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RESPONSE TO CEC STAFF DATA REQUEST SET 3 (46-56)

Gilroy Backup Generating Facility (20-SPPE-03)

SUBMITTED TO: CALIFORNIA ENERGY COMMISSION
SUBMITTED BY: **Amazon Data Services, Inc.**

September 22, 2021



INTRODUCTION

Attached are Amazon Data Services, Inc. (ADS) responses to California Energy Commission (CEC) Staff Data Request Set No. 2 (46-53) for the Gilroy Backup Generation Facility (GBGF) Application for Small Power Plant Exemption (SPPE) (20-SPPE-03). Staff issued Data Request Set No. 3 on September 10, 2021.

The Data Responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as Staff presented them and are keyed to the Data Request numbers (46-53). Additional tables, figures, or documents submitted in response to a data request (e.g., supporting data, stand-alone documents such as plans, folding graphics, etc.) are found in Attachments at the end of the document and labeled with the Data Request Number for ease of reference.

For context the text of the Background and Data Request precede each Data Response.

GENERAL OBJECTIONS

ADS objects to all data requests that require analysis beyond which is necessary to comply with the California Environmental Quality Act (CEQA) or which require ADS to provide data that is in the control of third parties and not reasonably available to ADS. Notwithstanding this objection, ADS has worked diligently to provide these responses swiftly to allow the CEC Staff to prepare the Draft Environmental Impact Report (DEIR).

AIR QUALITY AND PUBLIC HEALTH

BACKGROUND: REVISED CONSTRUCTION EMISSIONS CALCULATIONS

The Revised Project Description (TN 239193) for the addition of two battery energy storage system (BESS) facilities appears to increase: the ground disturbance area (acres); excavated and trenching material movement volume (cubic yards); and also the number and types of off-road equipment and haul trucks necessary to deliver and install BESS components. Staff needs to confirm that the newly proposed construction activities related to the BESS facilities were reflected accurately in the construction emission calculations that appear in the Revised Air Quality Impact Assessment (AQIA) (TN 237353) that was submitted on March 30, 2021, prior to proposing the BESS. The site plan with the Revised Project Description shows an additional five acres of ground disturbance, based on two areas covering approximately 2.5 acres each (286 feet x 379 feet and 286 feet x 380 feet).

DATA REQUEST

46. Please confirm that the disturbance area, material movement, and equipment and trucking fleet necessary to install the two proposed BESS facilities are accurately reflected in the project construction emissions and construction phase air dispersion modeling analysis. This response should describe whether the applicant finds it necessary to update the construction emissions estimates and air dispersion modeling analysis, and if not, a demonstration of how the BESS components are within the scope of the earlier construction-phase analysis.

RESPONSE TO DATA REQUEST 46

The construction of the BESS facilities is accounted for under the construction emissions and air dispersion modeling provided in the Revised AQIA. The construction emissions in the Revised AQIA reflect the maximum potential annual and daily emissions based on the construction schedule and equipment inventory inputs to CalEEMod. ADS provided CalEEMod output spreadsheets via File Transfer Protocol upload on April 30, 2021, which demonstrate the estimated emissions on a year-by-year basis.

ADS will construct the BESS facilities utilizing the previously proposed equipment inventory and daily operating hours and will accommodate the BESS facilities' construction by extending the previously proposed construction schedule such that the maximum annual emissions will not change. Based on the construction emissions with the incorporation of Mitigation Measure AQ-1, the maximum emissions occur in 2023 or 2024, depending on the type of criteria pollutant. The construction years 2023 and 2024 include

the overlap of construction activities for the Phase 1 and Phase 2 Buildings. The additional civil work, such as grading, excavation, and foundation, for the Phase 1 Building BESS facility has partially been encompassed by the anticipated construction activities for the original design of the proposed substation. The additional civil work for the BESS facilities is conservatively anticipated to extend the originally proposed construction schedule by one week for each building. By extending the construction schedule, all following construction will be pushed out such that the emissions from originally planned activities will occur in the following year for which the annual emissions are less than the maximum emissions construction year. ADS anticipates that any additional emissions from the civil work for the Phase 2 BESS would be similar to or less than the emissions from the displaced construction activities.

The additional truck deliveries for the BESS components will be planned to be spread out over the construction timeline and will not be concentrated in a single year. ADS conservatively evaluated the on-road construction emissions associated with the trucking of all BESS components in one year. ADS also conservatively used 2017 EMFAC emission factors for calendar year 2021 and applied the potential emissions to the anticipated maximum emissions construction year (anticipated 2024). Note that BAAQMD also accepts 2021 EMFAC emission factors which would result in even lower emissions. Even with these conservative assumptions, the total potential maximum mitigated emissions remain below the BAAQMD CEQA Thresholds of Significance. The additional emissions increase is quantified in Table 2 below.

Table 1. BESS Trucking Assumptions

GBGF BESS Trips (20-mile Trip Length)	Parameter
BESS Trips:	268
Miles/trip:	20
Total Miles BESS 2021 ¹ :	5,360
Trips per Day per Vehicle ² :	10

¹ Emission factors from calendar year 2021 conservatively used, however construction may occur in later years.

² Per CalEEMod Version 2020.4.0 User's Guide Appendix A, Section 5.2.4.

Table 2. BESS On-Road Construction Emissions

EMFAC2017 T7 Single Construction (20 mile) Emissions	ROG	NO_x	CO	SO_x	PM₁₀¹	PM_{2.5}¹
Running Em. Factor (grams/mile)	0.426	6.487	1.137	0.018	0.213	0.146
Idling Em. Factor (grams/vehicle/day)	1.578	22.673	20.042	0.037	0.032	0.031
Lbs/Mile	0.001	0.014	0.003	0.000	0.000	0.000
Lbs/vehicle/day	0.003	0.050	0.044	0.000	0.000	0.000
Lbs in 2021 ²	5.128	77.997	14.623	0.210	2.519	1.724
lbs/day ³	0.020	0.300	0.056	0.001	0.010	0.007
Tons/year	0.003	0.039	0.007	0.000	0.001	0.001

¹ PM accounts for PM from running, tire wear and brake wear.

² Lbs in 2021 = Lbs/Mile * Total Miles BESS 2021 + (Lbs/vehicle/day) / (Trips/day/vehicle) * BESS Trips

³ Assuming 260 days of hauling per year.

Similarly, the additional trucking for the Phase 2 Building BESS must occur after the completion of the Phase 2 Building infrastructure originally scheduled for 2027. As the trucking emissions would not occur in parallel with any significant excavation, grading, and paving activities, any additional emissions are significantly less than the maximum construction emissions reflected in the Revised AQIA.

In all, the construction emissions account for multiple conservative assumptions, including comparing emissions from the maximum emissions construction year to the CEQA Significance Thresholds, assuming Phase 2 construction occurs immediately after completion of the Phase 1 generation yard, assuming construction will occur over 260 days per year, and using construction emission profiles which do not reflect anticipated improvements over time. Based on ADS' proposed prolonged construction schedule to accommodate the BESS facilities' construction and the minimal on-road construction emissions associated with trucking, the maximum mitigated emissions will still result in a less than significant impact.

BACKGROUND

On page 15, the Revised Project Description states that lithium-ion cells would be the basis of the BESS. However, the exact chemistry of the lithium-ion battery has not been provided.

DATA REQUEST

47. Provide a safety data sheet for the proposed battery technology.

RESPONSE TO DATA REQUEST 47

The BESS has not yet been designed but has been described in the Revised Project Description as ADS is planning for the BESS facilities now. ADS believes that it is required by the California Environmental Quality Act (CEQA) to disclose the CEC as the lead agency of this planning effort. ADS understands that the CEC can evaluate the potential environmental effects of the BESS with the information available to it now even if such evaluation may be at a general level because it is not issuing a permit authorizing the construction or operation of the BESS. The City of Gilroy will ultimately be the only agency to issue a permit to allow construction and operation of the BESS. Such permits will require a higher level of detail than is available at this preliminary design stage by the City of Gilroy at the time of submittal of the building permits. As part of its review of the building permit applications for the BESS, the City of Gilroy will review the Final Environmental Impact Report (FEIR) prepared by the CEC and determine whether the evaluation of the potential environmental effects of the BESS is sufficient to support its decision to issue building permits. If any additional environmental analysis is required, the City of Gilroy will prepare a supplemental environmental document prior to issuing such permits. Notwithstanding that the BESS has not yet been designed, ADS provides information that would be typical and under consideration for the BESS facilities.

Attachment HAZ DR-47 includes safety data sheets from two types of lithium-ion batteries that are under consideration. It is possible that during the final design the actual lithium-ion battery provider selected may be different. However, ADS believes the safety data sheets provided as part of this response are sufficient for the CEC to complete its CEQA-level environmental review.

BACKGROUND

On page 15, the Revised Project Description states the batteries would be housed either in a purpose-built battery container or in an outdoor enclosure with appropriate environmental controls.

DATA REQUEST

48. Please provide a written description of what the BESS enclosure would be and clarify how maintenance would be conducted on the BESS enclosures.

RESPONSE TO DATA REQUEST 48

Please see Response to Data Request 47. Notwithstanding that the BESS has not yet been designed, ADS provides information that would be typical and under consideration for the BESS facilities.

Each manufacturer's enclosure is a bespoke design to contain their proprietary energy storage equipment. As an example, one BESS manufacturer's enclosure is approximately 30' wide 5' deep 8' high with a maximum mass of 84,000 pounds. The enclosure is a non-divisible structure that ships fully-assembled. It has an ingress protection rating of IP66 and NEMA 3R certification for water protection. The enclosure has a minimum impact protection rating of IK09. The enclosure has been tested for 1,000-hour salt and fog resistance. The enclosure's corrosion resistant paint is certified to ISO 12944: C5I (industrial) and C5M (coastal) standards. The BESS are also tested to ensure performance across different temperatures and elevations, and are rated to withstand shock and vibration, seismic activity, winds up to Category 5 hurricane strength (157 MPH), rain and snow loading, and sun exposure. Other BESS manufacturer's enclosures are anticipated to have only minor variations.

BESS facilities are unmanned. BESS facilities are autonomous, 100% continuously monitored and operated remotely. Routine maintenance activities, such as safety and cooling system and electrical connection checks, would involve several technicians driving a pickup truck to access the site and then enter through the BESS facility security fence. Preventative maintenance is anticipated to occur approximately four times per year. The BESS enclosures are designed to allow technicians to access key components via external hinged or removable panels. The same access panels also allow for battery replacement or augmentation to maintain system capacity over time, typically after years of BESS operations. Spare parts such as power supplies, network switches and other small electronics are stored and readily available to be replaced should they fail.

BACKGROUND

On page 16, the project design for the BESS calls for each cell to contain a fire detection system to monitor operational environment for smoke and fire components and safely shut down the BESS in emergency situations. The fire safety system would meet all federal and state standards and the BESS facilities would comply with NFPA 855, IEEE 1547, and UL (9540, 9540A, 1741SA, 1973).

DATA REQUESTS

49. Please provide a written description of the fire protection system for each BESS enclosure.

RESPONSE TO DATA REQUEST 49

Please See Response to Data Request 47. Notwithstanding that the BESS has not yet been designed, ADS provides information that would be typical and under consideration for the BESS facilities.

BESS fire prevention systems are proprietary to each original equipment manufacturers' unique designs. Compliance with the federal, state, National Fire Protection Association, Institute of Electrical and Electronics Engineers, and Underwriters Laboratories requirements are key. As an example, one manufacturer uses a multi-layered fire protection approach for each BESS enclosure. First the design includes physical features such as fire-resistant materials and barriers/gaps to isolate equipment. The hardware combines with BESS software- a battery monitoring and management system- to continuously oversee individual cells and battery stacks. Together the hardware and software minimize the chance for thermal runaway. Then the BESS has a fire alarm system including battery off-gas/smoke/heat detectors, alarm bells, and strobe lights. After several levels of alarms are triggered, the BESS automatically shuts down. In case of fire the pre-installed wet sprinkler system can be utilized. Each enclosure has an external fire hose connection for temporary or permanent water supply, and an external panel to provide critical BESS safety and operational details to provide information to aid first responder decision-making. The BESS will be designed without a single point of failure. The BESS will have redundant controls systems to monitor battery performance and ensure operation within the manufacturer's prescribed limits. All BESS components and systems will be tested and commissioned during product validation and certification.

Outside of the BESS enclosures the project design will also include multiple layers of protection to mitigate fire risk to the maximum extent possible. Spacing of equipment will follow best design practices to ensure safety and access. The BESS will have surge protection devices on equipment, and circuit breakers and fuses on cables, to ensure safe operations. The project site will have readily accessible emergency stops to instantly stop

the BESS from a safe distance. Safety manuals and records of updates to the BESS will also be maintained onsite. Combined, the integral and external safety features designed for BESS facilities minimize and mitigate fire risk.

To ensure that the final design of the BESS would include all of the fire protection systems necessary to comply with federal, state and local code and standards ADS proposes the following Project Design Measure PD HAZ-2, which requires the fire protection system and measures be reviewed and approved by the City of Gilroy Fire Department as part of the City of Gilroy BESS facility building permit review process.

PD HAZ-2 To ensure that the final design of the BESS facilities shall provide adequate fire protection engineering controls, maintenance procedures, and access, prior to obtaining building permits for any BESS facility, the project owner shall include the following in its design, building permit application, and final plans for review and approval by the City of Gilroy:

1. The BESS shall comply with applicable federal, state and local building codes and standards in effect at the time of the submittal of the building permit application including, but not limited to:
 - a. NFPA 855
 - b. IEEE 1547; and
 - c. UL (9540, 9540A, 1741SA, 1973)
2. A written description of the integrated fire and thermal runaway protection system for each BESS facility;
3. Adequate emergency response equipment access through the security gates and internal roadways to each BESS facility; and
4. Final location of fire hydrants within the facility near each BESS facility.

50. Please describe how thermal runaway protection would be enacted on the lithium-ion BESS.

RESPONSE TO DATA REQUEST 50

Please see Response to Data Request 49 and Project Design Measure PD HAZ-2.

51. Please describe how the fire department would gain access to each BESS during an emergency event such as a fire.

RESPONSE TO DATA REQUEST 51

Please see Response to Data Request 47. Notwithstanding that the BESS has not yet been designed, ADS provides information that would be typical and under consideration for the BESS facilities.

Emergency access to the project site is unchanged with the addition of BESS. As shown on the site plan provided in the Revised SPPE Application, Project Description, both proposed conceptual BESS facilities are accessible to emergency equipment from the existing planned internal roadways within AWS' property. Both potential BESS locations are adjacent to the internal roads within and around the data center buildings, and the substation area also has a separate dedicated driveway.

Internally, the BESS facility layouts also incorporate roads to allow emergency equipment access within the separate security fencing as with the substation. The BESS facility interior road specifications- width, turning radii, load-bearing capacity, etc.- will be adequate for emergency equipment access. PD HAZ-2 proposed in Response to Data Request 49, will ensure that the City of Gilroy Fire Department the access it requires.

52. Please describe and locate a water supply and any fire hydrants near the lithium-ion BESS enclosures.

RESPONSE TO DATA REQUEST 52

At this time, ADS believes that it has designed a fire loop system that will be sufficient to respond to a fire at either the data center or at the BESS. Please see Attachment HAZ DR-52 for the preliminary fire water supply plan. During final design and as ensured by PD HAZ-2 the City of Gilroy will review, comment and ultimately approve the fire water supply and hydrant locations for the site.

TRANSPORTATION

BACKGROUND

CEQA Appendix G, Transportation, includes a question to determine if a proposed project would conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.

According to the City of Gilroy 2040 General Plan, Mobility Chapter 3, “Figure M-2 Planned Bicycle Network”, a Class II Bicycle facility is planned to go through the project site, from Camino Arroyo, south to Arroyo Circle.

DATA REQUEST

53. Please provide confirmation from the City of Gilroy whether the project applicant would be required to construct a bicycle facility through the project site or another alternative. If construction of a bicycle facility is required, please provide details describing and illustrating the location, the necessary construction activities required by the City, and the estimated duration of construction.

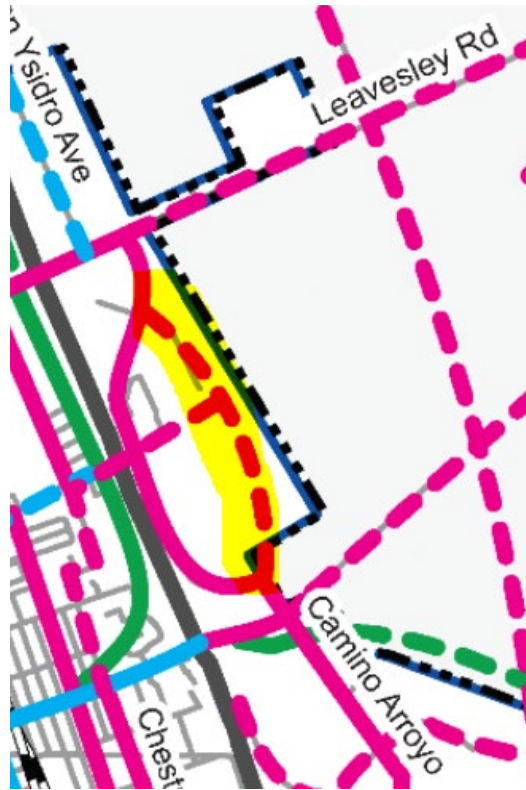
RESPONSE TO DATA REQUEST 53

The City’s General Plan includes the following statement about changes to the bicycle network:

Figure N-2: Planned Bicycle Network. This figure identifies the network of existing and proposed bicycle paths, bicycle lanes, and bicycle routes that are planned to serve the future land uses within the city.

- a) Multi-Use Trail (Class I) – A bicycle trail that is separated from the vehicle travel lanes and designed to accommodate bicycles and pedestrians.
- b) Bike Lane (Class II) – A separate lane for bicycles that is striped on the roadway.
- c) Bike Route (Class III) – A route for bicyclists to ride on-street with no separate lane.

Changes to the Bicycle Network do not require a General Plan Amendment




In terms of conflicts with the General Plan policies, the future bicycle path (dashed line) is classified as Class II bicycle path which would be striped on a future roadway. The future roadway was probably envisioned to allow the property to be developed into uses satisfying the General Plan General Industrial designation so that multiple industrial facilities could gain access to their respective properties. Such access is no longer needed to develop the property as the GDC would encompass all of the land. The future bicycle path running through the site would connect two points that are already connected by an existing bicycle path (solid line). The future bicycle path would not shorten trip lengths between those two points and would not provide meaningful access to anything other than privately-owned land, so eliminating this future bicycle path would not affect connectivity in the area and, therefore, would not conflict with General Plan policies intended to increase bicycle path connectivity and bicycle usage.

As discussed above the future proposed Class II bicycle path was to be striped on a future roadway. Attachment TRANS DR-53 includes a memorandum from the City of Gilroy describing its concurrence that elimination of the future roadway would not interfere with the connectivity envisioned by its planning efforts. ADS believes that for the reasons above, the City of Gilroy would concur that a similar finding is applicable to the proposed future bicycle path.

ADS has requested confirmation from the City of Gilroy.

ATTACHMENT HAZ DR-47

Safety Data Sheets

	SAFETY DATA SHEET	Version: R0001.0002
		Date of issue: 2016-05-10
	LGCHEM JH3 Lithium-Ion Battery Cell	Revision date: 2017-06-28
		Change List: see Section 16

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1. IDENTIFICATION

A. Product name

- LGCHEM JH3 Lithium-Ion Battery Cell

B. Recommended use and restriction on use

- General use : Rechargeable Lithium-Ion Battery Cell
 - Restriction on use : Not available

C. Manufacturer / Supplier / Distributor information

o Manufacturer information

- Company name : LG Chem Ltd.
 - Address : LG Twin Tower, Youido-Dong, Youngdeungpo-Ku, Seoul, Korea
 - Telephone number : +82-2-3773-6740
 - E-mail address : lkblive@lgchem.com

o Supplier/Distributor information

- Company name : LG Chem Ltd.
 - Address : LG Twin Tower, Youido-Dong, Youngdeungpo-Ku, Seoul, Korea
 - Telephone number : +82-2-3773-6740
 - E-mail address : lkblive@lgchem.com

Legal Remark

U.S.A

- The Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200 does not apply to various subcategories including anything defined by OSHA as an "article". The products are defined as "articles", and are exempted from the requirements for Material Safety Data Sheets.

EU

- The products are no "substances" or "mixtures" according to Regulation (EC) No 1907/2006 EC. Instead they have to be regarded as "articles", no substances are intended to be released during handling. Therefore there is no obligation to supply a Safety Data Sheet according to Regulation (EC) 1907/2006, Article 31.

General remark

- This Safety Data Sheet is provided as a service to our customers. This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only.
 - It should not therefore be construed as guaranteeing any specific property of the product.

2. HAZARD IDENTIFICATION

A. GHS Classification

- No classification is presented since the product is legally an article rather than chemical substance or mixture according to The Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200

B. GHS label elements

- Not applicable

C. Other hazards which do not result in classification :

- Not available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)
Aluminium	Aluminium Foil	7429-90-5	2-10
Metal Oxide (proprietary)			20-50
1,1-Difluoroethene homopolymer	Polyvinylidene Fluoride (PVDF)	24937-79-9	<5
Copper	Copper Foil	7440-50-8	5-20
Carbon (proprietary)		7440-44-0	10-20
Electrolyte (proprietary)			10-20
Aluminum, Copper plate and inert materials		Not applicable	Remainder

Lithium-equivalent Content: 18.56g (233 Wh)

4. FIRST AID MEASURES

A. Eye contact

- Not a health hazard.

B. Skin contact

- Not a health hazard.

C. Inhalation contact

- Not a health hazard.

D. Ingestion contact

- Get medical attention immediately.

IF EXPOSURE TO INTERNAL MATERIALS WITHIN CELL DUE TO DAMAGED OUTER CASING, THE FOLLOWING ACTIONS ARE RECOMMENDED :

- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Keep away from heat/sparks/open flames/hot surfaces.
- Keep/Store away from clothing /combustible materials.
- Do not breathe dust/fume/gas/mist/vapours/spray.
- Do not get in eyes, on skin, or on clothing.
- Avoid release to the environment.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Use personal protective equipment as required.

A. Eye contact

- Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- Get medical attention immediately.

B. Skin contact

- Wash with plenty of soap and water.
- Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- Take off contaminated clothing and wash it before reuse.
- Get medical attention immediately.
- If skin irritation or rash occurs, Get medical advice/attention.
- Wear gloves when washing the patient, and please avoid contact with contaminated clothing.

C. Inhalation contact

- Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Take specific treatment if needed.
- Get immediate medical advice/attention.
- If breathing is stopped or irregular, give artificial respiration and supply oxygen.

D. Ingestion contact

- Rinse mouth.
- Immediately call a POISON CENTER or doctor/physician.
- Get immediate medical advice/attention.
- About whether I should induce vomiting Take the advice of a doctor.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.

5. FIREFIGHTING MEASURES**A. Suitable (Unsuitable) extinguishing media**

- Use extinguishing media suitable for the materials that are burning.

B. Specific hazards arising from the chemical

- Cell is not flammable but internal organic material will burn if the cell is incinerated. Combustion products include, but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.

C. Special protective actions for firefighters

- Notify your local firestation and inform the location of the fire and characteristics hazard.
- Avoid inhalation of materials or combustion by-products.
- Use appropriate extinguishing measure suitable for surrounding fire.
- Wear appropriate protective equipment.
- Use fire fighting procedures suitable for surrounding area.
- If possible, remove cell(s) from fire fighting area. If heated above 150°C, cell(s) may combust/vent.
- Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

6. ACCIDENTAL RELEASE MEASURES**A. Personal precautions, protective equipment and emergency procedures**

- Protective equipment: Wear proper protective equipment
- Emergency procedures:
 - On Land
Place material into suitable containers and call local fire/police department.
 - In Water
If possible, remove from water and call local fire/police department.
- If required, notify relevant authorities according to all applicable regulations.

B. Environmental precautions

- Prevent runoff and contact with waterways, drains or sewers.
- Advise emergency services.

C. Methods and materials for containment and cleaning up

- Control personal contact by using protective equipment.
- Prevent, by any means available, containment from entering drains or water course.
- Dispose of waste in accordance with local regulation.

7. HANDLING AND STORAGE

A. Precautions for safe handling

- No special protective clothing required for handling individual cells.
- Do not expose battery or cell to extreme temperatures or fire.
- Do not disassemble, crush or puncture battery.
- Do not overcharge or over discharge the battery.
- Do not connect (short circuit) positive and negative terminals.
- Do not place the batteries on conductive metal.

B. Conditions for safe storage, including any incompatibilities

- Store in a cool, dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

- ACGIH TLV
 - Not available
- OSHA PEL
 - Not available

B. Engineering controls

- Keep away from heat and open flame.
- Store in cool and dry place.

C. Personal protective equipment

- **Respiratory protection**
 - Not required during normal operations.
 - SCBA required in the event of fire.
- **Eye protection**
 - Not required beyond safety practices of employer.
- **Hand protection**
 - Not required for handling of cells.
- **Skin protection**
 - Steel toed shoes recommended for large container handling.
- **Others**
 - Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	
- Appearance	Solid
- Color	Not available
B. Odor	Not available
C. Odor threshold	Not available
D. pH	Not available
E. Melting point/Freezing point	Not available
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	Not available
H. Evaporation rate	Not available
I. Flammability(solid, gas)	Not available
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Insoluble
M. Vapour density	Not available
N. Specific gravity(Relative density)	Not available
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available

Q. Decomposition temperature	Not available
R. Viscosity	Not available
S. Molecular weight	Not available

10. STABILITY AND REACTIVITY

A. Chemical Stability

- None during normal operating conditions.

B. Possibility of hazardous reactions

- None during normal operating conditions.

C. Conditions to avoid

- Avoid exposure to heat, open flame, and corrosives.
- Do not puncture, crush or incinerate.

D. Incompatible materials

- None during normal operating conditions.

E. Hazardous decomposition products

- None during normal operating conditions.
- If cells are damaged, hydrogen fluoride and carbon monoxide may be released.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

- **(Respiratory tracts)**
 - None during normal operating conditions.
- **(Oral)**
 - None during normal operating conditions.
- **(Eye·Skin)**
 - None during normal operating conditions.

B. Delayed and immediate effects and also chronic effects from short and long term exposure

- **Acute toxicity**
 - * **Oral**
 - This product does not elicit toxicological properties during routine handling and use.
 - * **Dermal**
 - This product does not elicit toxicological properties during routine handling and use.
 - * **Inhalation**
 - This product does not elicit toxicological properties during routine handling and use.
- **Skin corrosion/irritation**
 - No irritation.
 - If the cells are opened through misuse or damage, discard immediately. Internal components of cell are irritants and sensitizers.
- **Serious eye damage/irritation**
 - Not available
- **Respiratory sensitization**
 - Not available
- **Skin sensitization**
 - No sensitization.
 - If the cells are opened through misuse or damage, discard immediately. Internal components of cell are irritants and sensitizers.
- **Carcinogenicity**
 - Not available
- **Germ cell mutagenicity**
 - Not available
- **Reproductive toxicity**
 - This product does not elicit toxicological properties during routine handling and use.
- **STOT-single exposure**
 - Not available

- **STOT-repeated exposure**
 - Not available
- **Aspiration hazard**
 - Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

- **Fish**
 - Not available
- **Crustaceans**
 - Not available
- **Algae**
 - Not available

B. Persistence and degradability

- **Persistence**
 - Not available
- **Degradability**
 - Not available

C. Bioaccumulative potential

- **Bioaccumulative potential**
 - Some materials within the cell are bioaccumulative. Under normal conditions, these materials are contained and pose no risk to persons or the surrounding environment.
- **Biodegradation**
 - Not available

D. Mobility in soil

- Not available

E. Other adverse effects

- Not available

13. DISPOSAL CONSIDERATIONS

A. Disposal methods

- Dispose of according to all federal, state, and local regulations.
 - Follow Directive 2006/66/EC.
 - California regulated debris
 - RCRA Waste Code : Non regulated

B. Special precautions for disposal

- Not available

14. TRANSPORT INFORMATION

A. UN No.

- 3480 / 3481

B. Proper shipping name

- Lithium Ion Batteries / Lithium Ion Batteries contained in equipment

C. Hazard Class

- Class 9
- Hazard label: Miscellaneous

D. Packing group

- II

E. Marine pollutant

- Not available

F. Special precautions for user related to transport or transportation measures**ICAO/IATA**

- Packing Instruction: 965, 967
- Maximum Gross Weight per Package on Passenger and Cargo Aircraft: 5 kg
- Maximum Gross Weight per Package on Cargo Only Aircraft: 35 kg
- Special Provision: A45, A88, A99

IMO

- Packing Instruction: P903
- Special Provision: 188, 230, 310, 957
- EmS: F-A, S-I

US DOT

- This product is not subject to any other requirements of dangerous goods under 49
- CFR 173.185 (Lithium Batteries and Cells).

15. REGULATORY INFORMATION**A. National and/or international regulatory information**

- **Information of EU Classification**
 - Information according to Regulation (EC) No 1272/2008 [CLP]
 - Information according to Directive 67/548/EEC
- **U.S. Federal regulations**
 - Information according to ISHA
 - Information according to TCCA and other chemical management regulations
 - Dangerous Substances Safety Management Act
 - Regulation of Disposal
 - OSHA hazard communication standard (29 CFR 1910.1200)
 - ___ Hazardous ___ Non-hazardous

16. OTHER INFORMATION**A. Reference**

- This information is based on our present state of knowledge. It shall describe our products regarding safety requirements and shall not be construed as a guarantee or statement of condition and/or quality
- Information contained in this safety data sheet is based on LG Chem owned data and public sources deemed valid or acceptable. The absence of data elements indicates, that no data meeting these requirements is available

B. Issue date

- 2016-05-11

C. Revision number and Last date revised

- R1.1: Established / 2016-05-11
- R1.2: Change the product name (Li ion Polymer Battery → Li ion Battery Cell) / 2017-06-28

D. Other

- This SDS is prepared according to the Globally Harmonized System (GHS).



Safety Data Sheet

Regulation : In accordance with Regulation (EU) 2015/830 (REACH), Annex II, and OSHA 29 CFR 1910.1200

Section I – IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Important Note: As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use. This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirement. The information contained in this Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

1.1 Product identifier

Substance name : INR21700-40T

Synonyms :

Lithium-ion Cell, Lithium-ion Pack, Lithium-ion Battery, Li-Ion Cell, Li-Ion Pack, Li-Ion Battery

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : Lithium-ion batteries

Uses advised against : Use for recommended use only

Further Information : Not available

1.3 Details of the supplier of the safety data sheet

Supplier : SAMSUNG SDI Co., Ltd.

Street address/P.O. Box : 150-20, Gongse-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Korea

Country ID/Postcode/Place :

Telephone number : 1-800-424-9300: US and Canada / 1-703-527-3887: International

Responsible Department: Quality team

e-mail address of competent person responsible for the SDS : Not available

National contact : 1-800-424-9300: US and Canada / 1-703-527-3887: International

1.4 Emergency Telephone

: 1-800-424-9300: US and Canada / 1-703-527-3887: International

Opening hours : Not available

Other comments : Not available

1.5 Further Information

Battery-System: Lithium-ion (Li-ion)

Nominal Voltage: 3.6 V

Rated Capacity: 4.0 Ah

Wh rating: 14.4 Wh

Anode (negative electrode): based on intercalation graphite

Cathode (positive electrode): based on lithiated metal oxide (Cobalt, Nickel)

Remark:



The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. SAMSUNG SDI Co., Ltd. makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

Section II – HAZARDS IDENTIFICATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No. 1272/2008 [CLP] and OSHA 29 CFR 1910.1200 : Not classified

2.1.2 Additional information:

Classification of the substance or mixture.

Preparation Hazards and Classification: The product is a Lithium ion cell or battery and is therefore classified as an article and is not hazardous when used according to the recommendations of the manufacturer. The hazard is associated with the contents of the cell or battery. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains and the seals remain intact. The potential for exposure should not exist unless the cell or battery leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. If the cell or battery is compromised and starts to leak, based upon the battery ingredients, the contents are classified as Hazardous.

Hazardous Materials Information Label (HMIS)

Health: Not available
Flammability: Not available
Physical Hazard: Not available

NFPA Hazard Ratings

Health: Not available
Flammability: Not available
Reactivity: Not available

2.2 Label elements

Hazard pictograms : Not applicable

Signal word : Not applicable

Hazard statement : Not applicable

Precautionary statements: Not applicable

Supplemental Hazard information (EU) : Not applicable

2.3 Other hazards :



Appearance, Color and Odor: Solid object with no odor.

Primary Routes(s) of Exposure: These chemicals are contained in a sealed enclosure. Risk of exposure occurs only if the cell or pack is mechanically, thermally, electrically or physically abused to the point of compromising the enclosure.

If this occurs, exposure to the electrolyte solution contained within can occur by inhalation, ingestion, eye contact and skin contact.

Potential Health Effect(s):

Acute (short term): see Section 8 for exposure controls.

In the event that this cell or pack has been ruptured, the electrolyte solution contained within the cell would be corrosive and can cause burns to skin and eyes.

Inhalation: Inhalation of materials from a sealed cell is not an expected route of exposure. Vapors or mists from a ruptured cell may cause respiratory irritation.

Ingestion: Swallowing of materials from a sealed cell is not an expected route of exposure.

Swallowing the contents of an open cell can cause serious chemical burns to mouth, esophagus, and gastrointestinal tract.

Skin: Contact between the cell and skin will not cause any harm. Skin contact with the contents of an open cell can cause severe irritation or burns to the skin.

Eye: Contact between the cell and the eye will not cause any harm. Eye contact with the contents of an open cell can cause severe irritation or burns to the eye.

CHRONIC (long term): see Section 11 for additional toxicological data.

Interactions with other chemicals: Immersion in high conductivity liquids may cause corrosion and breaching of the cell or battery enclosure. The electrolyte solution inside of the cells may react with alkaline (basic) materials and present a flammability hazard.

Potential Environmental Effects: Not Available.

Section III – COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Mixture

CAS No.	EC No.	REACH Registration No.	%[weight]	Name	Common Name (Synonyms)	Classification according to Regulation(EC) No 1278/2008(CLP)
12325-84-7	Not available	-	25~35	Lithium Nickel Oxide	Not available	Not classified
7782-42-5	231-955-3	-	20~30	Graphite	Not available	Not classified
7439-89-6	231-096-4	-	10~20	Iron	Not available	Not classified
7440-50-8	231-159-6	-	5~15	Copper	Not available	Not classified
12190-79-3	235-362-0	-	1~5	cobalt lithium dioxide	Not available	Not classified
554-12-1	209-060-4	-	1~5	Methyl propanoate	Not available	Flam. Liq. 2, H225



						Acute Tox. 4, H332
7429-90-5	231-072-3	-	1~5	Aluminium	Not available	Pyr. Sol. 1, H250 Water-react. 2, H261
21324-40-3	244-334-7	-	1~3	lithium hexafluorophosphate(1-)	Not available	Not classified
114435-02-8	Not available	-	1~3	4-Fluoro-1,3-dioxolan-2-one	Not available	Not classified
616-38-6	210-478-4	-	1~3	dimethyl carbonate	Not available	Flam. Liq. 2, H225
9002-88-4	Not available	-	1~3	Polyethylene	Not available	Not classified
1309-37-1	215-168-2	-	0.1~1	diiron trioxide	Not available	Not classified
1318-23-6	215-284-3	-	0.1~1	Boehmite (Al(OH)O)	Not available	Not classified
1333-86-4	215-609-9	-	0.1~1	Carbon black	Not available	Not classified
7440-02-0	231-111-4	-	0.1~1	Nickel	Not available	Skin Sens. 1, H317 Carc. 2, H351 STOT RE 1, H372 Aquatic Chronic 3, H412
872-50-4	212-828-1	-	0.1~0.3	1-Methyl-2-pyrrolidinone	Not available	Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335 Repr. 1B, H360D
11089-89-7	Not available	-	0.1~0.3	Aluminum lithium oxide (LiAlO)	Not available	Not classified
7440-47-3	231-157-5	-	0.1~0.3	Chromium	Not available	Not classified
554-13-2	209-062-5	-	0.1~0.3	lithium carbonate	Not available	Not classified
100-41-4	202-849-4	-	0.1~0.3	ethylbenzene	Not available	Flam. Liq. 2, H225 Acute Tox. 4, H332 Asp. Tox. 1, H304



						STOT RE 2, H373(hearing organs)
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Further Information

Because of the cell structure the dangerous ingredients will not be available if used properly.
During charge process a lithium graphite intercalation phase is formed.

Section IV – FIRST-AID MEASURES

4.1 Description of first aid measures

Following eye contact :

- Rinse eyes with plenty of water for at least 15 minutes and seek medical attention.

Following skin contact :

- Remove contaminated clothing and wash before reuse.
- Immediately rinse contact area with plenty of clean water.
- Provide first aid to contacted area to prevent infection.
- Get medical attention.

Following inhalation :

- In case of inhalation of organic electrolyte mist, remove from exposure to fresh air.
- If necessary give oxygen. Get medical attention.

Following ingestion :

- In case of ingestion of electrolyte don't induce vomiting.
- If patient is conscious and alert give 2~4 cupfuls of milk or water.
- Never give anything by mouth to an unconscious person.
- Get medical attention immediately.

Further Information :

- The following first aid measures are required only in case of exposure to interior battery components after damage of the external battery casing.
- Undamaged, closed cells do not represent a danger to the health.

4.2 Most important symptoms and effects, both acute and delayed

Acute effects : Not available

Delayed effects : Not available

4.3 Indication of immediate medical attention and special treatment needed

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Section V – FIRE-FIGHTING MEASURES



5.1 Extinguishing media

- When the scale of the fire is small, use a HFC (hydrofluorocarbon) clean-agent fire extinguisher or alcohol resistant foam fire extinguishers. (In case of battery overheating, wear protective gear and immerse heated battery in water)
- In case of large fire, use large amount of water to extinguish.

5.2 Special hazards arising from the substance or mixture

- Flammable gas leaks before ignition and then the product ignites.

5.3 Advice for firefighters

- The ignited battery has a high temperature, so there is a risk of additional ignition even if the fire is extinguished at early stage. Sprinkle a large amount of water until the battery temperature drops to normal temperature.
- If the battery is ignited in multi-stacked condition, multi-stack should be disassembled and then extinguished so that heat is not transferred between batteries
- In the event of a battery fire, cool it by spraying water directly on the battery.
- When handling a overheated battery, wear heat-resistant protective equipment.

Section VI – ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Protective equipment : Use personal protective equipment, see Section 8

Emergency procedures :

- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Battery may emit electrolyte if charging or discharging rates exceed manufacturer's recommendations or if pack has been breached.
- Move battery to well ventilated area to prevent gas accumulation.

For emergency responders

- Eliminate all ignition sources.
- Please note that materials and conditions to avoid.
- Move battery to well ventilated area to prevent gas accumulation.

6.2 Environmental precautions :

- Avoid release to the environment.
- Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up

For containment : Not available

For cleaning up :



- Cover with Dry earth, DRY sand or other non-combustible material and put on the plastic sheet to minimize spreading or contact with rain.
- Move battery to well ventilated area to prevent gas accumulation.
- Dispose in accordance with applicable local, state and federal regulations.

Other information: Not available

6.4 Reference to other sections

- See also sections 8 and 13 of the Safety Data Sheet.

Section VII – HANDLING AND STORAGE

7.1 Precautions for safe handling

- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- The battery stores electrical energy and is capable of rapid energy discharge.
- Battery cell contents are under pressure.
- Handle battery carefully to avoid puncturing case or electrically shorting terminals.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions : Not available

Packaging materials : Not available

Requirements for storage rooms and vessels :

- Storage at room temperature (approx. 20°C) at approx. 40% of the nominal capacity
- Keep in closed original container.

7.3 Specific end use(s)

Recommendations : Not available

Industrial sector specific solutions : Not available

Section VIII – EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Occupational Exposure limits

Name	ACGIH regulation	Biological exposure index	OSHA regulation	NIOSH regulation	EU regulation
Lithium Nickel Oxide	TWA = 1.5 mg/m ³ (inhalable particulate matter)(Nickel CAS.no 7440-02-0)	Not available	TWA = 1 mg/m ³ (metal and insoluble compounds (as Ni)) TWA = 1 mg/m ³ (soluble	Ca TWA = 0.015 mg/m ³ (metal and insoluble compounds (as Ni)) Ca TWA =	Not applicable



			compounds (as Ni) (Nickel CAS.no 7440-02-0)	0.015 mg/m ³ (soluble compounds (as Ni)) (Nickel CAS.no 7440-02-0)	
Graphite	TWA = 2mg/m ³	Not available	Not applicable	Not applicable	Not applicable
Iron	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Copper	TWA = 0.2 mg/m ³ (fume)	Not available	Not applicable	Not applicable	Not applicable
cobalt lithium dioxide	TWA = 0.2 mg/m ³ (Cobalt and cobalt compounds,CAS.no7440-48-4)	Not available	TWA = 0.1 mg/m ³ (Cobalt metal, dust, and fume (as Co),CAS.no7440-48-4)	TWA = 0.05 mg/m ³ (Cobalt metal, dust, and fume (as Co),CAS.no7440-48-4)	Not applicable
Cobalt, Co	TWA = 0.02 mg/m ³	Not available	Not available	TWA 0.05 mg/m ³	Not available
Methyl propanoate	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Aluminium	TWA = 1 mg/m ³ (respirable particulate matter)	Not available	TWA = 15 mg/m ³ (Aluminum Metal (as Al) Total dust) TWA = 5 mg/m ³ (Aluminum Metal (as Al) Respirable fraction)	TWA = 1 mg/m ³ (Aluminum Metal (as Al),Respirable fraction)	Not applicable
lithium hexafluorophosphate(1-)	Not applicable	Not available	Not applicable	Not applicable	Not applicable
4-Fluoro-1,3-dioxolan-2-one	Not applicable	Not available	Not applicable	Not applicable	Not applicable
dimethyl carbonate	Not applicable	Not available	Not applicable	Not applicable	Not applicable
Polyethylene	Not applicable	Not available	Not applicable	Not applicable	Not applicable
diiron trioxide	TWA = 5 mg/m ³	Not available	TWA = 10 mg/m ³ (fume)	TWA = 5 mg/m ³ (dust and fume)	Not applicable
Boehmite (Al(OH)O)	Not applicable	Not available	Not applicable	Not applicable	Not applicable



Carbon black	TWA = 3mg/m ³ (inhalable particulate matter)	Not available	TWA = 3.5 mg/m ³	TWA = 3.5 mg/m ³ Ca TWA = 0.1 mg PAHs/m ³ [Carbon black in presence of polycyclic aromatic hydrocarbons (PAHs)]	Not applicable
Nickel	TWA = 1.5 mg/m ³ (inhalable particulate matter)	Not available	TWA = 1 mg/m ³ (metal and insoluble compounds (as Ni)) TWA = 1 mg/m ³ (soluble compounds (as Ni))	Ca TWA = 0.015 mg/m ³ (metal and insoluble compounds (as Ni)) Ca TWA = 0.015 mg/m ³ (soluble compounds (as Ni))	Not applicable
1-Methyl-2-pyrrolidinone	Not applicable	Not available	Not applicable	Not applicable	TWA = 40 mg/m ³ , TWA= 10 ppm, STEL = 80 mg/m ³ , STEL = 20 ppm
Aluminum lithium oxide (LiAlO)	TWA = 1 mg/m ³ (respirable particulate matter)(Aluminum CAS.no 7429-90-5)	Not available	TWA = 15 mg/m ³ (Aluminum Metal (as Al) Total dust) TWA = 5 mg/m ³ (Aluminum Metal (as Al) Respirable fraction) (Aluminum CAS.no 7429-90-5)	TWA = 1 mg/m ³ (Aluminum Metal (as Al),Respirable fraction)(Aluminum CAS.no 7429-90-5)	Not applicable
Chromium	TWA = 0.5 mg/m ³ (inhalable particulate matter); TLV basis: respiratory tract irritation, TWA = 0.5 mg/m ³	Not available	TWA = 0.5 mg/m ³ (Chromium (II) compounds (as Cr),Chromium (III) compounds (as Cr)) TWA = 1 mg/m ³ (Chromium metal)	TWA = 0.5 mg/m ³ (Chromium (II) compounds (as Cr),Chromium (III) compounds (as Cr)) TWA = 0.5 mg/m ³ (Chromium metal)	TWA = 2 mg/m ³



			and insol. salts (as Cr))	and insol. salts (as Cr))	
lithium carbonate	Not applicable	Not available	Not applicable	Not applicable	Not applicable
ethylbenzene	TWA = 20 ppm	Not available	TWA = 100 ppm TWA = 435 mg/m ³	TWA = 100 ppm (ST) 125 ppm	TWA = 442 mg/m ³ , TWA= 100 ppm, STEL = 884 mg/m ³ , STEL = 200 ppm

8.2 Exposure controls

8.2.1 Appropriate engineering controls :

Substance/mixture related measures to prevent exposure during identified uses:

- Avoid charging batteries in areas where hydrogen gas accumulate.
- Use local exhaust ventilation to maintain concentrations of hydrogen below the Lower Explosive collect and transport flammable gases in ventilation systems.
- Insure proper ventilation is present and electrolyte mist and vapours.

Structural measures to prevent exposure:

- Avoid charging batteries in areas where hydrogen gas accumulate.
- Use local exhaust ventilation to maintain concentrations of hydrogen below the Lower Explosive collect and transport flammable gases in ventilation systems.
- Insure proper ventilation is present and electrolyte mist and vapours.

Organisational measures to prevent exposure: Not available

Technical measures to prevent exposure:

- Insure proper ventilation is present and electrolyte mist and vapours.

8.2.2 Individual protection measures, such as personal protective equipment :

Eye and face protection

- Wear ANSI approved safety glasses with side shield during normal use.
- Wear NIOSH approved face shield with safety glasses and H.V protection during intentional disassembly.

Skin protection

Hand protection

- Wear nitrile butyl rubber, neoprene, or PVC glove during battery component disassembly.
- Discard contaminated work clothing after one work day.

Other skin protection

- Wear protective clothing during battery component disassembly.
- Discard contaminated work clothing after one work day.

Respiratory protection :

- None required during normal use.



- Wear NIOSH or European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.
- In lack of oxygen(< 19.5%), wear the supplied-air respirator or self-contained oxygen breathing apparatus.
- In case exposed to particulate material, the respiratory protective equipments as follow are recommended; facepiece filtering respirator or air-purifying respirator, high-efficiency particulate air(HEPA) filter media or respirator equipped with powered fan, filter media of use (dust, mist, fume)

8.2.3 Environmental exposure controls

Substance/mixture related measures to prevent exposure: Not available

Instruction measures to prevent exposure: Not available

Organisational measures to prevent exposure: Not available

Technical measures to prevent exposure: Not available

Section IX – PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance

Description : Solid

Color : Not available

Odor : Odorless

Odor threshold : Not available

pH : Not available

Melting point/freezing point : Not available

Initial boiling point and boiling range : Not available

Flash point : Not available

Evaporation rate : Not available

Flammability (solid, gas) : Not available

Upper/lower flammability or explosive limits : Not available

Vapor pressure : Not available

Solubility (ies) : insoluble.

Vapor density : Not available

Relative density : Not available

Partition coefficient: n-octanol/water : Not available

Auto ignition temperature : Not available

Decomposition temperature : Not available

Viscosity : Not available

Explosive properties : Not available

Oxidizing properties : Not available

Molecular weight : Not available



9.2 Other information

Not available

Section X – STABILITY AND REACTIVITY

10.1 Reactivity

- Stable at ambient temperature.

10.2 Chemical stability

- There is no hazard when the measures for handling and storage are followed.
- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Will not occur under normal conditions.
- In case of cell damage, possible release of dangerous substances and a flammable gas mixture.
- Containers may explode when heated.
- Fire may produce irritating and/or toxic gases.
- Some liquids produce vapors that may cause dizziness or suffocation.
- Inhalation of material may be harmful.

10.4 Conditions to avoid

- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- Friction, heat, sparks or flames
- Dusts or shavings from borings, turnings, cuttings, etc.
- Do not exceed manufacturer's recommendation for charging or use battery for an application for which it was not specifically designed.
- Do not electrically short.

10.5 Incompatible materials

- Avoid contact with acids and oxidizers.
- Keep away from any possible contact with water, because of violent reaction and possible flash fire.
- Handle under inert gas. Protect from moisture.
- Combustibles, reducing agents

10.6 Hazardous decomposition products

- None under normal conditions.
- Corrosive and/or toxic fume
- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.
- Irritating and/or toxic gases

Section XI – TOXICOLOGICAL INFORMATION



※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

11.1 Information on toxicological effects

Acute toxicity

Oral : ATEmix = 5,082.4 mg/kg bw

- Graphite : Rat LD₅₀ > 2,000 mg/kg (female)(OECD Guideline 401)
- Fe : Rat LD₅₀ = 98,600 mg/kg (Reduced iron, OECD TG 401)
- Copper : Rat LD₅₀ > 2,500 mg/kg (Cupric oxide; read across)(OECD TG 423, GLP)
- Aluminum : Rat LD₅₀ > 15,900 mg/kg (OECD TG 401)(Fumed alumina; read across)
- Lithium hexafluorophosphate(1-) : Rat LD₅₀ = 50 ~ 300 mg/kg (Female)(OECD Guideline 423, GLP)
- 4-fluoro-1,3-dioxolan-2-one : Rat LD₅₀ = 500 mg/kg (male)(OECD Guideline 423)
- Dimethyl carbonate : Rat LD₅₀ > 5,000 mg/kg (male/female) (OECD Guideline 401)
- Polyethylene : Rat LD₅₀ > 2,000 mg/kg
- Diiron trioxide : Rat LD₅₀ > 5,000 mg/kg (male/female)(EU Method B.1)
- Boehmite (Al(OH)O) : Rat LD₅₀ > 2,000 mg/kg (OECD Guideline 423, GLP)
- Carbon black : Rat LD₅₀ > 8,000 mg/kg (OECD TG 401)
- Nickel; Raney nickel : Rat LD₅₀ > 9,000 mg/kg (male/female) (OECD Guideline 401, GLP)
- 1-Methyl-2-pyrrolidinone : Rat LD₅₀ = 4,150 mg/kg (male/female)(OECD Guideline 401)
- Chromium : Rat LD₅₀ > 5,000 mg/kg (Read across; chromium(III) oxide)(OECD TG 420, GLP)
- Lithium carbonate;Lithane : Rat LD₅₀ = 525 mg/kg
- Ethylbenzene : Rat LD₅₀ = 3,500 mg/kg (male or female)

Dermal : ATEmix = 1,651,224 mg/kg bw

- Copper : Rat LD₅₀ > 2,000 mg/kg (OECD TG 402, GLP)
- 4-fluoro-1,3-dioxolan-2-one : Rat LD₅₀ > 2,000 mg/kg (male/female) (OECD Guideline 402)
- Dimethyl carbonate : Rabbit LD₅₀ > 2,000 mg/kg (male/female)
- 1-Methyl-2-pyrrolidinone : Rat LD₅₀ > 5,000 mg/kg (male/female) (OECD Guideline 402)
- Lithium carbonate;Lithane : Rabbit LD₅₀ > 3,000 mg/kg (male/female) (OECD Guideline 402)
- Ethylbenzene : Rabbit LD₅₀ = 15,432 mg/kg

Inhalation : ATEmix = 226.04 mg/L

- Graphite : Rat LD₅₀ > 2 mg/L/4hr (male/female) (OECD Guideline 403)
- Fe : Rat LC₅₀ > 100 mg/m³/6hr
- Aluminum : Rat LC₅₀ > 0.888 mg/L/4hr (analytical) (OECD TG 403)
- Dimethyl carbonate : Rat LD₅₀ > 5.36 mg/L/4hr (male/female) (OECD Guideline 403)
- Diiron trioxide : Rat LC₅₀ = 5.05 mg/L/4hr (male/female) (OECD Guideline 403, GLP)
- Boehmite (Al(OH)O) : Rat LD₅₀ > ~ 0.888 mg/kg/4hr (OECD Guideline 403, GLP)
- Carbon black : Rat LC₅₀ > 0.005 mg/L/4hr
- 1-Methyl-2-pyrrolidinone : Rat LC₅₀ > 5.1 mg/L/4hr (male/female) (OECD Guideline 403)
- Chromium : Rat LD₅₀ > 5.41 mg/L/4hr (Read across; chromium(III) oxide)(OECD TG 403, GLP)
- Lithium carbonate;Lithane : Rat LC₅₀ > 2 mg/L/4hr (male/female) (OECD Guideline 403)
- Ethylbenzene : Rat LC₅₀ = 17.8 mg/L/4hr

Skin corrosion/ irritation :

- Graphite : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)



- Fe : In test on skin irritation with rabbits, skin irritations were not observed.(Read across; Fe₃O₄)(OECD TG 404, GLP)
 - Copper : In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 404, GLP)
 - Aluminum : Aluminium oxide caused slight erythema in 2/12 rabbits. The observed effects do not lead to a classification. Aluminium oxide is, therefore, not considered to be a primary skin irritant.(OECD TG 404)(Read across; aluminium oxide)
 - Lithium hexafluorophosphate(1-) : In the skin irritation test using human, the test material was corrosive. (EU Method B.40, GLP)
 - 4-fluoro-1,3-dioxolan-2-one : In the skin irritation test using human skin model, the test material was non-corrosive. (OECD Guideline 431, GLP)
 - Dimethyl carbonate : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404)
 - Polyethylene : No irritation was observed at the other two treated sites and no corrosive effects were noted during the study using rabbits. The primary irritation index was calculated as 0.2 and polyethylene was classified as a mild irritant.
 - Diiron trioxide : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
 - Boehmite (Al(OH)O) : In the skin irritation test using rabbits, skin irritations were not observed.(OECD Guideline 404, GLP)
 - Carbon black : In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 404)
 - Nickel; Raney nickel : Industrial nickel dust causes nickel dermatitis.
 - 1-Methyl-2-pyrrolidinone : In the skin irritation test using rabbits, the test material was slightly irritating. (OECD Guideline 404, GLP)
 - Chromium : In test on skin irritation with rabbits, skin irritations were not observed.(Read across; chromium(III) oxide)(OECD TG 404, GLP)
 - Lithium carbonate;Lithane : In the skin irritation test using rabbits, the test material was not irritating. (OECD Guideline 404, GLP)
 - Ethylbenzene : In test on skin irritation with rabbits, moderate irritations were observed to rabbit skin.
- Serious eye damage/ irritation :**
- Graphite : In the eye irritation test using rabbit, the test material was not irritating. (OECD Guideline 405, GLP)
 - Fe : In test on eyes irritation with rabbits, eyes irritations were not observed.(Read across; Fe₃O₄)(OECD TG 405, GLP)
 - Copper : In test on skin irritation with rabbits, skin irritations were not observed. (OECD TG 405, GLP)
 - Aluminum : An eye irritation study of the aluminium oxide was performed in rabbits. No eye irritation/ corrosion effects were observed. (Read across; aluminium oxide)
 - Lithium hexafluorophosphate(1-) : In the eye irritation test using fertilised brown leghorn chicken eggs, the test material was severely irritating. (GLP)
 - Dimethyl carbonate : In the eye irritation test using rabbit, the test material was not irritating. (GLP)
 - Polyethylene : Mild irritants were observed in eye irritation test with rabbits. (Score 11.7/110)
 - Diiron trioxide : In the eye irritation test using rabbits, the test material was not irritating. (OECD Guideline 405, GLP)
 - Boehmite (Al(OH)O) : In the eyes irritation test using rabbits, the test material was not irritating.(OECD Guideline 405, GLP)
 - Carbon black : In test on eyes irritation with rabbits, eyes irritations were not observed. (OECD TG 405)
 - 1-Methyl-2-pyrrolidinone : In the eye irritation test using rabbit, the test material was moderately irritating. (OECD Guideline 405, GLP)
 - Chromium : In test on eyes irritation with rabbits, eyes irritations were not observed.(Read across;



chromium(III) oxide)(OECD TG 405, GLP)

- Lithium carbonate;Lithane : In the eye irritation test using rabbit, the test material was moderately irritating. (OECD Guideline 405, GLP)

- Ethylbenzene : In test on eyes irritation with rabbits, slight irritations were observed to rabbit.

Respiratory sensitization : Not classified

- Aluminum : Al₂O₃ was the least inflammatory material tested and led to only weak effects on the mouse lung. (Read across; Aluminium oxide)

- Boehmite (Al(OH)O) : In respiratory sensitization test with mice, it did not induce respiratory sensitization.

- Carbon black : In respiratory sensitization test with mice, it did not induce respiratory sensitization.

Skin sensitization :

- Graphite : In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)

- Fe : In the test using guinea pigs, the test substance was not considered to be a dermal sensitizer in guinea pigs.(read across; FeO, Fe₂O₃)

- Copper : In maximization test on skin sensitization with guinea pig, skin sensitization was not observed. (OECD TG 406, GLP)

- Aluminum : In test with guinea pigs, it can be concluded that aluminium oxide has no sensitisation potential under the experimental conditions. (Read across; Aluminium oxide)

- Lithium hexafluorophosphate(1-) : In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)

- 4-fluoro-1,3-dioxolan-2-one : In the skin sensitization test using mice, the test material was skin sensitization. (OECD Guideline 429, GLP)

- Dimethyl carbonate : In the skin sensitization test using guinea pig, this material was not skin sensitizing. (OECD Guideline 406, GLP)

- Polyethylene : No reactions were observed in skin sensitization test with guinea pigs.

- Diiron trioxide : In the skin sensitization test using guinea pigs, the test material was not skin sensitizing.

- Boehmite (Al(OH)O) : In the skin sensitization test using guinea pig, this material was not skin sensitizing.(OECD Guideline 406, GLP)

- Carbon black : In skin sensitization test with guinea pig, it did not induce skin sensitization. (OECD TG 406, GLP)

- Nickel; Raney nickel : Nickel hypersensitivity dermatitis may be initiated by contact with nickel on the skin.

- 1-Methyl-2-pyrrolidinone : In the skin sensitization test using mice, the test material was not skin sensitization. (OECD Guideline 429, GLP)

- Chromium : In vitro skin sensitisation test, the test substance was not considered to be a dermal sensitizer.

- Lithium carbonate;Lithane : In the skin sensitization test using guinea pig, this material was not skin sensitizing. (OECD Guideline 406, GLP)

Carcinogenicity :

IARC

- Nickel : Group 2B

- Cobalt and cobalt compounds : Group 2B

- Polyethylene : Group 3

- diiron trioxide : Group 3

- Carbon black : Group 2B

- Chromium : Group 3

- Ethylbenzene : Group 2B

NTP

- Nickel : R

- Iron : Present



- Carbon black : Present

OSHA

- Nickel : Present
- Carbon black : Present

ACGIH

- Nickel : A5
- Aluminum : A4
- Cobalt and cobalt compounds : A3
- diiron trioxide : A4
- Carbon black : A3
- Chromium : A4
- Ethylbenzene : A3

KOREA-ISHL

- Lithium Nickel Oxide : 2
- Nickel : 1A
- Cobalt and inorganic compounds : 2
- Carbon black : 2
- Chromium : 1A(Chromium(VI)compounds(Water insoluble inorganic compounds))
- Ethylbenzene : 2

EU

- Nickel : Carc. 2

- Copper : EPA IRIS: D In carcinogenicity study with rat, tumor was not observed.
- Polyethylene : Fifty rats were implanted with polyethylene. In the polyethylene group, 23 developed tumors (two of these were unrelated to the implants).
- Boehmite (Al(OH)O) : bauxite and alumina exposure was not associated with increased cancer risk.
- Ethylbenzene : there was clear evidence of carcinogenic activity of ethylbenzene in rat(male/female)with based on increased incidences of renal tubule neoplasms; increased incidence of testicular adenoma.

Mutagenicity :

- Graphite : Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Fe : In mammalian cell gene mutation assay electrolytic iron, positive carbonyl iron exhibited a cytotoxic and mutagenic response (OECD TG 476)
- Copper : Negative reactions were observed in both in vitro(Ames test) and in vivo(DNA damage and/or repair; unscheduled DNA synthesis, micronucleus assay). (GLP)
- Aluminum : Negative reactions were observed in vitro (mammalian cell gene mutation assay with mouse lymphoma L5178Y cells(OECD TG 476, GLP)) and in vivo (micronucleus assay with rats (OECD TG 474, GLP)). (Aluminium hydroxide, aluminium chloride, aluminum oxide; read across)
- Lithium hexafluorophosphate(1-) : Negative reactions were observed in both in vivo (Mammalian Erythrocyte Micronucleus test(OECD Guideline 474)) and in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- 4-fluoro-1,3-dioxolan-2-one : Positive reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)) and Negative reactions were observed in vivo (Mammalian Erythrocyte Micronucleus Test(OECD Guideline 474, GLP)).
- Dimethyl carbonate : Negative reactions were observed in both in vitro (Mammalian Chromosome Aberration Test (OECD Guideline 473, GLP)) and in vivo (Mammalian Spermatogonial Chromosome Aberration Test (OECD Guideline 483))
- Polyethylene : Negative reactions were observed in Ames test using Salmonella typhimurium and Escherichia coli.
- Diiron trioxide : Negative reactions were observed in both in vitro (Mammalian Chromosome



Aberration Test (OECD Guideline 473, GLP)) and in vivo (DNA damage, chromosome aberration and micronuclei induction test)

- Boehmite (Al(OH)O) : Negative reactions were observed in vitro(mammalian cell gene mutation assay(OECD TG 476, GLP), Negative reactions were observed in vivo Mammalian Erythrocyte Micronucleus Test(OECD TG 474, GLP)
- Carbon black : Negative reactions were observed in both in vitro(Bacterial gene mutation test(OECD TG 471, GLP), Chromosomal aberrations test(OECD TG 476)) and in vivo(DNA damage and/or repair test).
- 1-Methyl-2-pyrrolidinone : Negative reactions were observed in both in vitro (Chromosomal aberrations test (OECD Guideline 476, GLP)) and in vivo (Mammalian Erythrocyte Micronucleus Test (OECD Guideline 474, GLP)).
- Chromium : In vitro mammalian chromosome aberration test, the result of the assay was negative. (Read across; stainless steel)(OECD TG 473, GLP)
- Lithium carbonate;Lithane : Negative reactions were observed in vitro (Bacterial Reverse Mutation Assay(OECD Guideline 471, GLP)).
- Ethylbenzene : Negative reactions were observed in in vitro-mammalian chromosome aberration test(OECD TG 473), mammalian cell gene mutation test (OECD TG 476, GLP) and in vivo-unscheduled DNA synthesis (UDS) test with mammalian liver cells (OECD TG 486, GLP), mammalian erythrocyte micronucleus test (OECD TG 474, GLP).

Reproductive toxicity :

- Graphite :
- Copper : In reproductive toxicity with rats, there were no effects considered (up to 1500 ppm). (OECD TG 416, GLP)
- Aluminum : No reproduction, breeding and early post-natal developmental toxicity was observed in rats at 1000 mg/kg bw for males and females. (OECD TG 422, GLP)(Aluminium chloride; read across)
- Lithium hexafluorophosphate(1-) : In the two-generation reproductive toxicity with rats, no effects observed on reproductive toxicity. (male/female)(OECD Guideline 416, GLP)(OECD Guideline 414)(Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture))
- Boehmite (Al(OH)O) : No reproduction, breeding and early post-natal developmental toxicity was observed in rats at 1000 mg/kg body weight for males and females.(OECD Guideline 422, GLP)
- Carbon black : No adverse effects on the reproductive function are expected.(OECD TG 414)
- Chromium : In the 90 days inhalation toxicity study using rat, there were no effects on clinical signs, mortality.(OECD TG 413)
- Ethylbenzene : There were no adverse effects on reproductive or developmental endpoints at dose levels up to 500 ppm EB in this guideline two-generation rat inhalation study. OECD TG 416, GLP); Results of prenatal Developmental Toxicity tests for rats, litter size was comparable between the treated and control dose groups, while a statistically significant dose-related reduction in fetal weights were noted in the 1000 and 2000 ppm dose groups. Visceral malformations occurred in one or few fetuses from the 100, 1000 and 2000 ppm exposure groups, without a clear dose relationship and no statistical significance. NOAEC = 2000ppm (OECD Guideline 414)

Specific target organ toxicity (single exposure) :

- Fe : If inhaled, iron is a local irritant to the lung and gastrointestinal tract.
- Copper : All animals showed expected gains in bodyweight over the study period and there were no abnormalities noted at necropsy. (OECD TG 423, GLP)
- Aluminum : In test using rats, Clinical signs of depression, laboured respiration, piloerection and hunched appearance was noted at the highest dose 15900 mg/kg. Macroscopic examination at the end of the observation period did not reveal any aluminium-related changes of the internal organs of the aluminium treated animals compared to the control group. (OECD TG 401)(Fumed alumina; read across)
- Lithium hexafluorophosphate(1-) : Clinical signs observed during the study period were lethargy, hunched posture, uncoordinated movements, piloerection at 300 mg/kg, hunched posture, piloerection



at 50 mg/kg. The surviving animals had recovered from the symptoms by Day 3.(OECD Guideline 423, GLP)

- Polyethylene : No test substance-related toxic effects were observed in an acute oral toxicity study with rats.
- Carbon black : No effect on endothelins or blood pressure was observed after exposure to carbon black. There were also no effects on body temperature and activity of the animals.
- Nickel; Raney nickel : In the acute oral toxicity using rat, there were no effects on clinical signs, systemic toxicity.(OECD Guideline 401, GLP)
- Chromium : In the acute oral toxicity using rat, salivation increased among all animals 15 minutes after administration of the test substance, and lasted about 8 hours. (OECD TG 420, GLP)
- Ethylbenzene : In acute oral, inhalation, dermal toxicity study with rats, adverse effects were not observed related to acute toxicity.

Specific target organ toxicity (repeat exposure) :

- Fe : Rats were exposed to metallic iron as carbonyl iron via their feed (2.5%) for 2, 4, 6, or 9 weeks. This resulted in a strong increase of non-heme iron in the liver and clear lipid peroxidation in the liver and the mucosa of the duodenum. No evidence for DNA breakage were found. What follows is the original abstract of the publication. (carbonyl iron)
- Copper : In test with rats for 92 days, there were no mortalities or signs of clinical toxicity observed in any of the test species during the duration of the study. Ophthalmoscopic examinations revealed no abnormalities at any dose level tested. At gross pathology, significant decreases in heart and kidney weight were noted in the high dose males in the thymus and kidneys of high dose females. (GLP)
- Aluminum : On occasion workers chronically exposed to aluminum-containing dusts or fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax.
- Lithium hexafluorophosphate(1-) : According to expert review of fluoride intake and effects on human health, fluoride intake in drinking water at levels close to or above 4 mg/l is associated with dental fluorosis and perhaps also bone fluorosis and/or weakening.; Damage to dental enamel recorded: especially notable in young animals, which also showed atrophy of respiratory organs/tissues with local oedema of bronchial mucosa. Older animals showed peribronchial hyperplasia. Animals around 1 year in age showed cavity formation in their bones.(Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture))(OECD Guideline 412)
- Polyethylene : No significant adverse effects were observed in subchronic (90-day) oral toxicity study with rats and dogs.
- Boehmite (Al(OH)O) : There were no clear clinical signs or observations during necropsy which could be related to the treatment.(OECD Guideline 408, GLP), Intratracheal injection of aluminium powder caused nodular pulmonary fibrosis in the lungs of the rats only at the highest dose administered (100 mg).(OECD Guideline 413)
- Carbon black : Mice were continuously fed various types of carbon black in massive quantities (10% in diet) for 12 to 18 months. This led to no detectable changes from the normal in the organs and tissues of the mice fed.
- Nickel; Raney nickel : In nickel plating industry, exposure to nickel containing vapors has been reported to be assoc with asthma.
- Chromium : In the repeated Dose 90-Day Oral toxicity test using rat, there were no effects on clinical signs, mortality.
- Ethylbenzene : In repeated oral toxicity study with rats for 28 days, increased liver weight and hepatocellular hypertrophy at higher dose levels were observed. (NOEL = 75 mg/kg bw/day) (OECD TG 407, GLP); In repeated inhalation toxicity study with rats for 13 weeks, increases in liver and kidney weights but no other treatment related effects were observed in rats that inhaled ≥ 250 ppm ethylbenzene vapour for 13 weeks, NOAEC = 1000ppm (OECD Guideline 413, GLP), Classified as Category 2 according to EU GHS

Aspiration Hazard :

- Ethylbenzene : Classified as Category 1 according to EU GHS

Section XII – ECOLOGICAL INFORMATION

※ This is a product that fulfills a certain function in solid state with specific shape without discharging any chemical substance in its use and has no obligation to write (M)SDS. Since this document contains the precautions for safe handling related to its materials or chemical substances consisting of this product, please note that these overall information is irrelevant to this product.

12.1 Ecological toxicity

- Acute toxicity : ATEmix = 0.48250mg/l

Fish

- Graphite : 96hr-LC₅₀ (*Brachydanio rerio*) > 100 mg/L
- Fe : 96hr-LC₅₀ > 10000 mg/L (OECD TG 203, GLP)
- : 96hr-LC₅₀ = 54.1 mg/L (Read across; cobalt (II) chloride hexahydrate), 34d-NOEC (*Pimephales promelas*) = 0.21 mg/L
- Aluminum : 96hr-LC₅₀ > 218.64 mg/L (GLP)(Read across; aluminium chloride hexahydrate), 28d-NOEC (*Pimephales promelas*) = 4.7 mg/L (Read across; aluminium sulphate)
- Lithium hexafluorophosphate(1-) : 96hr-LC₅₀ = 51 ~ 193 mg/L Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture); 21d-NOEC = 4 mg F-/L
- Boehmite (Al(OH)O) : 96hr-LC₅₀ = 1.16 mg/L
- Carbon black : 96hr-LC₀ = 1000 mg/L (OECD TG 203, GLP)
- 1-Methyl-2-pyrrolidinone : 96hr-LC₅₀ > 500 mg/L (BBA-bulletin No. 33, 2. edition)
- Lithium carbonate; Lithane : 96hr-LC₅₀ = 30.3 mg/L (OECD Guideline 203, GLP), 34d-NOEC (*Danio rerio*) = 15.28 mg/L (Read across; lithium hydroxide monohydrate)(OECD Guideline 210, GLP)
- Ethylbenzene : 96hr-LC₅₀ = 4.2 mg/L (OECD Guideline 203)

Crustacean

- Graphite : 48hr-EC₅₀ (*Daphnia magna*) > 100 mg/L
- Fe : 48hr-EC₅₀ > 100 mg/L (OECD TG 202, GLP)
- : 48hr-EC₅₀ = 2.618 mg/L (GLP)(Read across; cobalt (II) chloride hexahydrate), 42d-NOEC (*Neanthes arenaceodentata*) = 0.713 mg/L (ASTM Method E1562, GLP)
- Aluminum : 48hr-LC₅₀ = 0.071 mg/L (Read across; CAS 13473-90-0), 8d-NOEC (*Ceriodaphnia dubia*) = 4.9 mg/L (Read across; CAS 7784-13-6)
- Lithium hexafluorophosphate(1-) : 48hr-LC₅₀ > 100 mg/L (OECD Guideline 202, GLP); 21d-NOEC (*Daphnia magna*) = 10 mg/L (Information on major hydrolysis product of the registered substance (released rapidly on contact with water/moisture)) (OECD guideline 202, GLP)
- 4-fluoro-1,3-dioxolan-2-one : 48hr-LC₅₀ = 8.4 mg/L (OECD Guideline 202, GLP)
- Boehmite (Al(OH)O) : 48hr-EC₅₀ > 100 mg/L (OECD Guideline 202, GLP)
- Carbon black : 24hr-EC₅₀ > 5600 mg/L (OECD TG 202, GLP)
- 1-Methyl-2-pyrrolidinone : 24hr-EC₅₀ > 1000 mg/L German Industrial Standard DIN 38 412 Part 11
- Lithium carbonate; Lithane : 48hr-EC₅₀ = 33.2 mg/L (OECD Guideline 202, GLP), 21d-NOEC (*Daphnia magna*) = 9 mg/L (Read across; lithium)(OECD Guideline 211, GLP)
- Ethylbenzene : 48hr-EC₅₀ = 1.8 ~ 2.4 mg/L (EPA method F), 7d-NOEC (*Ceriodaphnia dubia*) = 0.96 mg/L (U.S. EPA 600/4-91-003)

Algae

- Graphite : 72hr-EC₅₀ (*Selenastrum capricornutum*) > 100 mg/L
- : 96hr-EC₅₀ = 71.314 mg/L (Read across; cobalt (II) chloride hexahydrate), 96hr-NOEC (*Dunaliella tertiolecta*) = 4.672 mg/L
- : 96hr-EC₅₀ > 500 mg/L
- Aluminum : 72hr-EC₅₀ = 0.0169 mg/L (OECD TG 201), (Read across; CAS 13473-90-0)
- Lithium hexafluorophosphate(1-) : 96hr-EC₅₀ > 100 mg/L ; 96h-NOEC = 22 mg/L (OECD Guideline



201, GLP)

- 4-fluoro-1,3-dioxolan-2-one : 72hr-EC₅₀ = 32 mg/L
- Boehmite (Al(OH)O) : 72hr-EC₅₀ > 100 mg/L (OECD Guideline 201, GLP)
- Carbon black : 72hr-EC₅₀ > 10000 mg/L , 72hr-NOEC > 10,000mg/l (OECD TG 201, GLP)
- 1-Methyl-2-pyrrolidinone : 72hr-EC₅₀ = 600.5 mg/L
- Lithium carbonate;Lithane : 72hr-EC₅₀ > 400 mg/L
- Ethylbenzene : 96hr-EC₅₀ = 3.6 mg/L (U.S. EPA. 1985. Toxic substance Control Act Test guidelines)

12.2 Persistence and degradability

Persistence

- Graphite : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.78)
- : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.82)
- Aluminum : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.33) (estimated)
- Lithium hexafluorophosphate(1-) : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.354) (20 °C, pH > 6.5 - < 7.5)(OECD Guideline 107, GLP)
- 4-fluoro-1,3-dioxolan-2-one : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.435)
- 1-Methyl-2-pyrrolidinone : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.46)
- Ethylbenzene : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 3.6) (EU Method A.8)

Degradability : Not available

12.3 Bioaccumulative potential

Bioaccumulation

- Graphite : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 2.433)
- Copper : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 0.02 ~ 20)
- : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 23) (Read across; 57CoCl)
- : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 2.5)
- Aluminum : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- Lithium hexafluorophosphate(1-) : Bioaccumulation is expected to be low according to the BCF < 500 (BCF < 31)
- 4-fluoro-1,3-dioxolan-2-one : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (estimated)
- Dimethyl carbonate : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.2)
- Nickel; Raney nickel : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 70)
- Ethylbenzene : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 1)

Biodegradation

- Lithium hexafluorophosphate(1-) : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 86% biodegradation was observed after 28 days) (OECD Guideline 301 C, GLP)
- 4-fluoro-1,3-dioxolan-2-one : As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 38% biodegradation was observed after 21 days) (OECD Guideline 301 D, GLP)
- Dimethyl carbonate : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 86% biodegradation was observed after 28 days) (OECD Guideline 301 C, GLP)
- Polyethylene : As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 0% biodegradation was observed after 28 days)
- Carbon black : carbon black is an inorganic substance and will not biodegraded by microorganisms.
- 1-Methyl-2-pyrrolidinone : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 73% biodegradation was observed after 28 days)
- Ethylbenzene : As well-biodegraded, it is expected to have low accumulation potential in living organisms (70% ~ 80% biodegradation was observed after 28 days) (ISO 14593-CO2-Headspace Test)

12.4 Mobility in soil



- 4-fluoro-1,3-dioxolan-2-one : Low potency of mobility to soil. (Koc = 5.117)
- Nickel; Raney nickel : Low potency of mobility to soil. (Koc = 2.86)
- 1-Methyl-2-pyrrolidinone : Low potency of mobility to soil. (Koc = 20.94) (estimated)
- Ethylbenzene : Low potency of mobility to soil. (Koc = 257.04)

12.5 Results of PBT and vPvB assessment : Not available

12.6 Other adverse effects : Not available

Section XIII – DISPOSAL CONSIDERATION

13.1 Waste treatment methods

Product/Packaging disposal

- Consider the required attentions in accordance with waste treatment management regulation.

Waste codes / Waste designation according to LoW(2015) : 16-06-05

Waste treatment-relevant information

- Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Sewage disposal-relevant information: Not available

Other disposal recommendations: Not available

Section XIV – TRANSPORTATION INFORMATION

※ If those lithium-ion batteries are packed with or contained in an equipment, then it is the responsibility of the shipper to ensure that the consignment are packed in compliance to the latest edition of the IATA Dangerous Goods Regulations section II of either Packing Instruction 966 or 967 in order for that consignment to be declared as NOT RESTRICTED (non-hazardous/non-Dangerous). If those lithium-ion batteries are packed with or contained in an equipment, UN No. is UN3481.

14.1 UN Number : 3480

14.2 UN Proper shipping name : LITHIUM ION BATTERIES

14.3 Transport Hazard class : 9

14.4 Packing group : II

14.5 Special provisions : 188, 230, 384

14.6 Packing instructions : P903

14.7 Environmental hazards : No

14.8 Special precautions for user

in case of fire : F-A

in case of leakage : S-I

14.9 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not Available

14.10 IATA Transport : PI 965-Section IB

14.11 Package labels



Section XV – REGULATORY INFORMATION

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture

EU regulations

Authorisations and/or restrictions on use:

Authorisations: Not regulated

Restrictions on use:

- Nickel : Regulated
- 1-Methyl-2-pyrrolidinone : Regulated

Other EU regulations:

- 1-Methyl-2-pyrrolidinone : Regulated

Foreign Regulatory Information

External information :

U.S.A management information (OSHA Regulation) : Not regulated

U.S.A management information (CERCLA Regulation) :

- Copper : 5,000 lb
- Nickel : 100 lb
- Chromium : 5,000 lb
- ethylbenzene : 1,000 lb

U.S.A management information (EPCRA 302 Regulation) : Not regulated

U.S.A management information (EPCRA 304 Regulation) : Not regulated

U.S.A management information (EPCRA 313 Regulation) :

- Aluminium (metal) : Regulated
- Copper : Regulated
- Nickel : Regulated
- 1-Methyl-2-pyrrolidinone : Regulated
- Chromium : Regulated
- lithium carbonate : Regulated

Substance of Roterdame Protocol : Not regulated

Substance of Stockholme Protocol :

- lithium hexafluorophosphate(1-) : Regulated



Substance of Montreal Protocol : Not regulated

15.2 Chemical safety assessment :

- No chemical safety assessment has been carried out for this product by the supplier.

Section XVI – OTHER INFORMATION EU

Product safety data sheet for PA0001N0006A/PA0001N0007A/PA001N0008A prepared in accordance with Regulation (EU) 2015/830 (REACH), Annex II, and OSHA 29 CFR 1910.1200

16.1 Indication of changes

Date Updated : 28 June. 2018

Version : Rev. 01

16.2 Abbreviations and acronyms

ACGIH = American Conference of Government Industrial Hygienists

CLP = Classification Labelling Packaging Regulation ; Regulation (EC) No 1272/2008

CAS No. = Chemical Abstracts Service number

DMEL = Derived Minimal Effect Levels

DNEL = Derived No Effect Level

EC Number = EINECS and ELINCS Number (see also EINECS and ELINCS)

EU = European Union

IARC = International Agency for Research on Cancer

ISHL = Industrial Safety & Health Law

NIOSH = National Institute for Occupational Safety & Health

NTP = National Toxicology Program

OSHA = European Agency for Safety and Health at work

PBT = Persistent, Bioaccumulative and Toxic substance

PNEC(s) = Predicted No Effect Concentration(s)

REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 453/2010

STP = Sewage Treatment Plant

SVHC = Substances of Very High Concern

vPvB = Very Persistent and Very Bioaccumulative

UN = United Nations

MARPOL = International Convention for the Prevention of Pollution from Ships (IMO)

IBC = Intermediate Bulk Container

CERCLA = Comprehensive Environmental Response, Compensation & Liability Act (US)

EPCRA = Emergency Planning and Community Right-to-Know Act (US)

EINECS = European Inventory of Existing Commercial chemical Substances

ELINCS = European List of Notified Chemical Substances

16.3 Key literature reference and sources for data :



U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB)
LookChem; <http://www.lookchem.com/>
IUCLID: <http://ecb.jrc.ec.europa.eu/IUCLID-DataSheets/7631905.pdf>
CHRIP(Cheical Risk Information Platform)
EPISUITE v4.11; <http://www.epa.gov/opt/exposure/pubs/episuitedi.html>
The Chemical Database -The Department of Chemistry at the University of Akron;
<http://ull.chemistry.uakron.edu/erd/>
ECOTOX: <http://cfpub.epa.gov/ecotox/>
International Chemical Safety Cards (ICSC): <http://www.nihs.go.jp/ICSC/>
National Chemical Information System (<http://ncis.nier.go.kr>)
Korea Dangerous Material Inventory Management System (<http://hazmat.nema.go.kr>)
REACH information on registered substances; <https://echa.europa.eu/information-on-chemicals/registered-substances>
EU CLP; <https://echa.europa.eu/information-on-chemicals/cl-inventory-database>
NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>
National Toxicology Program; <http://ntp.niehs.nih.gov/results/dbsearch/>
TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>
UN Recommendations on the transport of dangerous goods 17th
American Conference of Governmental Industrial Hygienists TLVs and BEIs.

16.4 Classification and procedure used to derive the classification for mixtures according to Regulation(EC) 1272/2008(CLP) : Not classified

16.5 Relevant H-statements : Not applicable

16.6 Training advice :

- Do not handle until all safety precautions have been read and understood.

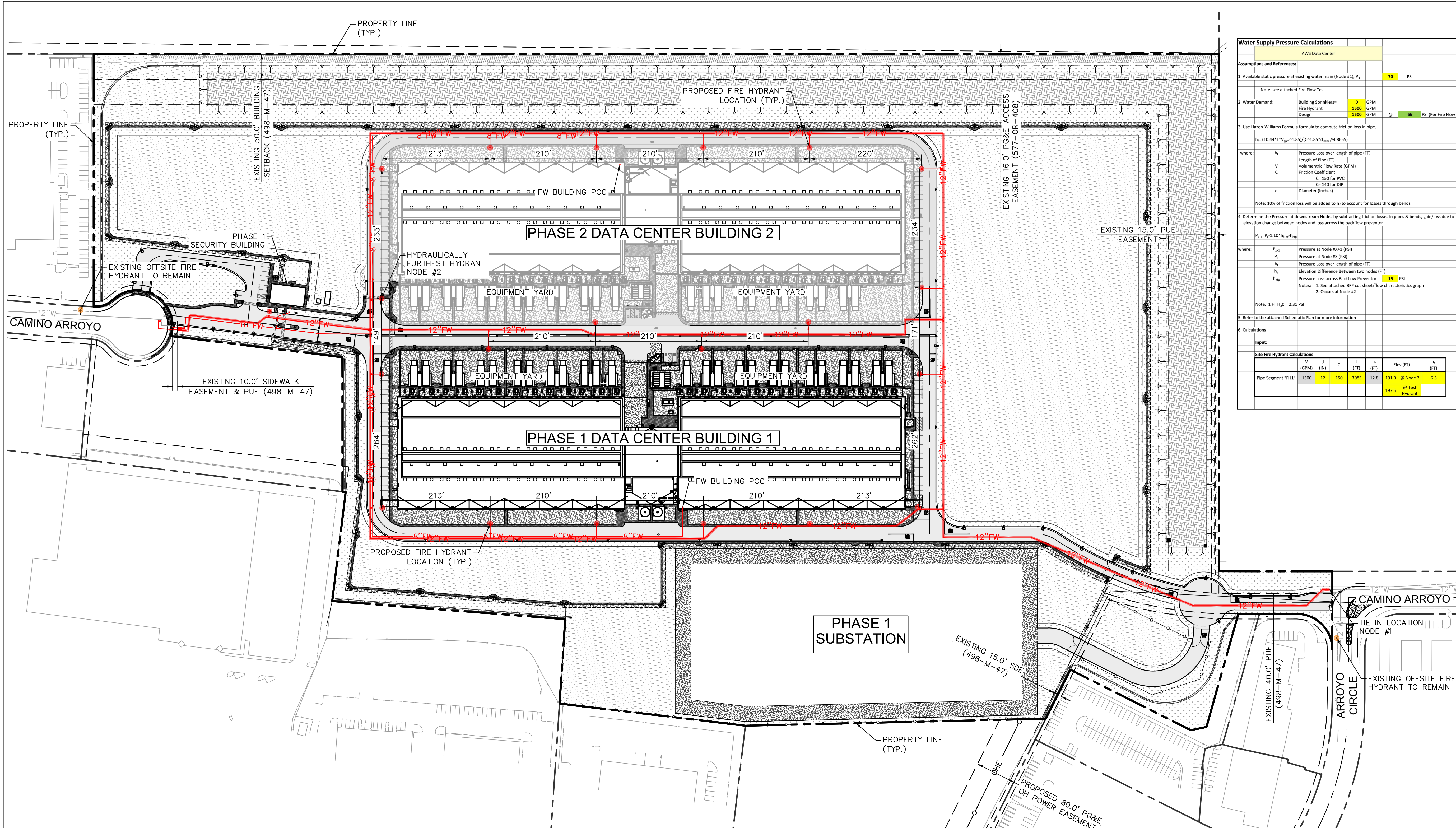
16.7 Further information :

Data of sections 4 to 8, as well as 10 to 12, do not necessarily refer to the use and the regular handling of the product (in this sense consult package leaflet and expert information), but to release of major amounts in case of accidents and irregularities. The information describes exclusively the safety requirements for the product (s) and is based on the present level of our knowledge. This data does not constitute a warranty for the characteristics of the product(s) as defined by the legal warranty regulations. "(n.a. = not applicable; n.d. = not determined)"

The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.

ATTACHMENT HAZ DR-52

Fire Water Supply Plan



Water Supply Pressure Calculations

Prepared By: Kimley-Horn and Associates

Assumptions and Reference:

- Available static pressure at existing water main (Node #1), P_s = 70 PSI
- Water Demand: Building Sprinklers = 0 GPM, Fire Hydrants = 1500 GPM, Design = 1500 GPM @ 66 PSI (Per Fire Flow Test)
- Use Hazen-Williams Formula formula to compute friction loss in pipe.

where:

- h_f = Pressure Loss over length of pipe (FT)
- L = Length of Pipe (FT)
- V = Volumetric Flow Rate (GPM)
- C = Friction Coefficient (C=150 for PVC, C=140 for HDPE)
- d = Diameter (inches)

Note: 30% of friction loss will be added to h_f to account for losses through bends

- Determine the Pressure at downstream Nodes by subtracting friction losses in pipes & bends, gain/loss due to elevation change between nodes and loss across the backflow preventer.

where:

- P_{node} = Pressure at Node #X (PSI)
- P_s = Pressure at Node #X (PSI)
- h_f = Pressure Loss over length of pipe (FT)
- h_e = Elevation Difference between two nodes (FT)
- h_b = Pressure Loss across Backflow Preventer (PSI)

Note: 1. See attached BFP cut sheet/flow characteristics graph
2. Occurs at Node #2

Note: 1 FT H₂O = 2.31 PSI

5. Refer to the attached Schematic Plan for more information

6. Calculations

Input:

Pipe Segment	V (GPM)	d (IN)	C	L (FT)	h _f (FT)	Elev (FT)	h _e (FT)	P (PSI)
Pipe Segment "H1"	1500	12	150	3085	12.8	191.0 @ Node 2	6.5	47.7 @ Node #2 > 20 PSI OK
						197.5 @ First Hydrant		

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PROJECT DELIVERY PACKAGE
PLANNING/ENTITLE.

PROJECT: CAMINO ARROYO - BUILDING 1

SHEET TITLE: PRELIMINARY FIRE DEPARTMENT WATER SUPPLY PLAN

CONFIDENTIAL

LEGEND

	PROPERTY LINE		HYDROSEEDED AREA. SEE LANDSCAPE PLANS FOR DETAILS.
	EXISTING WATER LINE		LANDSCAPE AREA. SEE LANDSCAPE PLANS FOR DETAILS.
	FIRE HYDRANT PLACEMENT		BIORETENTION AREA
	EXISTING FIRE HYDRANT		EXISTING DIRT ROAD TO REMAIN
	PROPOSED FIRE WATER LINE. SIZE PER PLAN.		
	ASPHALT CONCRETE PAVEMENT		
	CONCRETE SIDEWALK		
	HEAVY DUTY CONCRETE		
	PLANTING BARRIER. SEE LANDSCAPE PLANS FOR DETAILS.		
	GRAVEL. SEE LANDSCAPE PLANS FOR DETAILS.		

PHASE 1 DATA CENTER BUILDING 1 DATA

BUILDING CONSTRUCTION TYPE:	IIB
TOTAL BUILDING SQUARE FOOTAGE:	±215,000 SF
REQUIRED FIRE FLOW (PER CFC TABLE B105.1, BEFORE REDUCTION):	8,000 GPM
MINIMUM REQUIRED HYDRANTS (PER CFC TABLE C102.1):	8 HYDRANTS
HYDRANTS PROVIDED:	10 HYDRANTS
AVERAGE FIRE HYDRANT SPACING:	215 LF

PHASE 1 SECURITY BUILDING DATA

BUILDING CONSTRUCTION TYPE:	IIB
TOTAL BUILDING SQUARE FOOTAGE:	±2,500 SF
REQUIRED FIRE FLOW (PER CFC TABLE B105.1, BEFORE REDUCTION):	1,500 GPM
MINIMUM REQUIRED HYDRANTS (PER CFC TABLE C102.1):	1 HYDRANT
HYDRANTS PROVIDED:	1 HYDRANT

GENERAL NOTES

- DOMESTIC WATER TO MAINTAIN 5' HORIZONTAL CLEARANCE FROM BIORETENTION AREAS.
- CONTRACTOR TO FIELD VERIFY INVERTS PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY IF ANY DISCREPANCIES ARE FOUND.
- PRIOR TO THE START OF CONSTRUCTION, FIRE PROTECTION WATER SUPPLIES SHALL BE INSTALLED AND MADE SERVICEABLE PRIOR TO THE TIME OF CONSTRUCTION OR PRIOR TO COMBUSTIBLE MATERIALS BEING MOVED ONSITE, UNLESS AN APPROVED ALTERNATIVE METHOD OF PROTECTION IS APPROVED BY THE FIRE PREVENTION AND HAZARDOUS MATERIALS DIVISION.

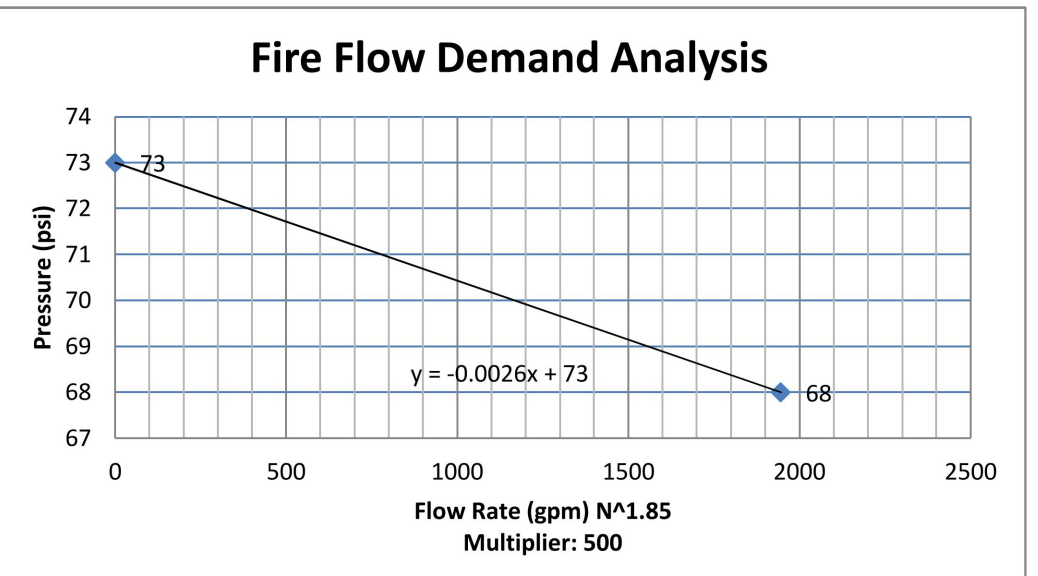
PHASE 2 DATA CENTER BUILDING 2 DATA

BUILDING CONSTRUCTION TYPE:	IIB
TOTAL BUILDING SQUARE FOOTAGE:	±215,000 SF
REQUIRED FIRE FLOW (PER CFC TABLE B105.1, BEFORE REDUCTION):	8,000 GPM
MINIMUM REQUIRED HYDRANTS (PER CFC TABLE C102.1):	8 HYDRANTS
HYDRANTS PROVIDED:	10 HYDRANTS
AVERAGE FIRE HYDRANT SPACING:	215 LF

Fire Flow Graphical Analysis

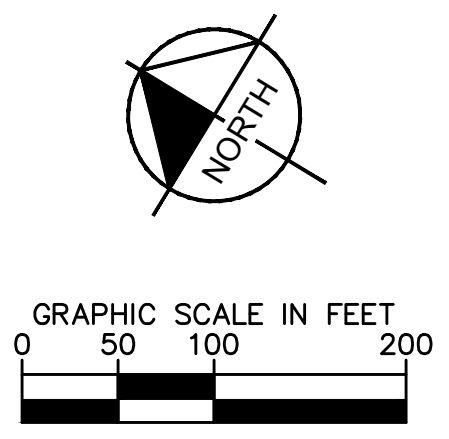
= Manual Input	
= Calculated Demand	
Static	Flow Rate
73	0
Observed	1725
Demand	1500

Do Not Modify		
73	0	0
68	972881	1946
X	751223	1502



EXISTING UTILITY NOTE

THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.



REVISIONS

MARK	DATE	DESCRIPTION
	30OCT2020	PLANNING & ENTITLEMENT #1
	15JAN2021	3RD PARTY REVIEW
	26JAN2021	3RD PARTY REVIEW #2
	28JAN2021	3RD PARTY REVIEW #3
	02FEB2021	PLANNING & ENTITLEMENT #2

SEAL/SIGNATURE

The licensed professional seal affixed to this sheet applies only to the material and items shown on this sheet. All drawings, instruments or other documents not exhibiting this seal shall not be considered prepared by this professional, and this professional expressly disclaims any and all responsibility for such plan, drawings or documents not exhibiting this seal.

ISSUE DATE: 12FEB2021 KH PROJECT NO:197315002
DESIGNED: JAK ENGINEER: MRJ
DRAWING NUMBER: **C600**

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ATTACHMENT TRANS DR-53

City of Gilroy Circulation Memo



Community Development Department

Karen Garner
DIRECTOR

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Telephone: (408) 846-0451 Fax: (408) 846-0429
cityofgilroy.org

MEMORANDUM

DATE: June 3, 2020
TO: Arminta Jensen, Principal, RJA
FROM: Karen Garner, Director, Community Development – (408) 846-0467
SUBJECT: Southpoint Business Center - APN 841-69-039

The purpose of this memo is to provide clarification on two items related to the proposed project on the subject site.

1. Does the road realignment proposed by this project require a General Plan Amendment?

In the existing General Plan, and the proposed 2040 General Plan currently in environmental review stage, a new roadway is shown to intersect the subject property. RJA, on behalf of their client, submitted a proposed realignment that would relocate this Camino Arroyo extension through the project site to a location east of the property, and create a network connection parallel to Arroyo Circle and San Ysidro Avenue.

City staff reviewed the realignment proposed by RJA, and has determined that it is in the general alignment with the future Cameron Boulevard roadway extension. From the current General Plan, this future roadway would extend the current Cameron Boulevard alignment from Pacheco Pass Highway in a northerly direction to connect with Marcella Avenue. Since this roadway network improvement project is already in the City's Traffic Circulation Master Plan, payment of project Traffic Impact Fees would be the project's fair share contribution towards this future roadway improvement. Should there be any changes to the proposed roadway or other significant changes to the project, staff will re-evaluate to determine if the project requires a General Plan Amendment.

Please note, there were discussions with the development team at our previous meeting regarding the current roadway configuration at the southern access point of the project property where Camino Arroyo makes the sharp turn onto Arroyo Circle. The development team's engineer with RJA agreed to investigate potential safety

improvements that could be constructed by the developer at this site access location to benefit local traffic in the area. Possible improvements could include a roundabout, or some other kind of intersection circulation safety improvement.

2. Does the existing zoning and land of the site allow for the use as proposed and described?

The existing zoning for the site is M2 - General Industrial. The land use designation is General Industry. Section 30.23.10 of the City Zoning Code (Industrial use table), lists "Data Processing Center" as a permitted use in the M2 Zone. Staff has determined that the use, as proposed, would be considered a Data Processing Center and is therefore a permitted use for this site.

Should there be any changes to the proposed use staff will re-evaluate to determine if the project requires a zoning or land use change.

We look forward to working with you and your client on this exciting project.