

As of 13 July 2016

Department of Environment and Natural Resources
Biodiversity Management Bureau

Cave Rescue Protocol Framework

Working document

DRAFT

1 **I. Introduction**

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3 There are people who enter a cave that provides physical and mental challenges and the satisfaction
4 of personal discovery. But caves are also an environment that can be unremitting in its hostility to
5 the unprepared, incapacitated or injured. Injuries sustained inside a cave must always be considered
6 serious. Emergency medical services that are readily available to participants in above ground
7 activities may take hours to get to a patient inside a cave. Getting aid to the casualty and returning
8 the injured person to the surface can be a long and difficult task. Cave rescue is a slow and
9 deliberate undertaking that entails multiple resources, set protocols, a high level of organization and
10 special skills and techniques for working in the difficult and demanding cave environment.

11
12 Since cave accidents, are a limited form of incident in the country, normal emergency medical
13 personnel lack the skill and experience to conduct cave rescue and as such are rarely employed in
14 the underground component of the rescue. Instead, cave rescues are usually undertaken by other
15 experienced cavers who undergo regular training and are called up in times of need.

16
17 Cave rescue is one of the most demanding rescue operations whose management is difficult for one
18 rescuer to perform. An organizational structure that is easily understood and adaptable to everyone
19 involve can spell the difference between a failed operation or an efficient and a successful
20 conclusion.

21
22 The Department of Environment and Natural Resources (DENR) through its Cave Management and
23 Conservation Program (CMCP) conducts regular caving activities as part of its mandate in protecting
24 and conserving caves. This cave rescue framework and protocol will enhance the capability of the
25 Department in the conduct of cave rescue should any related incident occur during its caving
26 operations.

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28 **II. Objectives**

- 29
30 1. To prescribe policies and procedures that will guide the conduct of rescue response to caving
31 incidents involving DENR personnel and caving operations; and
32 2. To reduce the potential for injury or loss of life during caving operations by DENR personnel.
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34 **III. Scope and applicability**

35 **A. Contents of the protocol document**

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37 The DENR Cave Safety and Rescue Protocol examines generic cave hazards and risks,
38 recommends risk mitigation and control measures, identifies areas for capacity building, and
39 prescribes guidelines on the formation of a Department cave rescue team, self-rescue and the
40 activation of an inter-agency cave emergency response and rescue system.

41
42 **B. Applicability**

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44 This protocol applies to all employees and contract personnel of the DENR working on or visiting
45 caves in the Philippines.

46 **C. Integration and harmony with other policies, procedures and plans**

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48 The Regional Office must conduct their own cave risk assessments and establish their own safe
49 systems of work (including standard operating procedures, training programs, provision of
50 equipment, levels of response, etc.) within the context of this protocol, integrated risk
51 management plans, local conditions, knowledge and existing organizational arrangements.

52
53 Depending on the nature and scale of the operational incident a variety of significant hazards
54 may be present. Therefore, rescue authorities may need to consider other existing state policies,
55 guidelines and procedures specific to disaster risk reduction and management system, hazard
56 management, occupational safety and health standards, cave classification and assessment, and
57 caves and cave resources conservation.

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59 **D. Review and amendment**

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61 This protocol will be reviewed for its currency and accuracy one year from the date of its
62 publication, and every two years hence. The DENR Secretary through the BMB Director will be
63 responsible for commissioning the review and any decision for revision or amendment, and may
64 likewise decide that a full or partial review is required within this biannual period.

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66 **IV. Definition of terms**

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68 **A. Definition of a cave**

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70 Republic Act 9072, National Cave and Cave Resources Protection Act , defines cave as any
71 naturally occurring void, cavity, recess or system of interconnect passages beneath the earth or
72 within a cliff or ledge and which is large enough to permit an individual to enter, whether or not
73 the entrance, located in private or public land, is naturally formed or manmade. It shall include
74 any natural pit, sinkhole or other features which is an extension of the entrance. The term also
75 includes cave resources therein, but not any vug, mine tunnel, aqueduct or other man made
76 excavation.

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78 **V. Roles and Responsibilities**

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80 **A. Office of the DENR Secretary**

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82 The roles and responsibilities of the Office of the DENR Secretary with respect to the Cave
83 Rescue Protocol are as such but not limited to:

- 84
85 1. Commit resources of the DENR to implement the cave rescue protocol
86 2. Issue a directive implementing the cave rescue protocol throughout the regional/field
87 offices
88 3. Ensure adequate funding for the implementation of the cave rescue protocol
89 4. Ensure the institutionalization of the rescue protocol

- 90 5. Ensure inter-agency knowledge about the cave rescue protocol and relevant support for
91 its implementation
92 6. Ensure adequate funding and resource mobilization for cave emergency response
93 7. Establish a caving certification program for DENR personnel with cave entry and cave
94 rescue coordination duties
95 8. Establish a sustainable capacity building program and mechanism for training,
96 equipping, certifying and auditing DENR personnel with cave entry duties to implement
97 the various aspects of this protocol
98 9. Allocate funds for, but not limited to, the following:
99 a. Development of command policy and guidelines
100 b. Development of capacity building programs
101 c. Development of a *Risk Assessment Guide* including a summary of risk assessment
102 and control template
103 d. Development of caving incident documentation and reporting template
104 e. Equipment and skills training program for all DENR personnel with cave entry duties
105 on, but not limited to the following:
106 i. Basic caving and self-rescue skills
107 ii. Rigging and SRT (single rope technique)
108 iii. Basic life support / wilderness first aid
109 iv. Incident command system / incident management and coordination
110 v. Safety officer training course
111 vi. Cave rescue
112 vii. Water safety and water rescue
113 viii. Air monitoring in confined spaces
114 ix. Micro-weather forecasting
115 f. Actual cave rescue operations
116 g. Insurance, medical and other caving incident expenditures relevant to DENR cave
117 operations
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119 **B. Office of the BMB Director**
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121 Through the Caves, Wetlands & Other Ecosystems Division, the roles and responsibilities of the
122 Office of the BMB Director with respect to the Cave Rescue Protocol are as such but not limited
123 to:

- 124 1. Establish command policy and guidelines relative to cave entry and cave rescue
125 coordination
126 2. Endorse a standard list and description of necessary technical equipment to be used by
127 DENR field offices and personnel with cave entry operations
128 3. Establish standards, techniques, tools, templates and processes for cave risk assessment
129 to be adopted by DENR offices at all levels with cave entry duties
130 4. Develop a template for incident documentation to be adopted by DENR offices at all
131 levels with cave entry duties
132 5. Establish and maintain a national registry on caves and caving incidents
133 6. In behalf of the Secretary, coordinate with the NDRRMC for inter-agency
134 implementation of relevant sections of this protocol

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C. Regional Director’s Office

The roles and responsibilities of the Regional Director’s Office with respect to the Cave Rescue Protocol are as such but not limited to:

1. Implement the cave rescue protocol in the regional/field offices
2. Ensure that policy and guidelines relative to cave entry is observed on all cave operations under its jurisdiction
3. Exercise authority to approve all caving operations by DENR staff, visitors and contract personnel in his/her area of jurisdiction
4. Establish risk approval procedures utilizing the standard risk assessment tools and processes established within the organization, thus ensuring all cave entries in the region have received approval from RD
5. Establish institutional and operational arrangements with external cave rescue team/s and system in the region
6. Appoint cave rescue-trained and certified regular personnel of the RENRO as liaison to the external cave rescue teams and system in the region
7. Appoint a Cave Rescue Officer for the RENRO and a Cave Safety Field Officer for each of the DENR field offices, from among regional and field personnel with cave entry duties who are adequately trained and certified in cave safety and cave rescue
8. Establish DENR Regional Cave Rescue Team
9. Recommend DENR regional and field personnel for cave rescue training
10. Allocate funds for cave rescue training
11. Allocate funds for continuing education and refresher courses on cave rescue
12. Allocate funds for regular skills exercises
13. Allocate funds for actual cave rescue operations and other cave rescue related expenditures
14. Provide proper maintenance and storage facility for all rescue equipment, apparel and logistical materials
15. Coordinate with the RDRRMC and other agencies for and during the conduct of an actual rescue response
16. Provide logistical and operational fund support for, but not limited to, the following:
 - a. Mobilization of additional cave rescuers from other RENRO
 - b. Mobilization of additional cave rescuers from other agencies, organizations
17. Establish lines of communication with other agencies involved in disaster management and cave rescue operations
18. Appoint Cave Rescue Protocol Coordinator
19. Submit cave incident report to the Secretary through the BMB Director

D. Cave Rescue Protocol Coordinator

The roles and responsibilities of the Cave Rescue Coordinator are as such but not limited to:

1. Report to the DENR Regional Director

- 179 2. Monitor the implementation of DENR policy and guidelines relative to cave entry and
180 cave rescue coordination
- 181 3. Recommend and coordinate the planning and implementation of a capacity
182 development program to improve effectiveness in implementing this protocol and
183 increase safety in cave entry within the organization
- 184 4. Maintain a national registry of caving incidents, collating incident reports from RENRO
185 using the template for incident documentation
- 186 5. Schedule and ensure participation of appropriate DENR personnel from national,
187 regional and field offices to programmed training courses and skills and knowledge
188 review sessions on caving and cave rescue
- 189 6. Endorse a standard list and description of necessary technical equipment for DENR field
190 offices with cave entry operations and for inter-agency cave rescue operations involving
191 DENR personnel
- 192 7. Ensure observance of standards and protocol in tender, procurement, use, storage and
193 maintenance of caving and cave rescue equipment in all DENR offices
- 194 8. Coordinate with the P/MDRRMC in behalf of DENR Regional Director
- 195 9. Convene the Cave Emergency Response Coordinating Team
- 196 10. Activate the DENR rescue call out system

197 198 **E. Cave Rescue Protocol Officer**

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200 The roles and responsibilities of the Cave Rescue Officer as a personnel from the Provincial
201 Environment and Natural Resources Office (PENRO) are as such but not limited to:

- 202
- 203 1. Monitor the implementation of cave entry procedures during program evaluation, field
204 surveys and incident investigations
- 205 2. Ensure the implementation of approved ways to improve effectiveness in implementing
206 this protocol and increase safety in cave entry within the organization
- 207 3. Coordinate with the Cave Rescue Coordinator and the concerned regional and field
208 personnel in the preparation and conduct of capacity building activities initiated by the
209 DENR Regional Director's office
- 210 4. Organize regular skills and knowledge review sessions on caving and cave rescue for
211 DENR regional and field personnel
- 212 5. Participate and recommend appropriate participants from the regional and field offices
213 in cave rescue training events as scheduled
- 214 6. Ensure that standards and protocol in tender, procurement, use, storage and
215 maintenance of caving and cave rescue equipment issued by the DENR-BMB
- 216 7. Maintain a registry of caving incident reports in the province, collating reports from
217 DENR field offices using the template for incident documentation
- 218 8. Coordinate with the provincial, municipal or city disaster risk reduction and
219 management, whichever is applicable
- 220 9. Establish links, communication and coordination lines with local caving clubs and local
221 cave rescue groups, if any
- 222 10. Perform the functions as member of the Cave Emergency Response Coordinating Team
- 223 11. Activate the DENR rescue call out system

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F. Cave Safety Field Officer

The roles and responsibilities of the Cave Safety Field Officer as a personnel from the Community Environment and Natural Resources Office (CENRO) or the Protected Area Office (PAO) are as such but not limited to:

1. Report to the CENRO Chief or to the PAO Superintendent, if the Cave Safety Field Officer works in cave/s located inside a protected area
2. Ensure that the cave entry procedures prescribed in this protocol and other approved ways to increase safety are applied by all DENR personnel during cave entry in the CENRO/PAO area of coverage
3. Participate in cave rescue training events and caving and cave rescue skills and knowledge review sessions as scheduled by DENR-BMB and RENRO
4. Apply DENR-approved standards and protocol on the use, storage and maintenance of DENR-owned caving and cave rescue equipment
5. Submit to the CENRO/PAO and the Cave Rescue Coordinator timely incident reports and documentation on any caving incident that transpire in the CENRO/PAO area of coverage using the template for incident report and documentation
6. Establish links, communication and coordination lines with the municipal or city or barangay disaster risk reduction and management council, whichever is applicable
7. Establish links, communication and coordination lines with local caving clubs and local cave rescue groups, if any
8. Perform functions as member of the Cave Emergency Response Coordinating Team
9. Activate the DENR rescue call out system

G. Cave Emergency Response Coordinating Team

The roles and responsibilities of the Cave Emergency Response Coordinating Team are as such but not limited to:

1. Report to the Regional Director
2. Coordinate among team members or, if necessary, convene during a caving incident to undertake appropriate action or to recommend action by DENR authorities
3. During any caving incident involving DENR personnel, act as DENR focal point for information gathering and verification, incident monitoring, reporting and documentation
4. Activate the DENR rescue call out system
5. Facilitate inter-agency rescue system coordination
6. Activate the DENR rescue call out system

E. Cave rescue team

The Cave Rescue Teams shall be composed of cave rescue-trained and certified regular personnel of the RENRO. Their roles and responsibilities are as such but not limited to:

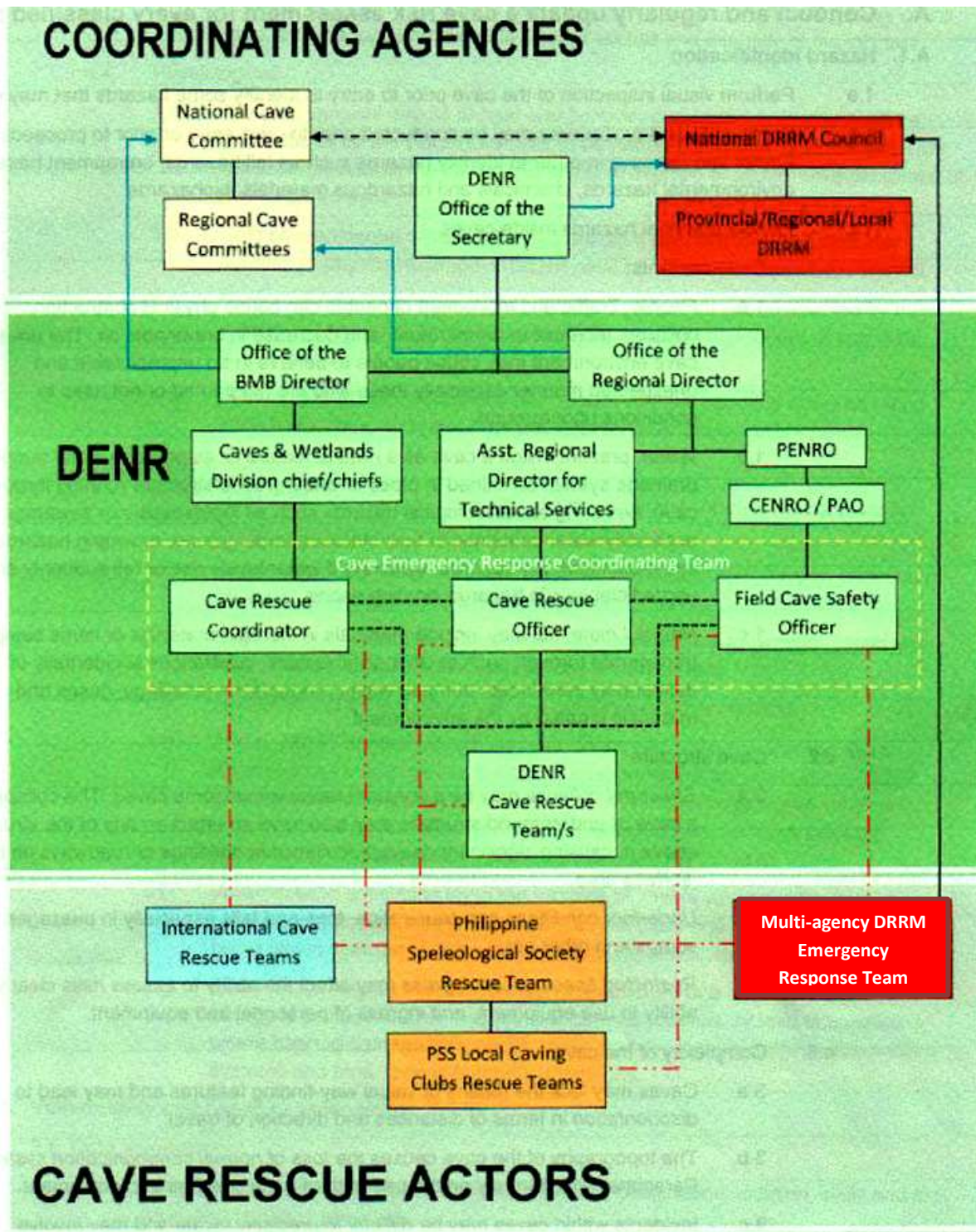
- 269 1. Technical team
270 a. The team shall be composed of the following:
271 i. Technical team leader
272 ii. Assistant technical team leader
273 iii. Technical team members
274 b. The technical teams shall be in charge with rope works, rigging and all technical
275 aspect of a cave rescue operation
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277 2. Medical team
278 a. The team shall be composed of the following:
279 i. Medical team leader
280 ii. Assistant medical team leader
281 iii. Medical team members
282 b. The medical team shall be in charge of patient management and all other medical
283 aspect of a cave rescue operation.
284
285 3. Transport team
286 a. The team shall be composed of the following:
287 i. Transport team leader
288 ii. Assistant transport team leader
289 iii. Transport team members
290 b. The transport teams shall be in charge with patient packaging and transport of the
291 patient from the site of incident to a proper medical facility
292

293 **F. Logistics**
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295 The logistics person will strategically manage and plan all the logistical requirements of the cave
296 rescue team, keep track of equipment, arrange the store room, maintain a log book on the
297 condition and location of all rescue related equipment and assets and optimize and coordinate
298 the movement of gear during a cave rescue operation.
299

300 **G. Technical consultant**
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302 The technical consultant shall be a third party group or individual with extensive caving
303 experience and technical knowledge in caving skills, cave safety and cave rescue. The technical
304 consultant will advise the cave rescue team on all matters concerning cave rescue operations.
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- 312 VI. Risk Reduction and Preparedness
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314 A. Conduct and regularly update a cave risk assessment for every classified cave
315
316 B. Hazard identification
317 1. Perform visual inspection of the cave prior to entry to identify some hazards that may exist.
318 2. Identify potential hazards inside caves
319 a. Cave contents
320 • *People*. Traffic and movement of people can cause physical obstruction, collision,
321 increase in temperature, and decrease in breathable air. The unusual cave
322 environment may cause people to behave in an unpredictable and unexpected
323 manner especially those who are not primed or not used to conditions underground.
324 • *Water* present inside a cave as a natural feature or as part of a water supply or
325 drainage system contained in pipes or underground structure running through the
326 cave, can bring about biological hazards such as leptospirosis or sewerage especially
327 water contained in built structure underground, drowning hazards,
328 inundation/flooding hazards especially if water levels rise or fall suddenly and
329 unpredictably, slip hazards, floating debris.
330 • *Harmful materials* may include materials in storage, materials or items being
331 transported through such as animals /livestock, substances accidentally or
332 deliberately introduced, dumped waste products, mine tailings, gases and materials
333 created by the environment.
334
335 b. Cave structure
336 • *Structural collapse* may be a constant factor within some caves. The collapse of a
337 cave or underground structure may also have an effect on any of the structures
338 above it, causing significant damage /collapse in buildings or roadways on the
339 surface area.
340 • *Underfoot conditions* can cause slips, trips and falls especially in passages with
341 sumps and other pits.
342 • *Restricted space/access/egress* may affect the ability to assess risks clearly, ability to
343 use equipment, and ingress of personnel and equipment.
344
345 c. Complexity of the cave
346 • Caves may lack the means of visual way-finding features and may lead to
347 *disorientation* in terms of distances and direction of travel.
348 • The topography of the cave causes the *loss of normal communication systems*.
349 Personnel will often rely on the use of third party systems and equipment.
350 • Incidents within caves may be *difficult to precisely locate* and may *involve significant*
351 *travel distance*. Thus, hazards associated with this may include difficulties estimating
352 working durations and resource requirements, delays in reaching the incident
353 location and crew rotation, delays or difficulties with the flow of information to and
354 from incident command, delays or difficulties with the flow of logistical/welfare
355 support, fatigue, and limitations of breathing apparatus duration.

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- *Difficulty in determining the appropriate extrication plan* may result from the potential of limited information being available because of the complexity of the cave, and the location, distance, limited access and intensity of the incident.
- d. Physiological
- The physiological effects of *heat and humidity* in a cave environment will be exacerbated by the inability for heat to be readily dissipated or ventilated. This will severely restrict the duration of physical exertion of rescue personnel.
 - *Cold* environmental conditions within the cave may significantly affect the duration of physical exertion of rescue personnel.
 - *Fatigue* of rescue personnel will be affected by travel distances, work rate, temperature/humidity, duration and nature of activities, fitness levels.
 - Working within *restricted space* may lead to manual handling activities being more hazardous, and raises the potential for musculo-skeletal injuries.
- e. Environmental
- *Heat* within a cave may rapidly create an extremely intense environment for working personnel or rescue authority operations.
 - The environment within the cave may become *irrespirable, oxygen-enriched or -deficient*, presenting risks to personnel.
 - The cave may become *water-flooded or inundated* due to weather conditions and/or failure of water drainage systems on the surface.
 - *Darkness* in the cave may mask the presence of other hazards.
 - The proximity of other cave passages, caves and cave systems to natural watercourses may increase the risk of *environmental pollution* due to rescue authority operations. Water discharge, waste materials, other products of contamination may be released from the cave passage, cave/system into unexpected areas remote from the incident.
 - *Weather/wind conditions* bring the hazards of severe weather affecting physiological capabilities of rescue personnel (heat and cold) and of objects being blown / carried by the wind underground and along cave passages.
 - *Noise* levels may be intensified within the structure of a cave as the sound energy is contained. This may hamper communications, or lead to conditions where hearing damage may occur. Noise sources include traffic, water suction systems and fans, rescue authority operations.

392 C. Vulnerability and capacity assessment

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1. Data management
 - a. Certified cave rescue personnel including sex, designation, location (place of assignment), skills and skill level, and trainings attended (other needed information)
 - b. Available cave rescue equipment, materials and other resources including owner/steward, location, and status on last inspection
 - c. Network of cave rescue organizations / agencies, area and base of operation, contact persons and contact details

- 401 d. Cave incident registry (what information needed)
- 402 • Name
- 403 • Address
- 404 • Gender/Sex
- 405 • Nationality
- 406 • Contact information
- 407 • Time of incident
- 408 • Estimated Time rescued
- 409 • Person to contact with in case of emergency
- 410 • Persons/organizations/agencies involved in the rescue
- 411

412 2. Post-incident risk review c/o GEC

413

414 **D. Risk assessment**

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416 1. Values for computing risk

- 417 a. Risks – probability of harmful consequence
- 418 b. Hazard – may cause harm, loss of life, damage to property, social or economic disruption, environmental degradation (measured in probability)
- 419 c. Vulnerability – conditions that affect the impact of hazards (measured in impact)
- 420 d. Capacity – ability to manage conditions
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- 422

423 2. Formula for computing risk

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$$R = \frac{H(p) \times V(i)}{C}$$

429 3. Risk Scale

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431

PROBABILITY						
High (5)	5	10	15	20	25	
Probable (4)	4	8	12	16	20	
Neither (3)	3	6	9	12	15	
Improbable (2)	2	4	6	8	10	
Low (1)	1	2	3	4	5	
	Low (1)	(2)	Mid (3)	(4)	High (5)	IMPACT
	Minimal (1)	(2)	Adequate (3)	(4)	Pro (5)	CAPACITY
						years of Training & Experience
						type of Equipment available
						level of Rope Capability
						presence / proximity of Network of Responders

432 4. Inventory and location of risky areas

- 433 a. Inventory
434 The Cave Safety Field Officer will identify high risk areas and subsequently assess and map
435 said risky areas. These areas will be identified and color coded in cave maps according to the
436 Probability in the Risk Scale (3.c.) the identification and inventory of risky areas inside a cave
437 and suitable cave entry points from which risky areas may be accessed by an emergency
438 response team.
439
- 440 b. Location
441 The inventory must be organized so that the locations of referenced entry points and risk
442 spaces are accurately documented and easily found on the ground. If a risky area is
443 designated as restricted, and, along with the cave assessment report, maintained on file for
444 one year following the entry. This file will be reviewed annually by the Cave Safety Field
445 Officer and the risky area inventory up-dated as necessary.
446
- 447 c. Mapping
448 Compass / GPS coordinates of entry points and risky areas shall be measured and marked on
449 a technical cave map of at least Grade 3C level (BCRA).
450
- 451 5. Site-specific *Summary of Cave Risk assessment*
452 a. Cave assessment should include a cave-specific report on Summary of Cave Risk Assessment.
453 This report, to be presented as a matrix or table of information, will present a catalog
454 (reference numbered) and description of the potential risk inside the cave, the conditions
455 and activity type in which the risk will be present, the potential person/s at risk, and the
456 control measure to prevent or reduce the risk.
457
- 458 b. Each of the potential risk catalogued in the Summary of Cave Risk Assessment will be
459 assigned a score or value using the Risk Scale (see V.A.3.3.),
460
- 461 c. If, after cave classification, a new hazard is found belonging to the high risk category in the
462 risk scale, the entry team will withdraw from the confined space or the cave immediately.
463 The hazard and risk assessment will be reported in that cave's Summary of Cave Risk
464 Assessment. Cave entry permit will be temporarily suspended until the cave-specific safety
465 program is updated for implementation.
466
- 467 **E. Establish risk control measures**
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- 469 1. Classification and permit
470
- 471 a. Restricted status prior to classification
472 As provided by the national cave act - RA 9072, any cave in the Philip[pines is considered in
473 its entirety as a restricted area requiring entry permit from duly designated authority under
474 conditions provided by this law and its Implementing Rules and Regulations (IRR). This
475 restriction status will remain until the cave is classified by the DENR.
476
- 477 b. Cave classification

478 As provided in RA 9072 and its IRR, a cave gains its classification status when the DENR
479 Secretary approves the classification as recommended by the DENR-BMB Director. The basis
480 of recommendation for cave classification is the completed cave assessment report,
481 Regional Cave Committee (RCC) resolution and maps submitted by the duly designated and
482 trained team of personnel to conduct the cave assessment.

483
484 c. Procedure of verifying and documenting risks after classification
485 Once a cave is classified, a DENR team of personnel with cave entry duty will verify and
486 document the specific risks based on hazards and probabilities in the *Summary of Cave Risk*
487 *Assessment* as well as evaluate other unreported, newly existing or potential hazards.
488

489 2. Control systems

490
491 a. Visitor / contractor control (?? GEC)
492 Each visitor / contractor will accomplish the following prior to entry into caves under the
493 jurisdiction of the RENRO:
494 i. Cave safety program requirements
495 ii. Cave-specific safety precautions and procedures
496 iii. Emergency response procedures
497 iv. Safety and hazard management plan
498 v. Contractors must supply the safety office a safety and hazard management plan
499 prior to operations.
500

501 b. Access control systems
502 i. Gates and locks hardware
503 ii. Gatekeepers and safety officers
504 iii. Access/egress arrangements
505

506 c. Communication
507 The team leader of the entering party will establish procedures for communication relative
508 to their entry. Continuous communication between team members is required and
509 emergency communication is required between the team and the gatekeeper. Range
510 Control. Communication between team members must be identified on the entry permit.
511

512 d. Control measures per hazard and risk set
513 Control measures should be identified per hazard-risk set and included in the Summary of
514 Cave Risk Assessment table (V.A.3.5.).
515

516 e. Post-incident review
517 A review of control system gaps and weak links relevant to the caving incident should lead to
518 effective ways of improving risk control.
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522 f. Public awareness

523 Informing the public on the control measures that concern their cooperation will minimize
524 risks.
525

526 **F. Integrate risk management and response in cave management planning –reiteration**
527

528 1. Site-specific cave management planning

- 529 a. Each cave/system that has undergone the proper DENR cave assessment and cave
530 classification shall be the subject for management planning and a cave-specific Cave
531 Management Plan (CMP)
532 b. The CMP should contain an *integrated risk management plan* that will set standards and
533 identify the resources required to ensure that safe systems of work in the cave are
534 maintained
535

536 2. Multi-stakeholder, multi-agency participation

537 Involving others in planning is also an effective way to build good working relations with partner
538 agencies and other interested parties, such as local owners/operators.
539

540 3. Information management

- 541 a. Planning for risk assessment of caves is grounded on information gathering, much of which
542 will be gained through inspections or visits by rescue personnel
543 b. Information must also be gathered and used to review safe systems of work from sources
544 both within and outside the rescue authority
545 c. Rescue authorities must ensure systems are in place to record and regularly review risk
546 information and to ensure that new risks are identified and recorded as soon as practicable.
547 i. Rescue authorities must ensure that the information gathered is treated as
548 confidential, unless disclosure is made in the course of duty or is required for legal
549 reasons.
550 ii. Rescue authorities must consider the benefits of using consistent systems and
551 formats to record information from all sources.
552 iii. Information needs and the capacity of rescue personnel to assimilate information
553 will vary in proportion to the nature and size of incident and what stage the
554 operational response has reached. Arrangements need to be flexible and may be
555 based on more than one system.
556 d. Consideration must also be given to how timely access will be provided to *information to*
557 *support operational decision-making.*
558

559 4. Developing SOPs relevant to risk management and emergency response

- 560 a. Site-specific management planning must include the development of cave-specific standard
561 operating procedures (SOP) both as policy and as practice, for example:
562
563 i. Emergency Action Plan
564 An Emergency Action Plan is a set of procedures to help guide the organization's
565 response to a caving incident. Although every incident is different and unique, many
566 elements can be anticipated and strategies developed to optimize the response. All

- 567 members should be aware of the emergency action plan and know how to activate
568 the plan.
569
- 570 ii. Requirement for Emergency Action Plan
- 571 • Assign responsibilities to be taken during and following a caving emergency
 - 572 • Develop pre-planned actions for different cave related emergencies
 - 573 • Identify resources for responding to a cave emergency
- 574
- 575 iii. Cave entry SOP
- 576 • Clear cave entry team roles and responsibilities
 - 577 • Team competency in caving appropriate to the level of difficulty of the cave
578 to be entered
 - 579 • Full compliance to the *Safe Cave Entry Measures* to be developed for the
580 implementation of this protocol
 - 581 • Review of the summary of risk assessment on the cave to enter
- 582
- 583 iv. Training SOP: individual proficiency, certification and retraining on caving skills and
584 techniques including self-rescue
- 585 • Each cave entry team member will be trained to standard level. The
586 standard shall be developed as part of this protocol's implementation.
 - 587 • Certification training can be scheduled by the DENR-BMB and Regional
588 Offices. The training shall maintain proficiency and certification among
589 employees.
 - 590 • All training will be properly documented to include individual student
591 identification.
 - 592 • Retraining will be conducted whenever there are changes in work practices
593 and duty assignment, or new hazards present.
- 594
- 595 v. Cave equipment SOP
- 596 • Personal protective gear and equipment for cave entry
 - 597 • Cave rescue equipment (should be used exclusively for cave rescue – self
598 rescue and externally aided rescue)
 - 599 • Equipment standards and rating
 - 600 • Procurement standards
 - 601 • Storage
 - 602 • Maintenance
- 603
- 604 vi. SOP on cave rescue response coordination
- 605 • Rescue call out system
 - 606 • Cave self-rescue
 - 607 • Inter-agency / inter-sector rescue operation (roles, process and procedures,
608 decision tree)
 - 609 • Identifying local protocols
 - 610 • Identifying and clarify overlapping legal responsibilities

- 611
 - Identifying available resources
 - 612 • Working with the Incident Command System(ICS)
 - 613
- 614 5. Contingency planning
- 615 a. Each rescue authority must assess the cave hazards and risks in their area relating to the *Risk*
- 616 *Assessment Guide* (to be developed as part of the implementing guide of this protocol) and
- 617 determine the appropriate risk control systems
- 618 b. Site-specific contingency plans must be considered for locations where cave hazards and
- 619 risks are significant. Contingency planning must include:
 - 620 i. Levels of response
 - 621 ii. Relevant standard operating procedures
 - 622 iii. Tactical considerations, including rendezvous points, marshalling areas and access
 - 623 points
 - 624 iv. Liaison with the contractor or site owner/operator to ensure that any specialist
 - 625 intervention equipment is provided. Separate provision must be made for the
 - 626 transport of equipment and personnel.
- 627
- 628 c. Contingency planning must also include coordination and communication lines and
- 629 agreements such as but not limited to:
 - 630 i. Agreement of rescue authority with cave managers on intervention strategies
 - 631 ii. Establishing communication systems effectiveness and contingency plans for their
 - 632 loss
 - 633 iii. Linkage and engagement with other agencies and service units tasked with
 - 634 responsibilities in rescue and emergency response, such as volunteer cave rescue
 - 635 groups, ambulance services, fire and rescue authorities, police services, the Office of
 - 636 Civil Defense, and the DRRM councils at various levels
 - 637

638 **G. Develop capacity for Cave Rescue Protocol implementation**

- 639
- 640 1. Trainings
- 641 a. Cave rescue training
- 642 i. Self-rescue
 - 643 • Navigation and search
 - 644 • Carries in horizontal caves and confined spaces
 - 645 • Wilderness first responder
 - 646 • Self-rescue process and procedures
 - 647
- 648 ii. System rescue (external)
 - 649 • Establishing, activating and operating in the system / fit in the loop
 - 650 • Cave management (Pre-requisite: must be certified on the 3 basic and
 - 651 mandatory trainings - BLS, SRT, and rigging)
 - 652 • What every cave rescue team member should know
 - 653 ○ Basic life support (BLS)
 - 654 ○ Near-drowning (cavers tend to free-dive way too often)
 - 655 ○ Recognition and response to cardiac conditions (MI, angina, etc.)

- 656 ○ Assessment (primary and secondary surveys)
- 657 ○ Spinal immobilization and use of the team's splints/collars
- 658 ○ Dressings and haemorrhage control (direct and indirect pressure)
- 659 ○ Suspension trauma
- 660 ○ Hypothermia (including use of whatever equipment your team
- 661 carries)
- 662 ○ Eye irrigation and care of injuries
- 663 ○ Burns (both heat and chemical; from friction such as ropes, or from
- 664 batteries and lighting)
- 665 ○ Safety precautions for oxygen therapy
- 666 ○ Assembling, loading and rigging the team stretcher(s) for horizontal
- 667 and vertical use
- 668
- 669 iii. What a team medic should know
 - 670 ● Basic anatomy and physiology (organ and major vessel locations, etc.)
 - 671 ● Trauma assessment
 - 672 ● Administration of pain relief
 - 673 ● Administration of oxygen
 - 674 ● Common atmospheric toxicity events (CO₂, CO, H₂S in both acute and
 - 675 chronic exposure)
 - 676 ● Treatment of acute glucose imbalance
 - 677 ● Oral/NP airway (and LMA if permitted by local protocols)
 - 678 ● Clinical spinal clearance
 - 679 ● Splinting of extremities (including traction splints)
 - 680 ● Peripheral IV fluid administration
 - 681 ● Crush injury (true 'treatment' will be the domain of a team physician, but
 - 682 assessment and management pre-release are important. All your crush
 - 683 injuries will be outside the safe release window.)
 - 684
- 685 b. Specialized trainings
 - 686 i. Basic Life Support / Wilderness First Aid
 - 687 Pre-requisite: basic caving course
 - 688 ii. Water safety and swift water rescue
 - 689 iii. Breathing apparatus
 - 690 iv. Air monitoring equipment
 - 691 v. Rope work
 - 692 ● SRT
 - 693 Pre-requisite: basic caving course, BLS/First Aid, and 2 years of certified field
 - 694 experience in horizontal caving.
 - 695 ● Rigging
 - 696 Pre-requisite: basic caving course, BLS/First Aid, and 2 years of certified
 - 697 field experience in horizontal caving.
 - 698 vi. Navigation (compass, GPS)
 - 699 vii. Weather forecasting
 - 700 viii. Critical incident and stress debriefing

- 701 ix. Radio operation
702 x. Public information and media management
703
704 c. Continuing education
705 i. Updates and simulations
706 ii. Drills and exercises
707
708 d. Refresher courses
709
710 2. Outfitting
711 a. Caving equipment
712 b. Personal protective gear and equipment for cave entry
713 c. Provisions for essential rescue equipment
714 i. Specialized patient transport equipment
715 ii. Specialized confined space rescue equipment
716 iii. Extrication equipment
717 iv. Communication equipment
718 v. Lighting
719 vi. Transportation
720 vii. Specialist access equipment
721
722 3. Equipment management
723 i. Standards and rating
724 ii. Storage
725 iii. Maintenance
726 iv. Resource pooling, stacking
727
728 4. Fund sourcing and generation
729 For but not limited to the following:
730 i. Further development of other section of the Cave Rescue Protocol
731 ii. Development of standard operating procedures as necessary/relevant to the
732 Protocol
733 iii. Training and outfitting
734 iv. Logistical expenses of deployment
735 v. Insurance and medical coverage (for the patient and rescuers)
736 vi. Drills and exercises
737
738 5. Forging institutional arrangements
739 a. Institutionalization of the rescue protocols
740 b. Inter-agency coordination and institutional arrangements for cave rescue
741 c. Interphase with DRRM System
742 d. Interphase with PSS Cave Rescue System
743 e. Multi agency emergency plans
744 f. Integration and harmony with other policies, procedures and plans
745

746 **VII. Emergency Response**

747

748 **A. Cave self-rescue**

749

750 1. What is cave self-rescue?

751

752 A cave self-rescue refers to the actions and techniques applied by the individual caver or a
753 caving team to progress or withdraw from a situation which would otherwise place them in a
754 dangerous situation.

755

756 2. Requirements to perform cave self-rescue

757 a. Have basic personal competence in all aspects of caving

758 b. Have a practiced rescue plan

759 c. Have good communication

760 d. Have foresight to avoid complicating the incident

761

762 3. Competency

763 a. The caving party team leader will lead a self-rescue operation. If the team leader is disabled
764 by injury or missing in action or dead, s/he shall be replaced by the next most experienced
765 and trained caving officer – usually the assistant team leader.

766 b. A technical officer/team shall be in charge with rope works, rigging and all technical aspect
767 of a cave self-rescue operation

768 c. A medic or medical team shall be in charge of patient management and all other life support
769 or medical aspects of a cave self-rescue operation

770 d. A transport team shall be in charge with patient packaging and transport and exit route
771 planning from the site of incident to a proper medical facility

772 e. A communication officer or team shall be in charge of opening communication lines
773 between the caving party encountering a caving incident and the first line of contact
774 identified in the rescue call out system. This team may also serve to establish internal
775 communication lines among the caving party members if separated while caving.

776

777 4. Documentation of caving incident and self-rescue operation

778 a. The DENR through its Caving Incident Coordinating Team will supervise and ensure proper
779 information management and incident reporting of DENR self-rescue operations.

780 b. Tools, templates/forms and SOPs will be developed for this as part of implementing the Cave
781 Rescue Protocol

782 c. Post-incident guidelines

783 *To be developed for this as part of implementing the Cave Rescue Protocol*

784

785 **B. External cave rescue response**

786

787 1. When to call an external response for cave rescue

788

789 a. Should an injury/incident occur in the cave, the caving team has the option to activate the
790 DENR Rescue Call-Out System and request for a cave rescue operation.

- 791 b. This rescue call-out system shall be designed specifically for DENR caving incidents such that
792 the call-out can link with a current or future external inter-agency / inter-sector response
793 system for cave rescue.
- 794 c. Among the conditions that merit external response are:
795 i. When a caver cannot go out of the cave under their own power
796 ii. When a caver has not reported back at the rescue call out time
797 iii. When an external event happens where casualties might be expected in a cave –
798 floods, earthquake
799
- 800 2. DENR rescue call-out system and procedure – *To be developed for the implementation of this*
801 *protocol*
802
- 803 3. Scenarios and general process of external response for cave rescue
804 a. Rescue call
805 b. Rapid cave entry and search
806 i. Only competent, experienced cavers should be doing the search and rescue;
807 everyone else is a liability
808 ii. Use entry protocols
809 iii. All entry should follow procedure
810 iv. Operate in teams of four (Minimum)
811 v. Cover everything safely but quickly
812 c. Location of casualty
813 i. Start documentation of patient condition
814 ii. Report to UC (underground coordinator)
815 iii. Recall everyone to agreed assembly point
816 d. Exit route planning and rigging
817 i. While waiting for everyone at the assembly point, initiate planning for exit route
818 ii. Start rigging
819 e. Casualty recovery
820 f. De-rigging and team exit
821 g. Documentation of incident response
822 i. Although the external response will likely be under an Incident Command System led
823 by other multi-agency/multi-sector formations, the DENR through its Caving Incident
824 Coordinating Team will supervise and ensure proper information management and
825 incident reporting.
826 ii. Tools, templates/forms and SOPs will be developed for this as part of implementing
827 the Cave Rescue Protocol.
828 iii. Among the information that need to be tracked and documented by the DENR
829 Caving Incident Coordinating Team during an external response:
830 • Who has gone underground and when, and of course who's come back out
831 again.
832 • Where the important people are in the system, like the Underground
833 Controller and Medic. Knowing the UC is at the bottom of a cave means that
834 you know how long it will take for them to get somewhere else.

- 835 • The layout of your underground communications system (phone, radio), so
- 836 you know who can talk to whom
- 837 • Where the casualty is, who the casualty is, and their current medical
- 838 condition
- 839 • What gear has gone underground so it can be diverted if needed, and so can
- 840 be checked back out again
- 841 • Recommended Forms (referenced from the National Speleological Society):
- 842 ○ Cave Rescue Event Log
- 843 ○ Cave Rescue Squad Resource
- 844 ○ Communications Log
- 845 ○ Current Organization
- 846 ○ Debriefing Form
- 847 ○ Entrance Control Log
- 848 ○ Equipment Log
- 849 ○ Level of Urgency Chart
- 850 ○ Lost Personnel Form 1
- 851 ○ Lost Personnel Form 2
- 852 ○ Medical Log
- 853 ○ Personnel Log
- 854 ○ Public Information Release Form
- 855 ○ Task Assignment Form

857 4. Incident command system (ICS)

858 The DENR Cave Rescue Protocol adopts relevant knowledge, technical information, and
859 processes and procedures expounded in the book, *Disaster Risk Reduction Resource Manual*
860 (Republic of the Philippines Department of Education, 2008), quoted as follows:

861 a. Definition

862 The ICS is a standardized on-scene emergency management concept. It is
863 specifically designed to allow its users to adopt an integrated organizational
864 structure, equal to the complexity and demands of single or multiple incidents
865 without being hindered by jurisdictional boundaries. It is an excellent means of
866 determining how resources will be used, who will coordinate them and how
867 information will be communicated using terminologies.

868 It is a model tool for command, control and coordination of a response that
869 provides a means to coordinate the efforts of individual agencies as one agency
870 working out differences of opinion as they work toward a common goal of
871 stabilizing the incident and protecting life, property and the environment. ICS
872 however, is not a permanent organizational structure or secretariat, but rather a
873 flexible core mechanism for effective coordination and collaboration.

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- b. Features
 - The ICS has many features:
 - i. It establishes common terminology, and standards of organization, doctrine and procedures that enable diverse organizations to work together effectively;
 - ii. It exercises interactive management components, each of which contributes strength and efficiency to the overall system;
 - iii. The responsible official establishes policy, direction, parameters, and delegates authority to the Incident Commander;
 - iv. The responsible official is generally not at scene all the time but maintains contact as necessary.
 - c. Basic ICS Concepts
 - i. Coordination and support to serve the needs of the command function – generally located away from the site
 - ii. Command is the direct management of the on-scene operations.
 - d. Functional Responsibility
 - i. Command - overall responsibility
 - ii. Operations - direct actions on incident site
 - iii. Planning/Intelligence - collect / analyze data, prepare incident action plan
 - iv. Finance/Administration - cost accounting and procurement
 - e. Process
 - The ICS management process:
 - i. Allows all agencies that have jurisdictional or functional responsibilities for the incident to jointly develop a common set of objectives and strategies;
 - ii. Participating agencies retain their authority, responsibility, or accountability.
 - iii. Unity of Command – means that every individual has a designated supervisor
 - iv. Chain of Command – means that there is an orderly line within the ranks of the organization with lower levels subordinate to, and connected to, higher levels
 - f. The Incident Commander must follow the principles of the current national incident command system.
 - i. Prior to committing personnel into any hazard area, the Incident Commander must take account of the actual information regarding the incident that is available at the time. This will assist them in making operational decisions in what are recognized as sometimes dangerous, fast moving and emotionally charged environments.

- 924 ii. A thorough safety brief prior to deployment of personnel within the
- 925 hazard zone must be carried out.
- 926 iii. Communication of new or changed risks must continue throughout the
- 927 incident.

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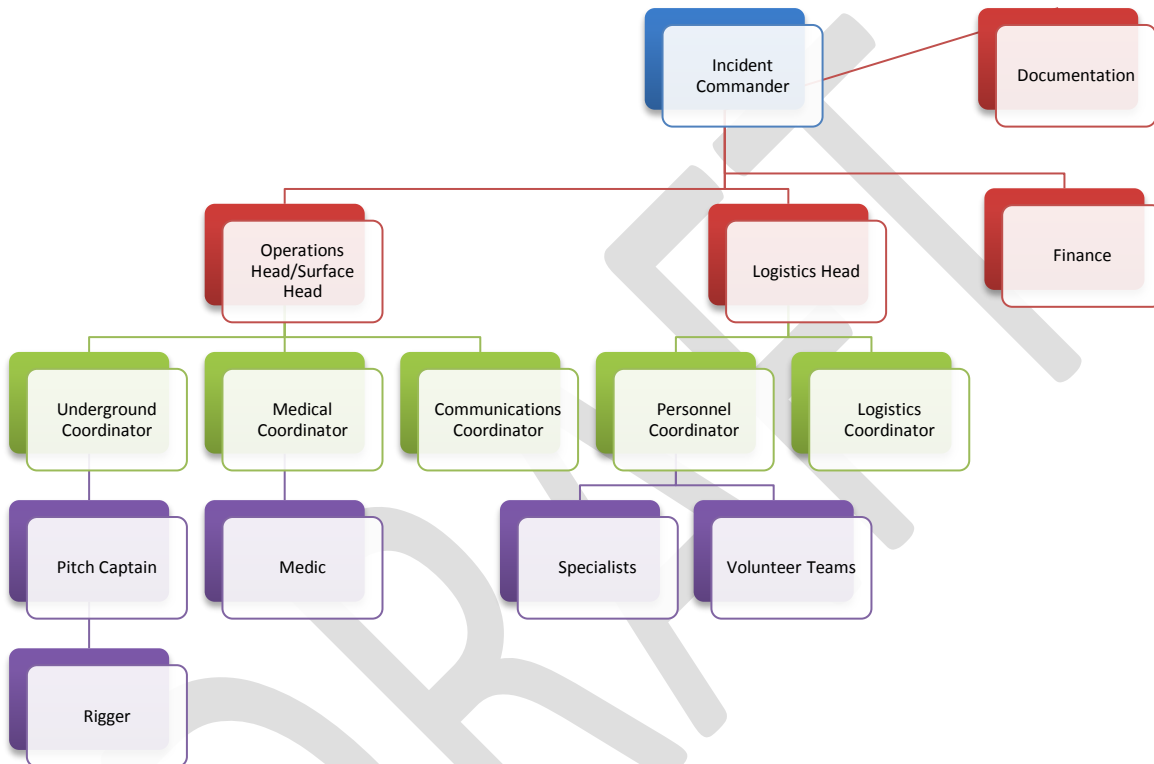
929 5. Post-incident guidelines

930 *To be developed for this as part of implementing the Cave Rescue Protocol*

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932 6. Management structure of a cave rescue

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VIII. Legal Basis

- 939 1. Republic Act 9072 - “National Caves and Cave Resources Management and Protection Act”;
- 940 2. DENR Administrative Order No. 2003-29 – “Implementing Rules and Regulations of the National
- 941 Caves and Cave Resources Management and Protection Act”; and
- 942 3. DENR Memorandum Circular No. 2007-04 - Procedure in Cave Classification”

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