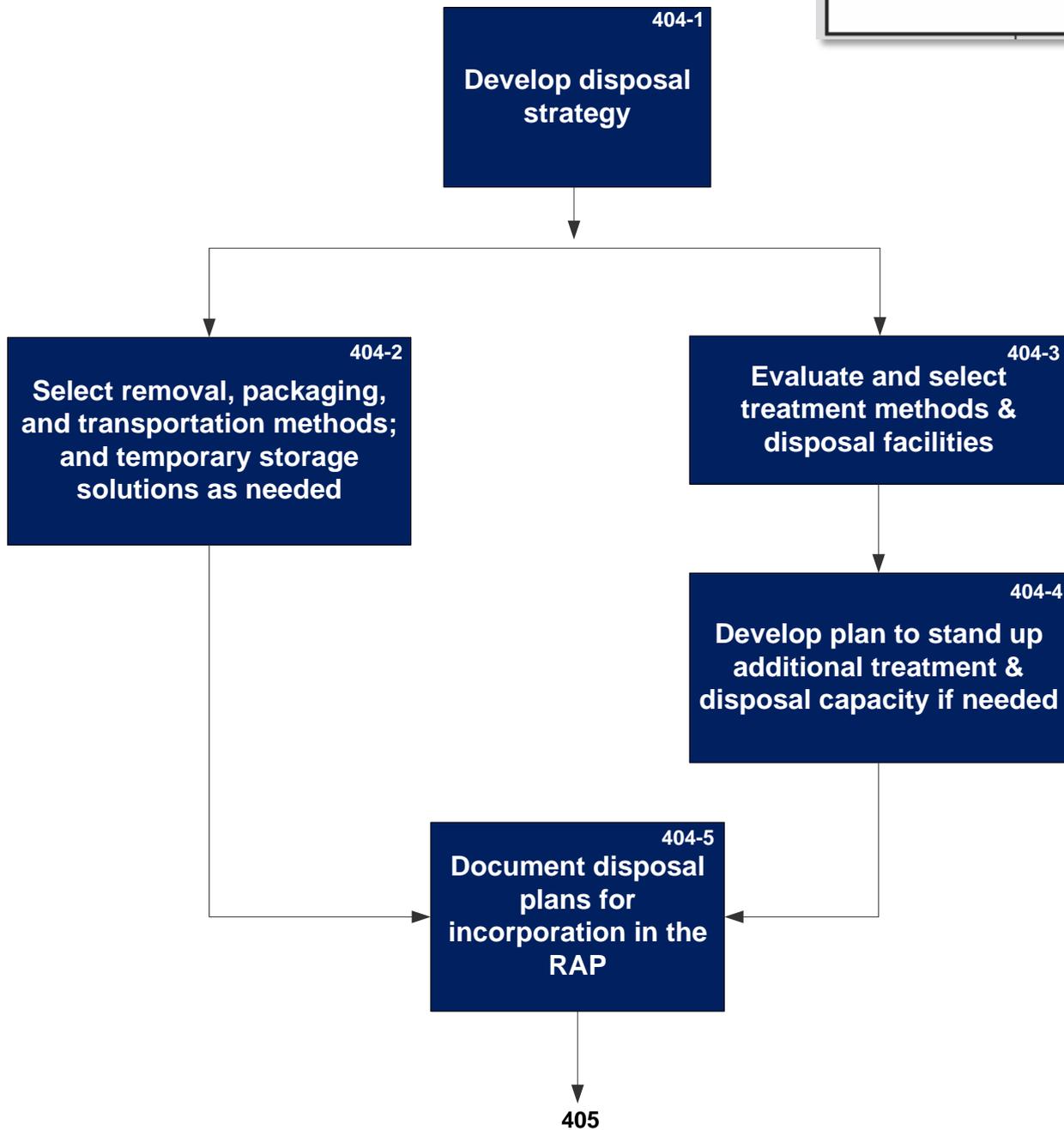


**DECONTAMINATION
(expanded 403)**



DECONTAMINATION (expanded 404)

404
Select appropriate treatment and disposal site; determine packaging and transportation requirements



DECONTAMINATION (expanded 405)

405
Prepare remediation & clearance
sampling & analysis action plan

- Select decontamination verification criteria
- Address clearance goals

405-1
Update prioritization of areas for decontamination

405-2
Develop integrated decontamination strategy, considering;

- Effectiveness
- Priorities and optimization of resources
- Decontamination of outdoor areas before enclosed/semi-enclosed areas

405-3
Develop decon verification criteria and process criteria
(e.g. concentration, temperature, humidity, contact time, pH)

405-4
Develop clearance strategy, considering:

- Judgmental and statistical approaches
- Characterization approach and results

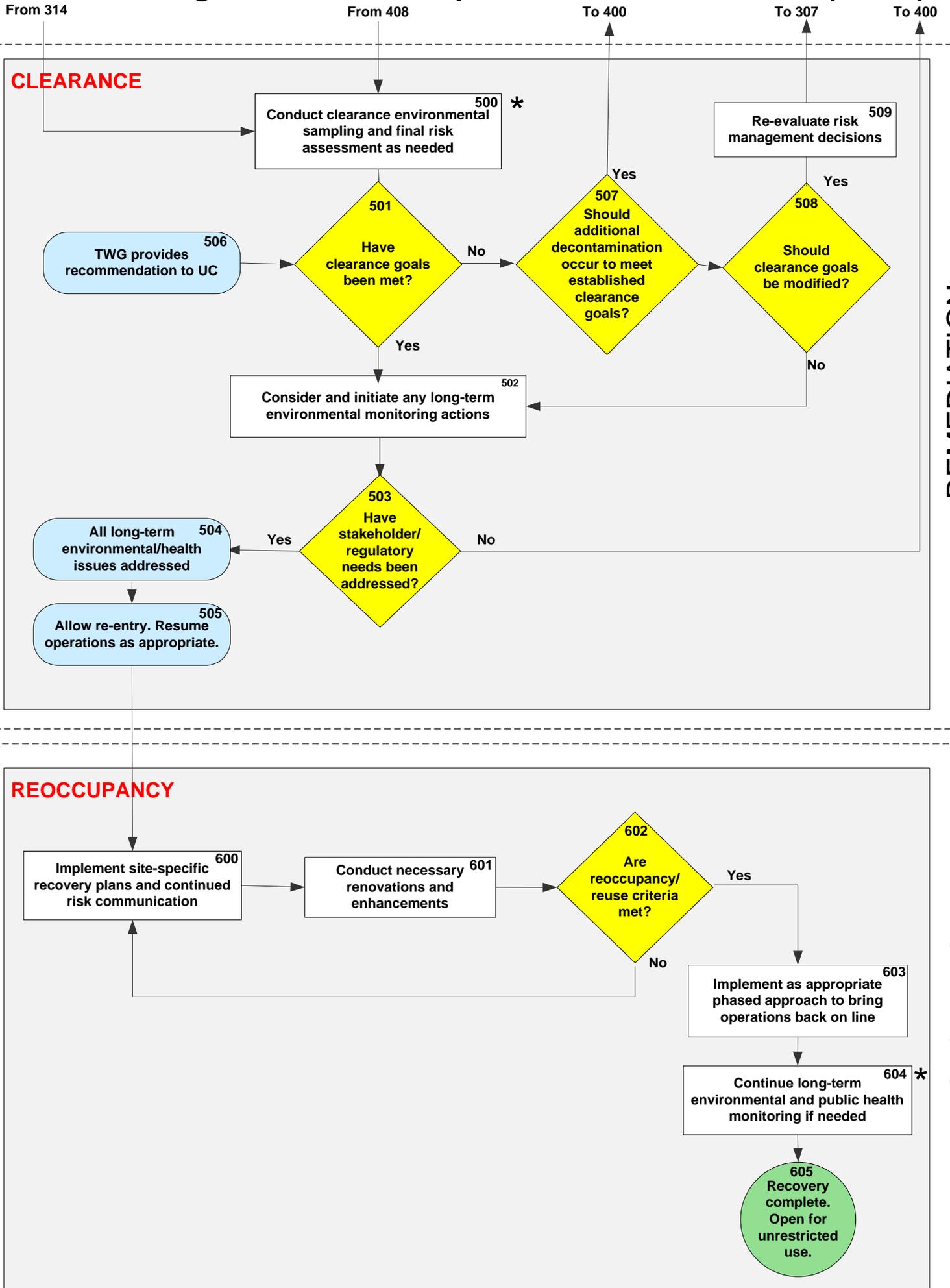
Enclosed/semi enclosed areas	Outdoor areas	Water areas	Non-contaminated buildings/areas
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405-5
Develop a Remediation Action Plan

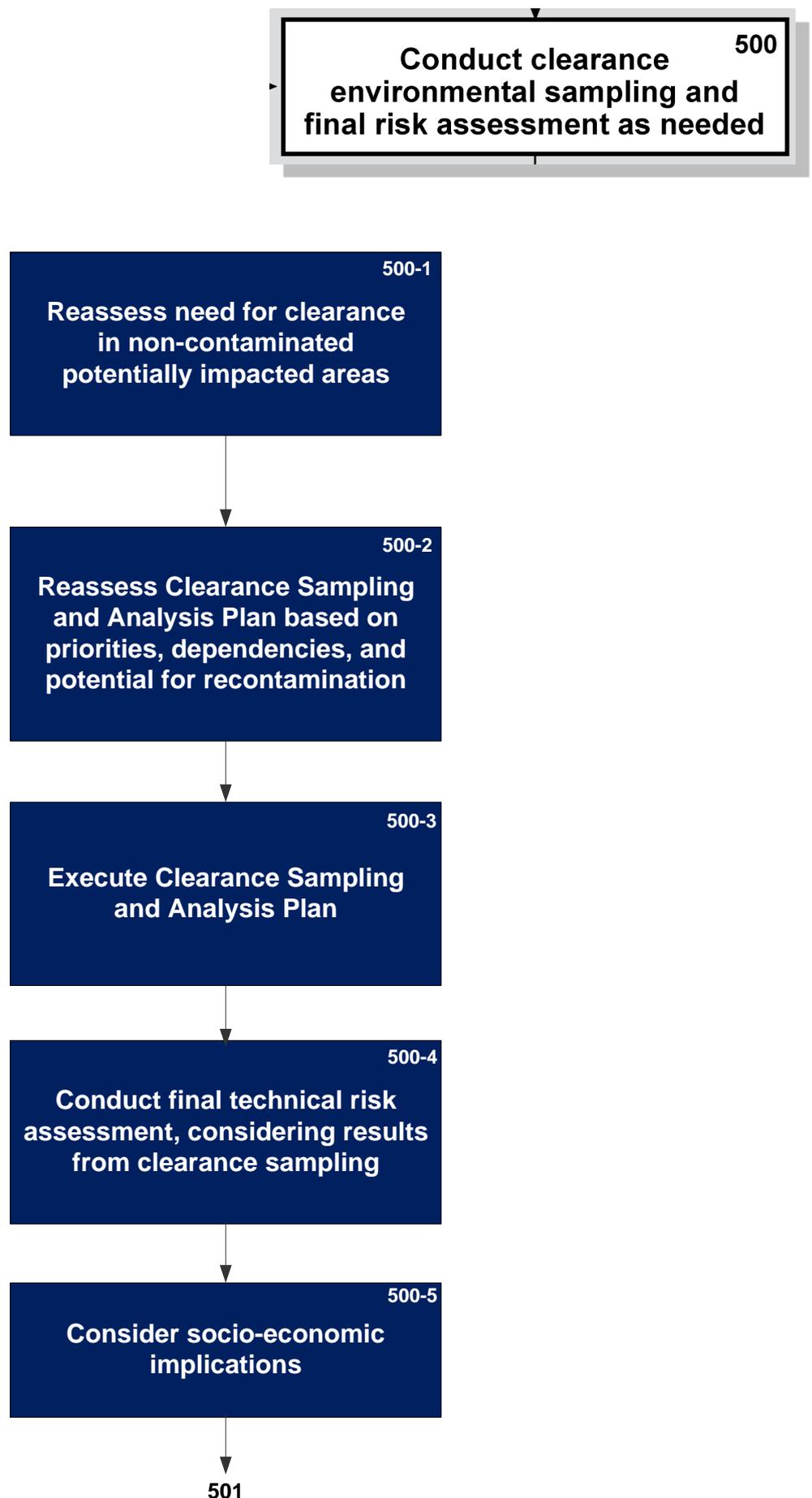
405-6
Develop Clearance Sampling and Analysis Plan



Chemical Agent Incident-Response Decision Process (5 of 5)



**CLEARANCE
(expanded 500)**



**REOCCUPANCY
(expanded 604)**

604
Continue long-term environmental
and public health monitoring
if needed

