Attachment-1 Hazard report template (From payload/GSE arrival to the KSC to the moment the payload is handed over to the launch vehicle)

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| No | Hazard | Cause | Hazard control | Safety verification method (baseline) | Status | Ph | Verification results | Document Name/number |
| HR-5.1  Apply    N/A | Death or injury of person and loss of launch site facility and equipment caused by fire in the explosive hazardous atmosphere  【Severity is generally I】 | (1) Spark generation at equipment contact switching | (1-1) Gas-explosion-proof or equivalent design is applied to the payload (potting, hermetic sealing, pressurization with inert gases). Note: Except for the type of protection “n”. Note: Explosion-proof is also considered for cables and electronic devices. | (1-1-1) Confirm explosion-proof or equivalent design by drawing or other methods | OPEN | II |  |  |
| (1-1-2) Confirm proper fabrication by physical inspection or other methods | OPEN | III |  |  |
| (1-2) Avoiding energization of non-explosion proof equipment of the payload in an explosive hazardous atmosphere. (Mis-operation needs to be considered if interface by operator exists.) | (1-2-1) Confirm that non-explosion proof equipment is not energized by procedures or other methods | OPEN | III |  |  |
| (1-3) If it is difficult to adopt explosion-proof certified products for GSE electrical equipment, gas-explosion proof equivalent design is applied to the GSE (potting, hermetic sealing, pressurization with inert gases). Note: Except for the type of protection “n”. Note: Explosion-proof is also considered for cables and electronic devices. | (1-3-1) Confirm explosion proof or equivalent design by drawing or other methods | OPEN | II |  |  |
| (1-3-2) Confirm proper fabrication by physical inspection or other methods | OPEN | III |  |  |
| (1-4) Electrical equipment (explosion-proof certified and non-explosion-proof equipment) of GSE is brought into an explosive hazardous atmosphere in accordance with JERG-1-007.  (The list of equipment to be brought in is subject to confirmation by the Launch Site Safety Gr.) | (1-4-1) Confirm proper measures in accordance with JERG-1-007 by procedure or other methods  (The list of equipment to be brought to the launch site is to be submitted to the Launch Site Safety Gr, so it does not need to be attached to the safety data package.) | OPEN | III |  |  |
| (2) Spark generation due to human contact with energized parts | (2-1) Design that there are no energized parts where a person can touch them in payload/GSE. | (2-1-1) Confirm design that there are no exposed energized parts by drawing or other methods (e.g. connectors on the side supplying power us female contacts) | OPEN | II |  |  |
| (2-2) Avoiding energization in case that there is an exposed energized parts (e.g. plasma thruster) in payload/GSE. | (2-2-1) Confirm that exposed parts are not energized by procedure or other methods | OPEN | III |  |  |
| (3) Existence of heat source | (3-1) Avoiding energization of exposed heating wires in an explosive hazardous atmosphere. | (3-1-1) Confirm that exposed heating wires are not energized by procedure or other methods | OPEN | III |  |  |
| (4) Ignition of pyrotechnic devices and solid propellants | (4-1) Non-ignition of pyrotechnic devices and solid propellants in explosive hazardous atmospheres. | (4-1-1) Confirm that pyrotechnic devices and solid propellants are not ignited by procedure or other methods | OPEN | III |  |  |
| (5) Spark generation due to static electricity | (5-1) Proper bonding and grounding of payload/GSE to prevent static electricity. | (5-1-1) Confirm proper bonding and grounding by grounding system drawing or other methods | OPEN | II |  |  |
| (5-1-2) Confirm proper bonding and grounding by inspection of actual products or other methods | OPEN | III |  |  |
| (5-2) Proper operation that does not generate static electricity | (5-2-1) Confirm that wrist straps and antistatic clothing/shoes are used by procedure or other methods | OPEN | III |  |  |
| (6) Contact between rust and flammable propellant | (6-1) Controlling that there is no rust for areas that may come in contact with flammable propellants (payload, GSE, and operating area). | (6-1-1) Confirm that there is no rust by visual inspection or other methods | OPEN | III |  |  |
| (7) Leakage of flammable propellant | According to hazard report No. 5.4. (However, if the separation measure to prevent contact between leaked flammable propellant and ignition source is applied, only 1FT design against leakage of propellant prepared.) | - | - | - | - | - |
| (8) Mixture of flammable propellant and oxidizer (only for propellant/ oxidizer propulsion system) | (8-1) Design to prevent mixing of flammable propellant and oxidizer due to mishandling during filling operation | (8-1-1) Confirm design of separation arrangement of the port and adoption of different pipe diameters by drawing or other methods | OPEN | II |  | A layout drawing is attached |
| (8-1-2) Confirm the application of the separation arrangement of the port and adoption of different pipe diameters to the actual products by inspection or other methods. | OPEN | III |  |  |
| (8-2) Operation without mixing flammable propellant and oxidizer | (8-2-1) Confirm operation that propellant filling equipment and oxidizer filling equipment are not placed at the same time during the filling operation by procedure or other methods | OPEN | III |  |  |
| (8-3) Prevention of mixing of propellant and oxidizer in the payload after filling (2FT design) | (8-3-1) Confirm 2FT design against mixing of propellant and oxidizer by drawing or other methods | OPEN | II |  | A schematic of 2FT design is attached |
| (8-3-2) Confirm 2FT design against mixing of propellant and oxidizer by test or other methods | OPEN | III |  |  |
| (9) Inadequate operation of class 4 lasers | (9-1) Design and operation in accordance with JIS C 6802 (IEC 60825-1) | (9-1-1) Confirm design in accordance with JIS C 6802 (IEC 60825-1) by drawing or other methods | OPEN | III |  |  |
| (9-1-2) Confirm operation in accordance with JIS C 6802 (IEC 60825-1) by procedure or other methods | OPEN | III |  |  |

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| No | Hazard | Cause | Hazard control | Safety verification method (baseline) | Status | Ph | Verification results | Document Name/number |
| HR-5.2  Apply    N/A | Death or injury of person and loss of launch site facility and equipment caused by pressure system burst   【Severity is generally I】 | (1) Inadequate design and manufacturing of pressure system | (1-1) Design and manufacturing of payload in accordance with JERG-0-001 “Technical Standard for High Pressure Gas Equipment for Space Use ”. | (1-1-1) Confirm proper design and manufacturing by the certification. | OPEN | III |  |  |
| (1-1-2) For parts outside the scope of the certification (low pressure side after the shutoff valve), confirm proper manufacturing by functional test. | OPEN | III |  |  |
| (1-2) Pressure-resistant design assuming the case of the worst thermal environment due to heater failure, and leakage to low pressure side (considering 2 failures of low pressure side valves) | (1-2-1) Confirm the pressure-resistant design by drawing, analysis or other methods | OPEN | II |  | A schematic and MDP analysis result are attached |
| (1-3) Design and manufacturing of GSE (Pressurization equipment) in accordance with the national law “High Pressure Gas Safety Act”. | (1-3-1) Confirm proper design and manufacturing by the permit. (In case of diverted/borrowed items, confirm results of statutory pre-use inspection.) | OPEN | III |  |  |
| (2) Pressurization beyond design pressure | (2-1) 2 FT design for pressurization beyond design pressure. | (2-1-1) Confirm 2FT design including regulating valves or safety valves by a piping system diagram or other methods | OPEN | II |  | A piping system diagram indicating 2FT design is attached |
| (2-1-2) Confirm that the control by pressure monitor and the safety valve is effective before pressurization operation by procedure or other methods | OPEN | III |  |  |
| (3) Inadequate pressurization operation | (3-1) Pressurization operation in accordance with JERG-1-007. When pressurizing or depressurizing above 1/4 of the design breakdown pressure, a hazardous area with protective walls is set. | (3-1-1) Confirm by procedure or other methods that the operation is based on JERG-1-007 and the hazardous area is established. | OPEN | III |  |  |

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| No | Hazard | Cause | Hazard control | Safety verification method (baseline) | Status | Ph | Verification results | Document Name/number |
| HR-5.3  Apply    N/A | Death or injury of person and loss of launch site facility and equipment caused by lithium-ion battery rupture  【Severity is generally I】 Note: Hazard identification is not required for assembled batteries of 100 Wh or less, and not charged in an explosive atmosphere  Note: Hazard identification is not required for Ni-MH battery rupture and electrolyte leakage. However, it is necessary to confirm that there is no safety impact due to overheating of the battery  Note: Flight environment compatibility of battery needs to be evaluated separately for each launch vehicle | (1) Internal short of a cell | (1-1) Design and manufacturing of cells without internal short. | \*(1-1-1) Confirm that cells are designed and manufactured in accordance with UN/UL recommendations by the certification. (In case of cells certified by a space agency, confirm that the cells have been certified by the agency). | OPEN | II |  | UN/UL authorization number is attached |
| \*(1-1-2) Confirm no change in battery charge/discharge characteristics before and after environmental tests (vacuum test, vibration test, etc.) of the payload on board condition (or battery assembly) by test report or other methods | OPEN | III |  | A summary of charge/discharge characteristics is attached |
| (2) External short of the cell | (2) Design and manufacturing without short-circuit on the battery load side. Select either (2-1) or (2-2)  (2-1) Preparing two protection functions (separator shutdown function, PTC, fusible link, fuse, etc.) inside or outside of the cell against short-circuit outside the cell.  The part where short-circuit is assumed in the path between the cell and the external protection function is double-insulation as shown in (2-2), because external protection function doesn’t work in the short-circuit of this path. | \*(2-1-1) Confirm design of protection functions by drawing or other methods | OPEN | II |  | A schematic indicating the protective function is attached |
| \*(2-1-2) Confirm that protection functions work by functional test or other methods | OPEN | III |  |  |
| (2-2) Double-insulation the load side. (Generally up to the switch nearest the battery) | \*(2-2-1) Confirm design of double-insulation by drawing or other methods | OPEN | II |  | A schematic indication of double-insulation is attached |
| \*(2-2-2) Confirm the installation of double-insulation by inspection or other methods | OPEN | III |  |  |
| (3) Overcharge | (3-1) 1FT design against overcharging when charging outside the explosive hazardous atmosphere at the launch site, and 2FT design when charging inside the explosive hazardous atmosphere or while the payload is on board the launch vehicle. | (3-1-1) Confirm proper FT design by drawing or other methods | OPEN | II |  | A schematic indicating FT design is attached |
| (3-1-2) Confirm that the protection functions work properly by functional test or other methods | OPEN | III |  |  |
| (3-1-3) Confirm that the control by the monitor is effective by procedure or other methods. (Only if there is operational hazard control.) | OPEN | III |  |  |
| (3-2) Management of cells voltage variation. (Because battery voltage monitor may not detect overcharge of a single cell due to cell variation.) | \*(3-2-1) Confirm the results of cell variation control by inspection or other methods | OPEN | III |  |  |
| (3-3) (Measures against over discharge) Prohibition of use of battery below the voltage that recommended by the cell/battery pack manufacturer or to a certified voltage by an acceptance test. | (3-3-1) Confirm battery voltage before charging (only if there is a charging operation in the launch site) | OPEN | III |  |  |
| (4) Use in abnormal temperature environments caused by thermal control system failure | Select either (4-1) or (4-2).  (4-1) Design environmental temperature below the guaranteed battery temperature even under worst-case condition (after two failures of the heater driver circuit). | (4-1-1) Confirm that the temperature is below the guaranteed battery temperature by thermal analysis. (Considering after two failures of the heater drive circuit.) | OPEN | II |  |  |
| (4-2) 2FT design against the heater ON. | (4-2-1) Confirm 2FT design by drawing or other methods | OPEN | II |  |  |
| (4-2-2) Confirm that 2FT design is valid by functional test or other methods | OPEN | III |  |  |

\*If JAXA developed cells are used, it has already been verified and no additional verification is required.

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| No | Hazard | Cause | Hazard control | Safety verification method (baseline) | Status | Ph | Verification results | Document Name/number |
| HR-5.4  Apply    N/A | Death or injury of person and contamination of launch site facility and equipment caused by toxic material leakage  【Severity is generally I】 | (1) Inadequate design of propulsion subsystem and seals defect | (1-1) Each leakage path (pouring/draining valve, downstream side of propellant tank, etc.) has three seals. | (1-1-1) Confirm the structure with 3 seals by drawing or other methods (Cross-sectional diagram for the pouring/draining valve) | OPEN | II |  | A diagram indicating 3 seals structure (cross sectional diagram for pouring/ drawing valves) is attached |
| (1-2) Selection of appropriate seal materials. | (1-2-1) Confirm seal performance by test or other methods | OPEN | III |  |  |
| (2) Malfunction of propellant valve drive circuit | (2-1) 2FT design against electrical malfunction. | (2-1-1) Confirm 2FT design by drawing or other methods | OPEN | II |  | A schematic indicating 2FT design is attached |
| (2-1-2) Confirm the validity of 2FT by test or other methods | OPEN | III |  |  |
| (3) Inadequate propellant filling operation | (3-1) Filling operation in accordance with JERG-1-007. | (3-1-1) Confirm that operation is in accordance with JERG-1-007 by procedure or other methods | OPEN | III |  |  |
| (4) Fluid incompatibility of tanks, etc. against propellant | (4-1) Use of fluid-compatible materials. | (4-1-1) Confirm the use of appropriate materials by materials list or other methods | OPEN | II |  |  |
| (5) Foreign matter caught in the valve | (5-1) Use of cleanliness-controlled fluids. | (5-1-1) Confirm the cleanliness by inspection or other methods | OPEN | III |  |  |
| (6) Falling or collision when lifting/hoisting payload after filling with toxic propellant. | (6-1) Design and manufacturing of payload suspension points with margin. | (6-1-1) Confirm safety margin by design analysis or other methods, and confirm manufacturing result by test or other methods | OPEN | II |  | A result of analysis is attached |
| (6-2) Design and manufacturing of lifting devices in accordance with national regulations, etc. | (6-2-1) Confirm that safety margin is in accordance with national law“Industrial Safety and Health Law”.  The “industrial Safety and Health Law, Safety Ordinance for Cranes” requires a minimum safety factor of 6 for wire rope and 5 for other types. | OPEN | II |  | A result of analysis is attached |
| (6-2-2) Confirm proper manufacturing by proof load test at a magnification of 2 times, or a factor defined by official standards.  (When using existing or commercial lifting devices, confirm use within the rated range.) | OPEN | III |  |  |
| (6-3) Lifting operation based on JERG-1-007 | (6-3-1) Confirm that the operation is in accordance with JERG-1-007 by procedure or other methods | OPEN | III |  |  |
| (7) Burst of pressure system | According to hazard report No. 5.2. | - | - | - | - | - |

\* Attach the results of the assessment of the severity of the hazard for propellants, oxidizers, ammonia in heat pipes, and other hazardous materials.

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| No | Hazard | Cause | Hazard control | Safety verification method (baseline) | Status | Ph | Verification results | Document Name/number |
| HR-5.5  Apply    N/A | Injury of person caused by inadvertent RF radiation  【Severity is assessed individually】 | (1) Inadequate design and manufacturing of radio frequency (RF) subsystem | (1-1) Fault tolerant design (1FT or 2FT) against inadvertent RF radiation | (1-1-1) Confirm FT design by drawing or other methods | OPEN | II |  | A schematic indicating FT design is attached |
| (1-1-2) Confirm the FT is valid by electrical performance tests or other methods | OPEN | III |  |  |
| (2) Unintended entry of person during testing at the launch site | (2-1) Person restrictions (keep out zone) during radiation testing | (2-1-1) Confirm that the keep out zone (safe distance) and period of the restriction are specified in the procedure or other methods | OPEN | III |  | A result of calculation of safe distance and keep out zone are attached |

※The results of the evaluation of severity for all RF radiation sources are attached.

Check for the applicability of the following hazards and prepare hazard reports if necessary.

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| Hazard | Apply | N/A | Hazard report No. |
| Death or injury of person and loss of launch site facility and equipment caused by inadvertent actuation of pyrotechnic devices |  |  |  |
| Death or injury of person and contamination of launch site facility and equipment caused by pathogens leakage |  |  |  |
| Death or injury of person and loss of launch site facility and equipment caused by ionizing radiation sources |  |  |  |
| Death or injury of person and loss of launch site facility and equipment caused by cryogenic fluid leakage  Death or injury of person and loss of launch site facility and equipment caused by pressure system burst containing cryogenic fluid  Death or injury of person and loss of launch site facility and equipment caused by fire and explosion due to mixing of cryogenic fluids (e.g. liquid hydrogen and liquid oxygen) |  |  |  |
| Other hazards |  |  |  |