OSHA COMPLIANCE JHA

Movie Hazard Analysis

TASK / OPERATION	LOCATION
Emergency Hull Flooding Control	Das Boot (1981) — Crush Depth Dive

JOB TITLE(S)

Submarine Commander (1), Submarine Engineer (2), Damage Control Technician (4)

TASK / OPERATION DESCRIPTION

A submarine crew dives beyond its rated crush depth to evade a depth-charge attack, working to patch hull leaks and control flooding in the engine room as ambient pressure exceeds safe structural limits.

DATE JHA PREPARED	SUPERVISOR(S)
Sep 22, 2026	*Not provided*

JHA TEAM MEMBERS

Not provided

STEP	POTENTIAL HAZARDS	CONTROLS	PHOTOGRAPHS

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STEP	POTENTIAL HAZARDS	CONTROLS	PHOTOGRAPHS
Step 1 Assess Over-Depth Emergency Condition Potential Injury: Multiple fatalities from hull collapse, drowning, or loss of life support.	- Catastrophic hull collapse from ambient pressure beyond the submarine's rated crush depth. - Rapid engine-room flooding and loss of life support while personnel remain in the threatened compartment. - Time-pressure decisions causing personnel to remain in a deteriorating engine room.	Can the potential hazard(s) be: - Eliminated? [ ] - Substituted/replaced? [ ] How? Do not perform hands-on leak repair beyond rated crush depth; reduce depth, surface, or relocate personnel from the threatened compartment when vessel command determines this is feasible. Engineering controls (Existing?) - Use available vessel depth-control [ ] - hull-integrity indication [ ] - compartment-isolation [ ] - dewatering [ ] - and internal-communication systems as designed [ ] - report depth and flooding changes continuously to damage control. [ ] Administrative controls - The commanding officer or designated damage-control authority shall brief all seven crew members [ ] - assign damage-control roles [ ] - maintain a timed status board for depth [ ] - flooding trend [ ] - personnel location [ ] - and communications [ ] - and order immediate withdrawal when structural or flooding indicators worsen. [ ] Personal protective equipment - Crew members shall use vessel-issued emergency breathing/escape equipment and protective clothing only as specified by the vessel damage-control arrangement - equipment type - readiness - and suitability are Data Unknown.	Uncontrolled No photo provided Controlled No photo provided

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STEP	POTENTIAL HAZARDS	CONTROLS	PHOTOGRAPHS
Step 2 Authorize Engine-Room Entry and Isolation Potential Injury: Asphyxiation, toxic exposure, drowning, entrapment, or multiple fatalities.	- Low oxygen in the engine room during flood response. - Potential flammable or toxic atmosphere from damaged engine-room systems; substance unspecified. - Entrapment or drowning if flooding increases after entry. - Uncontrolled inflow from unisolated lines or equipment.	Can the potential hazard(s) be: - Eliminated? [ ] - Substituted/replaced? [ ] How? Keep personnel out of the engine room when the leak can be controlled from another compartment or when atmospheric, flooding, structural, communication, or evacuation conditions cannot support entry. Engineering controls (Existing?) - Where practicable [ ] - isolate or blank lines and equipment that can introduce flooding [ ] - pressure [ ] - steam [ ] - exhaust [ ] - fuel vapor [ ] - or other energy. Establish forced ventilation only if it will not worsen flooding or vessel stability. Use calibrated continuous direct-reading monitors for oxygen [ ] - LEL [ ] - CO [ ] - H2S [ ] - and PID or task-specific toxic vapor where relevant [ ] - monitor configuration and alarm criteria are Data Unknown. [ ] Administrative controls - The designated entry supervisor shall evaluate and document confined-space classification [ ] - complete and sign an entry permit when applicable [ ] - name authorized entrants [ ] - an attendant [ ] - and entry supervisor [ ] - and brief communications and evacuation signals. Reauthorize entry after any flooding [ ] - ventilation [ ] - power [ ] - or scope change. If contractors perform entry [ ] - the entry supervisor shall verify documented training [ ] - monitor calibration/bump-check status [ ] - worker air-monitoring plan [ ] - and exposure-sampling media or badges when the identified hazard requires them [ ] - contractor involvement is Data Unknown. [ ] Personal protective equipment - Entrants shall use vessel-issued respiratory/escape equipment suitable for unknown or potentially IDLH conditions. Before respirator use - the responsible supervisor shall verify the written respiratory program - task training - medical clearance - fit testing - clean-shaven sealing area - and SCBA/escape-bottle readiness - if supplied air is used - verify Grade D breathing air. Equipment availability and configuration are Data Unknown.	Uncontrolled No photo provided Controlled No photo provided

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STEP	POTENTIAL HAZARDS	CONTROLS	PHOTOGRAPHS
Step 3 Stage Rescue, Access, and Communications Potential Injury: Drowning, asphyxiation, traumatic injury, chemical eye/skin injury, or fatal delay in rescue.	- Rescue delay for personnel trapped by rising water or blocked engine-room access. - Loss of communication with repair personnel in near-total darkness and high noise. - Entanglement or restricted evacuation from hoses, cords, lifelines, and repair materials in a flooded access route. - Delayed treatment after contact with unspecified engine-room fluids.	Can the potential hazard(s) be: - Eliminated? [ ] - Substituted/replaced? [ ] How? Do not send personnel into an engine room that cannot be monitored, communicated with, and evacuated using available vessel emergency arrangements. Engineering controls (Existing?) - Stage a tested hard-wired or vessel-approved communication method [ ] - emergency lighting [ ] - and unobstructed access route. Stage a retrieval harness and lifeline only after the attendant checks the route for snagging [ ] - obstruction [ ] - and interference with evacuation. Stage available eyewash/shower or decontamination supplies at the access point for possible contact with unspecified engine-room fluids. Stage a vessel-approved fire extinguisher only if flammable atmospheres or materials are identified [ ] - flammable-material presence is Data Unknown. [ ] Administrative controls - The entry supervisor shall assign a dedicated attendant outside the engine room [ ] - maintain a personnel log and check-in intervals [ ] - establish emergency signals [ ] - and verify a designated rescue team or vessel emergency-response capability is ready before entry where conditions allow. The attendant shall order evacuation for rising water beyond the planned work position [ ] - communication loss [ ] - atmospheric alarm [ ] - monitor failure [ ] - respiratory distress [ ] - structural-warning report [ ] - or command-directed evacuation. [ ] Personal protective equipment - Entrants shall wear vessel-issued flotation - immersion - head - hand - eye/face - and emergency breathing equipment only where compatible with access and repair work - exact equipment requirements are Data Unknown.	Uncontrolled No photo provided Controlled No photo provided

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STEP	POTENTIAL HAZARDS	CONTROLS	PHOTOGRAPHS
Step 4 Patch Hull Leak and Limit Flooding Potential Injury: Drowning, crushing, laceration, hand injury, eye injury, or fatal hull failure.	- High-velocity water ingress at the hull leak striking or sweeping personnel. - Pinch, crush, and laceration hazards while positioning patching, clamping, or shoring components against the leaking hull boundary. - Loss of footing, immersion, and drowning in rising floodwater. - Reduced visibility and high noise impairing communication and tool control. - Catastrophic structural failure while personnel work near the damaged hull.	Can the potential hazard(s) be: - Eliminated? [ ] - Substituted/replaced? [ ] How? Eliminate direct contact with the leak stream and avoid hands-on repair when isolation, depth reduction, or remote controls can reduce the leak without personnel exposure. Engineering controls (Existing?) - Use available vessel-approved shoring [ ] - patching [ ] - clamping [ ] - bracing [ ] - dewatering [ ] - and compartment-isolation equipment to reduce water flow and stabilize the patch. Provide vessel-approved task lighting that does not obstruct access [ ] - electrical suitability is Data Unknown. [ ] Administrative controls - The damage-control leader shall select and brief the specific vessel-approved patch method [ ] - assign one worker to observe hand/tool placement and another to track water level and communications [ ] - limit the entry team to the minimum necessary [ ] - and prohibit improvised changes without command review. Confirm each crew member location before and after the repair attempt. [ ] Personal protective equipment - Use vessel-issued eye/face protection - waterproof protective clothing - gloves selected for grip and puncture resistance - head protection - and emergency breathing equipment compatible with the repair. Compatibility with unspecified fluids and the selected patch method is Data Unknown.	Uncontrolled No photo provided Controlled No photo provided

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STEP	POTENTIAL HAZARDS	CONTROLS	PHOTOGRAPHS
Step 5 Verify Repair and Close Emergency Entry Potential Injury: Drowning, asphyxiation, re-flooding injury, or delayed fatal consequences from renewed hull failure.	- Patch displacement or renewed flooding after repair personnel withdraw. - Residual low oxygen or hazardous atmosphere during inspection and exit. - Unaccounted personnel or delayed evacuation during a renewed emergency. - Premature removal of isolation, ventilation, monitoring, or rescue support.	Can the potential hazard(s) be: - Eliminated? [ ] - Substituted/replaced? [ ] How? Evacuate personnel from the threatened compartment and discontinue repair when monitoring shows renewed flooding, degraded atmosphere, or worsening structural condition. Engineering controls (Existing?) - Maintain atmospheric monitoring [ ] - communications [ ] - emergency lighting [ ] - compartment isolation [ ] - dewatering/containment [ ] - and rescue capability until the responsible vessel authority directs a change. Inspect the patch from the safest available location for shifting or renewed flow. [ ] Administrative controls - The damage-control leader shall conduct and record accountability for all seven crew members [ ] - obtain attendant and entry-team reports [ ] - record flooding trend and patch condition [ ] - cancel or close the entry authorization only through the designated authority [ ] - and rebrief personnel before any re-entry or scope change. Vessel command authorization is required before reducing emergency posture. [ ] Personal protective equipment - Maintain vessel-issued emergency breathing/escape equipment and task-compatible protective clothing until personnel exit and the designated vessel authority authorizes stand-down.	Uncontrolled No photo provided Controlled No photo provided

CHEMICAL EXPOSURE OEL SUMMARY (2)

OEL source priority: U.S. OSHA, NIOSH, ACGIH, and state sources first; then other available sources. The lowest available numeric OEL from matching offline sources is listed in addition to the location/default OEL. Confirm chemical identity and exposure limits against the SDS, label, and applicable regulations.

Antimony trioxide; handling and use (as Sb) (CAS: 1309-64-4, confidence: 40%)

Detected as: The prompt identifies flooding, near-total darkness, low oxygen, hull failure risk, and time pressure. Rescue equipment and the engine-room access configuration are not provided; therefore, retrieval feasibility is Data Unknown and must be checked before entry. OSHA 29 CFR 1910.146(k), page: Data Unknown; assumption: the entry is determined to be covered by the cited rescue provisions is Data Unknown. A conventional lifeline may be unsafe or impracticable around obstructions or through flooded access; do not use it unless the attendant verifies it will not create entanglement or prevent movement. Rescue-team readiness must be verified before entry where conditions allow.
Location/default OEL: Hawaii HIOSH TWA 0.5 mg/m³
Lowest available OEL: 🇨🇦 British Columbia WorkSafeBC TWA 0.02 mg/m³
Sources cited: Hawaii HIOSH (TWA 0.5 mg/m³); 🇨🇦 British Columbia WorkSafeBC (TWA 0.02 mg/m³); 🇨🇦 Quebec CNESST (TWA 0.5 mg/m³)

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Ozone (CAS: 10028-15-6, confidence: 40%)

Detected as: The task explicitly states ambient pressure exceeds safe structural limits and hull failure risk is present. No OSHA standard supplied governs submarine crush-depth operations. The work cannot be made structurally safe by patching while beyond the rated depth; the preferred control is to remove the crew from the over-depth condition. Exact vessel damage criteria, available depth-control capability, and escape arrangements are Data Unknown. Any worsening hull noise, rapid flooding, loss of compartment integrity, or loss of communications requires immediate stop-work and evacuation/survival action under vessel command.
Location/default OEL: OSHA PEL TWA 0.1 ppm (0.2 mg/m³)
Lowest available OEL: 🇨🇦 British Columbia WorkSafeBC TWA 0.05 ppm
Sources cited: OSHA PEL (TWA 0.1 ppm (0.2 mg/m³)); NIOSH REL (TWA 0.1 ppm (0.2 mg/m3)); Hawaii HIOSH (TWA 0.1 ppm (0.2 mg/m³)); Michigan MIOSHA (TWA 0.1 ppm (0.2 mg/m³)); Oregon OSHA (TWA 0.1 ppm (0.2 mg/m³)); Washington WISHA (TWA 0.1 ppm); 🇨🇦 British Columbia WorkSafeBC (TWA 0.05 ppm); Finland FIOH (TWA 0.05 ppm (0.1 mg/m³)); France VLEP (TWA 0.05 ppm (0.1 mg/m³)); Ireland HSA (TWA 0.05 ppm); Mexico NOM-010-STPS (TWA 0.05 ppm (0.1 mg/m³)); New Zealand WES (TWA 0.05 ppm (0.1 mg/m³)); Singapore PEL (TWA 0.05 ppm (0.1 mg/m³)); South Korea OEL (TWA 0.05 ppm (0.1 mg/m³)); Germany TRGS 900 (TWA 0.06 ppm (0.12 mg/m³)); Netherlands SER (TWA 0.06 ppm (0.12 mg/m³)); 🇨🇦 British Columbia WorkSafeBC (TWA 0.08 ppm); Brazil NR-15 (TWA 0.08 ppm (0.16 mg/m³)); Chile DS 594 (TWA 0.08 ppm (0.16 mg/m³)); Ireland HSA (TWA 0.08 ppm); Taiwan PEL (TWA 0.08 ppm (0.16 mg/m³)); 🇨🇦 British Columbia WorkSafeBC (TWA 0.1 ppm); 🇨🇦 Ontario MOL (TWA 0.1 ppm (0.2 mg/m³)); Australia WES (STEL 0.1 ppm (0.2 mg/m³)); India Factories Act (TWA 0.1 ppm (0.2 mg/m³)); Ireland HSA (TWA 0.1 ppm); Japan JSOH (TWA 0.1 ppm (0.2 mg/m³)); Kenya OEL (TWA 0.1 ppm (0.2 mg/m³)); South Africa HCA OEL (TWA 0.1 ppm); Sweden AV (TWA 0.1 ppm (0.2 mg/m³)); 🇨🇦 British Columbia WorkSafeBC (TWA 0.2 ppm); Ireland HSA (TWA 0.2 ppm); United Kingdom WEL (STEL 0.2 ppm (0.4 mg/m³)); China GBZ (Ceiling 0.3 mg/m³)

RISK ASSESSMENT SUMMARY

Initial Risk: CRITICAL -> Residual Risk: HIGH | Risk reduction demonstrated across all steps.

Step	Description	Hazard	Controls	Initial Risk	Residual Risk
1	Assess Over-Depth Emergency Condition	- Catastrophic hull collapse from ambient pressure beyond the submarine's rated crush depth. - Rapid engine-room flooding and loss of life support while personnel remain in the threatened compartment. - Time-pressure decisions causing personnel to remain in a deteriorating engine room.	- Use available vessel depth-control - hull-integrity indication - compartment-isolation - dewatering	**20 - Critical**	**15 - High**

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2	Authorize Engine-Room Entry and Isolation	- Low oxygen in the engine room during flood response. - Potential flammable or toxic atmosphere from damaged engine-room systems; substance unspecified. - Entrapment or drowning if flooding increases after entry. - Uncontrolled inflow from unisolated lines or equipment.	- Where practicable - isolate or blank lines and equipment that can introduce flooding - pressure - steam	**20 - Critical**	**10 - High**
3	Stage Rescue, Access, and Communications	- Rescue delay for personnel trapped by rising water or blocked engine-room access. - Loss of communication with repair personnel in near-total darkness and high noise. - Entanglement or restricted evacuation from hoses, cords, lifelines, and repair materials in a flooded access route. - Delayed treatment after contact with unspecified engine-room fluids.	- Stage a tested hard-wired or vessel-approved communication method - emergency lighting - and unobstructed access route. Stage a retrieval harness and lifeline only after the attendant checks the route for snagging - obstruction	**20 - Critical**	**10 - High**
4	Patch Hull Leak and Limit Flooding	- High-velocity water ingress at the hull leak striking or sweeping personnel. - Pinch, crush, and laceration hazards while positioning patching, clamping, or shoring components against the leaking hull boundary. - Loss of footing, immersion, and drowning in rising floodwater. - Reduced visibility and high noise impairing communication and tool control. - Catastrophic structural failure while personnel work near the damaged hull.	- Use available vessel-approved shoring - patching - clamping - bracing	**20 - Critical**	**15 - High**

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5	Verify Repair and Close Emergency Entry	- Patch displacement or renewed flooding after repair personnel withdraw. - Residual low oxygen or hazardous atmosphere during inspection and exit. - Unaccounted personnel or delayed evacuation during a renewed emergency. - Premature removal of isolation, ventilation, monitoring, or rescue support.	- Maintain atmospheric monitoring - communications - emergency lighting - compartment isolation	**15 - High**	**10 - High**

Civilian risk levels: 1-4 Low, 5-9 Medium, 10-15 High, 16-25 Critical. Initial Risk = hazard risk before controls applied. Residual Risk = remaining risk after controls applied. Effective JHA demonstrates residual risk lower than initial risk on all steps.

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