Version 1.3
30 August 2022

ESRANGE USER'S HANDBOOK

Volume I
General Information

CHANGE LOG

Version	Issued	Changes
1.3	30 August 2022	Own chapters on Security, Medical, and Logistics
1.2	24 August 2022	Doc Id added; logistic part updated (6.8)
1.1	21 May 2021	Minor typos; author and title added in file info
1	7 May 2021	Full re-write of Volume, new issue

APPROVAL

This version was approved by Mr Lennart Poromaa, Head of Esrange Space Center, on the date of issue.

Lennart Poromaa Digitally signed by Alf Lennart Poromaa
Date: 2022-08-30 17:09:39+02:00

PREFACE

Swedish Space Corporation (SSC) owns and operates Esrange Space Center (ESC) located in the north of Sweden, where a multitude of activities are performed in support of space and Earth science research, satellite communications, aerospace technology development and orbital launches. SSC also maintains capabilities to conduct mobile launch activities for stratospheric balloons at Esrange.

Users of Esrange include space agencies, scientific and research organizations, universities, and commercial customers from all over the world.

This Esrange User's Handbook summarizes policies and procedures for facility use and provides a description of the range capabilities to users.

The handbook is divided into 11 volumes, with the three first addressing general information related to the range, safety and range instrumentation, while the next seven address specific facilities, processes and operations related to individual types of activities (e.g., sounding rockets or orbital launch).

Abbreviations and acronyms used throughout the handbook, as well as identified references, are included in Volume A.

Each new version of an individual volume of the Esrange User's Handbook replaces all previous versions of that particular document (but not any of the other volumes).

The most current version of the complete/consolidated Esrange User's Handbook, and other documents referenced within it, can be found at http://www.sscspace.com.

Volumes in Esrange User's Handbook

Vol. I - General Information	Vol. II - Safety
Vol. III - Launch Range Instrumentation	Vol. A - Abbreviations and References
Vol. IV - Scientific Ground Instruments	
Vol. V - UAS	Vol. VI - Stratospheric Balloons
Vol. VII - Sounding Rockets	Vol. VIII - Propulsive Development Testing
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1 INTRODUCTION

1.1 SSC

The Swedish Space Corporation (SSC) is a private company, wholly owned by the Swedish Government. In 2020, the SSC Group had approximately 560 employees and a total turnover of around 100 million Euro.

The SSC Group is organized into three business divisions:

- Science Services has historically provided scientific ground instrument hosting, UAV flight test services, and sounding rocket and stratospheric balloon launch services at Esrange Space Center, and developed payload experiments and flight systems for sounding rockets and stratospheric balloons. Several exciting new "Testbed" services and related infrastructure are also currently being developed at Esrange, including launch vehicle developmental testing and orbital launch capabilities for small satellites. Infrastructural services at Esrange are also provided by this division.
- Satellite Management Services is the operator of one of the world's largest civilian networks of ground stations for satellite communication, providing reliable access in virtually any orbit. Numerous types of critical on-orbit services – including LEOP support, antenna hosting, data processing, and satellite TT&C – are provided to meet satellite owners' increasing need for capacity and flexible solutions. Esrange constitutes one of the major hubs in the SaMS network.
- Engineering Services provides engineering, operations and consultancy services to the international space market and support all projects by bringing consulting expertise to all phases, from designing and testing to launch and operations.

1.2 ESRANGE

Fig. 1 - Esrange under the Aurora Borealis (Photo: Marcus Lindh)

Esrange Space Center (ESC or "Esrange") is the main operational and launch facility of SSC, located in northern Sweden above the Arctic Circle.

The original name of the facility was European Space Research Organization (ESRO) Sounding Rocket Launching Range, which became shortened in colloquial language to "ESRANGE". Esrange (only capital E) is now the proper name of the facility, and no longer an acronym.

Esrange is used by the international scientific community, space agencies and commercial customers for launching sounding rockets and high-altitude balloons for research under microgravity, astronomy, atmospheric research and technology demonstrations. To date over 550 sounding rockets and over 650 balloons have been launched.

The sounding rocket and stratospheric balloon activities are coordinated and financed by the Esrange and Andøya Special Project (EASP) Agreement within the European Space Agency (ESA). The member states of EASP are currently France, Germany, Switzerland, Norway and Sweden, and the assigned missions for ESC regarding sounding rockets and balloons are:

- Support of the sounding rocket and high-altitude balloon programs of the member states of EASP. Non-members can also use the facilities on a commercial basis.
- Operation of ground based scientific instrumentation to support scientific research.

One of Europe's largest stations for reception and control of polar orbiting satellites is located at Esrange. Since its start in 1978 with receiving images from the Landsat 2 satellite, the station has grown into a 25+ antenna site, receiving more than 110 satellite passes per day, from around 50 different satellites. It is also a backup control station for geostationary satellites.

Esrange is also used for Unmanned Aerial Vehicle (UAV) flights, due to its remote location with extremely low air traffic in the vicinity, coupled with a 6,600 km2 restricted airspace (from ground to space) that facilitates autonomous flights from the facility.

In 2018 Esrange began supporting activities related to launch vehicle developmental testing. The initial capabilities include horizontal rocket motor tests, and vertical rocket engine and stage tests. Additional flight test capabilities (such as reusability hover and landing tests, and test launches of new launch vehicles) are currently (2021) under construction. The launch vehicle testing activities are being used as a foundation for the development of a spaceport (orbital launch) capability that will become operational at Esrange in 2022/23.

More information regarding each of the different activities mentioned above can be found in the corresponding Volumes IV-X of this handbook.

1.2.1 Location

Esrange Space Center is located in the north of Sweden, above the Arctic Circle at lat 67° 53'N, long 21° 04'E. The nearest large population center is Sweden's principal mining town Kiruna, which is about half an hour away by car. Access to Kiruna is very good with several daily jet flight connections with Stockholm. It is also possible to reach Kiruna by train from Stockholm, or by car using roads E4 and E10 in Sweden.

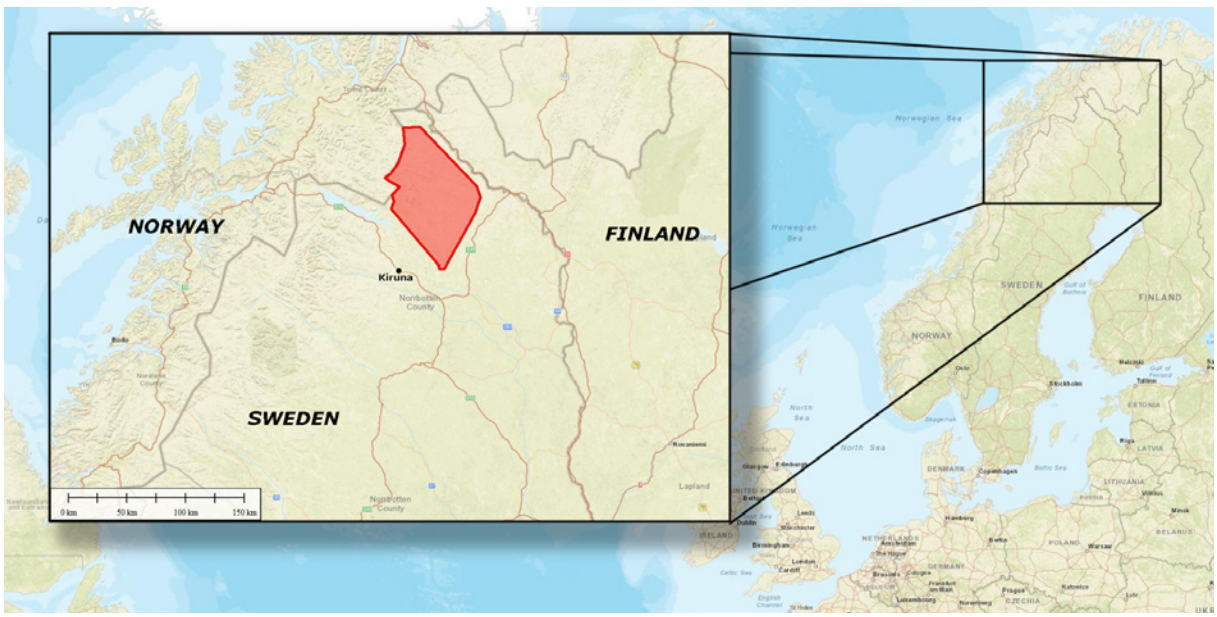


Fig. 2 - Esrange location in Europe

1.2.2 Climate

Esrange has a continental sub-arctic climate with very cold, long and dry winters and relatively warm summers. The precipitation and humidity are relatively low all year.

Snow begins to fall, and the lakes begin to freeze, by the first half of October. By the end of October, the ground is normally snow-covered. The 24-hour average temperature falls below 0 °C in mid-October and stays below until the beginning of May, according to the climatological mean from 33 years of model data.

During the coldest months (December, January and February), the average temperature is normally around –15 °C. However, temperatures below -40 °C have been measured. During winter, the temperature at the radar hill is generally about 10 °C higher than in the valley where the rest of the range is located. The snow and ice disappear around mid-May. Summer temperatures are in the 10 to 20 °C range, rising occasionally to 30°C.

The percentage of hours with clear skies or few clouds is highest in summer, and lowest in April and November. The average daily cloud cover is about 70% throughout the year, with a peak in November and a smaller peak in April. The average daily cloud cover is lowest during summer, especially during June.

The probability of a day without any precipitation is about 50% throughout the year; somewhat lower during winter and somewhat higher during summer. The average daily amount of precipitation is higher during summer. Fog can occur in the Vittangi valley before the river freezes in October – November. Fog can also be caused by warm, moist air meeting the cold ground, so-called advection fog. This type of fog is relatively common in December. Otherwise, fog is rarely seen.

1.2.3 History

In March of 1964 the European Space Research Organization (ESRO) was founded by Belgium, Denmark, France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland and the United Kingdom; with the aim to establish a coordinated program for peaceful space research, combined with advanced research and technological development, to support European industry in the member countries.

Esrange Space Center was built in the mid-1960s by ESRO and inaugurated in 1966 as the organization's sounding rocket (i.e., atmospheric and aurora research) launch facility. Around 150 rocket launches were performed between November 1966 and June 1972 at Esrange, mainly by ESRO but also by the member states of ESRO on a national basis.

In the early 1970s, when ESRO started converting into the European Space Agency (ESA), the facility was acquired by Sweden, and since July of 1972 Esrange has been owned and operated by SSC.

From its inauguration in 1966 until 1974 Esrange was only used for the launch of sounding rockets and corresponding ground measurements, but in 1974 the capability of the facility was expanded to also enable the launching of stratospheric balloons, providing an alternate method of performing atmospheric measurements and experiments. Over the years the balloon facilities have been continuously upgraded and can now accommodate the launching of high-altitude balloons larger than 1,000,000 m3, with payloads weighing more than 2000 kg, to altitudes as high as 40 km.

The first satellite ground antenna was established at Esrange in 1978, for reception of polar satellite data. Additional antennas were established in the mid-1980s and early 1990s, also for commanding satellites. The first customer-hosted antenna at Esrange was established in 1991, and since then over 10 antennas for various European and Asian customers have been constructed at the facility. Many more SSC-owned antenna assets have also been established at Esrange over the years. There are currently more than 25 satellite antennas at Esrange, which plays an increasingly important role in numerous satellite projects.

In 2018 the capability of the range was expanded to include developmental testing activities (e.g., horizontal rocket motor tests). These tests were a first step in the development of an orbital launch capability that will become operational at Esrange in 2022/23. Additional information regarding the ongoing development of testing and orbital launch capabilities can be found in Volume VIII (Propulsive Development Testing) and Volume IX (Spaceport), respectively.

2 RANGE LAYOUT

2.1 Base Area

The main Esrange Base Area, shown in Fig. 3 and Fig. 4, is approximately 4 km^2 in size and located about 45 km east of Kiruna in the Vittangi river valley.

Fig. 3 - Esrange main Base Area, with perimeter fence highlighted

Fig. 4 - Aerial view of Esrange Space Center

There are four primary 'zones' inside the main (fenced) Base Area:

2.1.1 Main Building Area

The Main Building Area consists of the Main Building, Hotel Aurora, a Network Management Center and various maintenance and storage facilities.

2.1.1.1 Main Building

The Main Building includes a reception/front-desk, a restaurant, offices for Esrange personnel, conference rooms, various operational facilities, and a recreational lounge.

Fig. 5 - Main Building Area with Main Building in middle, and hotel to the right (partially obscured by trees)

2.1.1.2 Hotel Aurora

Hotel Aurora is the on-base accommodation for range users. It includes hotel rooms, conference rooms, guest kitchens, a laundry facility, a gym and sauna.

Additional information is provided in paragraph 3.3.4 on page 20.

2.1.2 Balloon Launch Area

Fig. 6 - Balloon Launch Area

The Balloon Launch Area is where high-altitude balloon launch operations are performed and includes four associated buildings used for balloon payload preparation and mission control/operations.

Additional information is provided in Volume VI (Stratospheric Balloons).

2.1.3 Sounding Rocket Launch Area

The Sounding Rocket Launch Area is situated approximately 1 km east of the Main Building Area and includes a blockhouse, launch vehicle and payload preparation halls, laboratories and launch pads/rails.

Additional information is provided in Volume VII (Sounding Rockets).

Fig. 7 - Sounding Rocket Launch Area during MASER 14 launch

2.1.4 Satellite Station

The Satellite Station and a GPS reference station are situated on a hilltop called "Radar Hill" inside the Base Area, approximately 1.5 km southwest of the Main Building. Associated antenna sites are scattered around the western part of the Base Area.

Additional information is provided in Volume X (Satellite Telemetry, Tracking & Control).

Fig. 8 - Satellite Station on Radar Hill

2.2 KEOPS

A ground-based scientific observation station, the Kiruna Esrange Optical Platform System (KEOPS), is located outside the main Base Area on a hilltop approximately 3 km southwest of the Main Building.

Additional information is provided in Volume IV (Scientific Ground Instruments).

Fig. 9 - KEOPS site

Fig. 10 - Map of the Esrange Space Center, with KEOPS site circled in blue

2.3 Launch Complex 3

SSC is developing a new launch site approximately 4 km southeast of the Main Building, outside the main Base Area. This launch site is designated Launch Complex 3, or "LC-3" in short. The primary purpose of LC-3 is to provide the infrastructure needed for orbital launches and launch vehicle reusability testing.

Additional information is provided in Volume IX (Spaceport).

Fig. 11 - Map of the Esrange Space Center, with LC-3 circled in red

Fig. 12 - Status of LC-3 site development (as of Sep 2020)

2.4 Restricted Groundspace

The Esrange impact area is a large restricted groundspace in the uninhabited Swedish tundra region. In accordance with Swedish law, only space-related activities, reindeer herding and mobile recreational activities are allowed in this downrange area.

The impact area extends 120 km north from the Esrange Space Center, and is 75 km wide, providing a rhomboid-shaped area of 5,200 km^2 in total. The area is divided into three zones (A, B and C), access to each of which can be 'closed' by SSC in conjunction with launch activities.

Zone A is the primary impact area for the first stage of suborbital launch vehicles, and can also be extended if needed. Zones B and C are used as impact areas for suborbital LV upper stages and/or payloads. The preferred impact point typically chosen for suborbital payloads is situated approximately 60 km north of the sounding rocket launch pads, in Zone B. Zone C is available for use as an impact area during the period of 16 September – 30 April each year.

Although any/all the downrange zones can also be used for LV stage impact(s) during orbital launches, there is no requirement to do so from a trajectory design perspective.

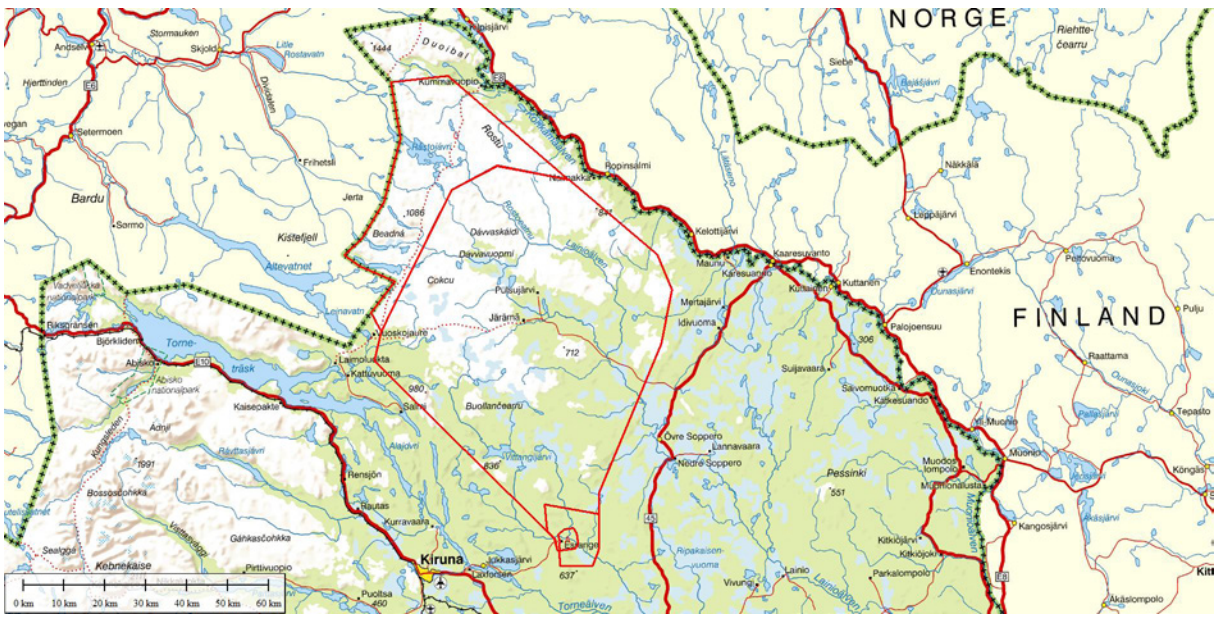


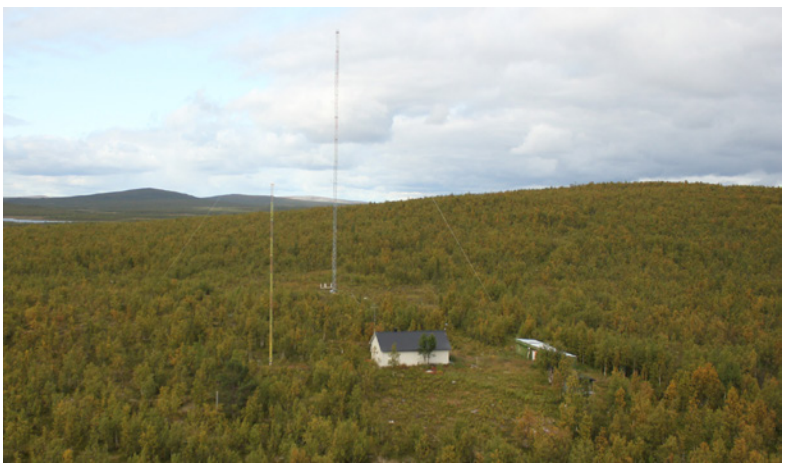
Fig. 13 - Esrange impact area with zones A, A extended, B and C

Within the impact area there are two primary observation sites: Sekkujärvi Station and Rappsåive Station.

2.4.1 Sekkujärvi Station

The Sekkujärvi downrange station is located below the typical apogee location for sounding rockets, approximately 25 km north of the launch area.

There are no roads to the station, so equipment and personnel are normally transported by air. The building can accommodate up to 6 people, and there are also areas for equipment and storage. Electricity is generated on site by diesel generators.



2.4.2 Rappsåive Station

The Rappsåive downrange station is located close to the typical impact location for sounding rocket payloads, approximately 60 km north of the launch area.

2.5 Restricted Airspace ES R01

Above the Esrange ground impact area is a restricted airspace covering 6,100 km^2. The restricted airspace stretches from ground to unlimited altitude (GND/UNL) and is activated whenever needed for rocket, balloon or UAV activities.

The restricted airspace is denominated ES R01 according to Swedish air traffic regulations.

2.5.1 ES R01 A

A part of ES R01 can be used for operations that does not need the full area, e.g. UAS operations, static motor firings. This area covers around 474 km^2 centered over the Esrange Base Area.

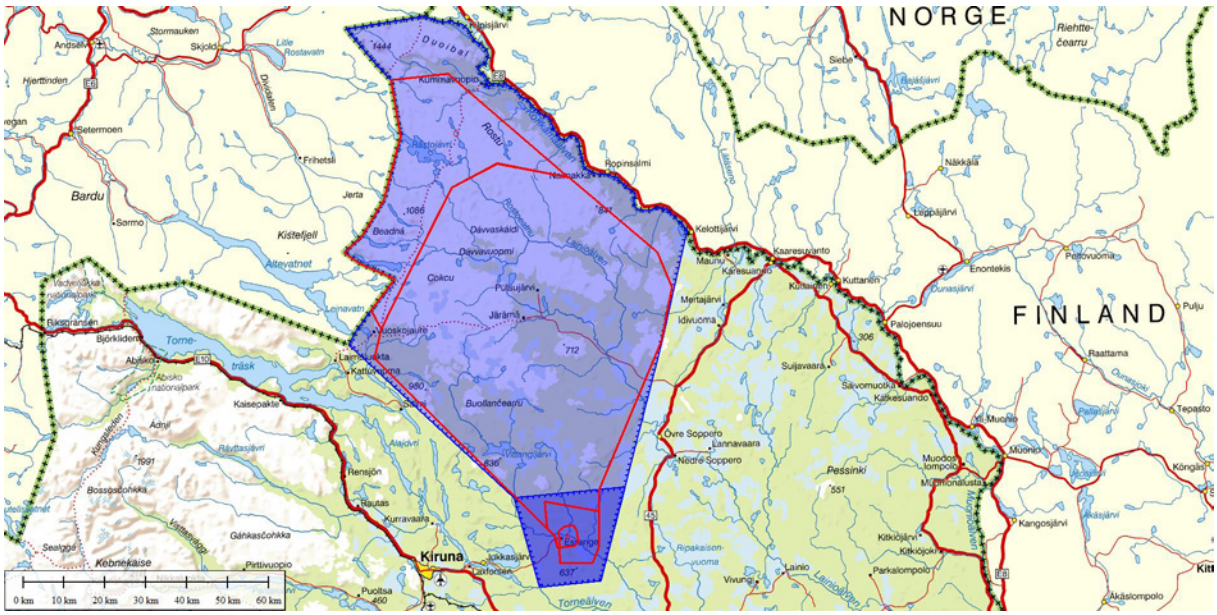


Fig. 14 - Restricted airspace ES R01 (light blue) and ES R01A (dark blue), covering Esrange impact area, with impact zones in red

3 FACILITIES

3.1 Operational Facilities

All of the operational facilities described below are located in the Main Building.

Two Ops. Centers for balloon operations are located at Balloon Launch Area, described in Volume VI (Stratospheric Balloons).

3.1.1 Operations Center

The Operations Center (Ops. Center) is the primary control room for scientific sounding rocket launches, consisting of console positions for the Operations Manager and a Safety Officer, plus one additional position for either customer or SSC personnel. The Ops Center can also be used to support other types of missions (e.g. balloon launches or solid rocket motor static firings) depending on schedule/availability.

Fig. 15 - Operations Center

3.1.2 Safety Operations Center

The Safety Operations Center (SOC) is used by the Flight Safety team and consists of several different console positions.

Tasks performed in the SOC include:

- Simulation and prediction of flight trajectories before launch
- Wind measurements for rocket and balloons launches
- Air Traffic Control (ATC) monitoring
- Display of real-time tracking information for rockets, balloons and other airborne vehicles
- Manual flight termination, of vehicles equipped with a non-autonomous Flight Termination System (FTS)

Additional information regarding Flight Safety activities can be found in Volume II (Safety)

Fig. 16 - Safety Operations Center

3.1.3 Telemetry Station

The Telemetry Station (TM Station) is the main receiving station for telemetry transmitted from sounding rockets and stratospheric balloons. Received data is relayed from the TM Station in real-time to the SOC for Flight Safety purposes, and to the Scientific Center for monitoring by range users. User commands can also be routed through the TM Station to airborne vehicles via Radio Frequency (RF) links.

Additional information regarding the TM Station is provided in Volume III (Launch Range Instrumentation).

Fig. 17 - Telemetry Station

3.1.4 Scientific Center

The Scientific Center is one of the primary mission control rooms for range users. Data to and from airborne vehicles is routed through the TM Station to this room, where range users can install their own equipment to display and control the experiments.

Data from various ground instruments can also be displayed in the Scientific Center, to enable range users to survey the real-time data in support of mission-critical decisions.

Fig. 18 - Scientific Center

3.2 Supporting Facilities

3.2.1 Workshops

3.2.1.1 Esrange

In the Main Building there is a small mechanical workshop serviced by SSC personnel. The workshop includes manual milling and lathing machines, and equipment for sheet metal fabrication and welding.

3.2.1.2 Kiruna

Kiruna is a large mining town, with a significant number of mechanical workshops that can provide support on a commercial basis, if needed.

3.3 Hospitality Facilities

3.3.1 Reception/Front-desk

The Reception/Front-desk is located on the ground floor of the Main Building and is open 08:00-15:45 on weekdays. Reception/Front-desk personnel can assist with all non-invoiced payments (e.g., hotel rooms and restaurant meals) and any non-project related questions.

Please note that Esrange Space Center is a cash-free facility. Accepted methods of payment include VISA, MasterCard and American Express.

Fig. 19 - Reception/Front-desk

3.3.2 Restaurant "Space Inn"

The Esrange restaurant is open during normal weekday working hours and, upon request by individual range users, extended hours are possible during launch campaign operations. In addition to breakfast, lunch and (during launch campaigns or upon special request) dinner, the restaurant offers a range of beverages including beer, wine and spirits.

The restaurant can accommodate up to 80 people, and seating for an additional 20 people can be arranged in the recreational lounge adjacent to the restaurant.

Fig. 20 - Restaurant "Space Inn"

3.3.2.1 Opening hours

Meal	Hours	Notes
Breakfast	07:15 - 09:00	
Lunch	11:00 - 12:00	11:00-13:00 during operational campaigns
Dinner	18:00 - 19:00	Only during operational campaigns

Special requests (e.g., regarding opening hours, specific dishes, allergies and/or dietary restrictions, etc.) are often able to be accommodated.

3.3.3 Recreational Lounge

Additional information to be added in the next revision.

3.3.4 Hotel Aurora

Hotel Aurora is the on-base accommodation for range users and is located in direct proximity to the Main Building. It houses 79 hotel rooms (of which 59 are configured for single occupancy and 20 can accommodate two people), conference rooms, lounge, a laundry facility, a gym, a sauna and showers, and guest kitchens. All rooms are equipped with satellite TV, WiFi, and a bathroom with shower.

Fig. 21 - Main entrance to Hotel Aurora

3.3.4.1 Laundry Facility

Hotel Aurora includes a laundry room with multiple washing machines and tumble driers, a drying cabinet, ironing board, etc.

3.3.4.2 Gym

Hotel Aurora has an indoor gym containing a small variety of machines (e.g., squat rack, rowing machine and exercise bike) dumbbells and barbells.

3.3.4.3 Sauna

Hotel Aurora includes a sauna for up to 12 people, with a small relaxation area and showers. The shower room has a mix of Japanese-style and European-style stations, 6 in total.

3.3.4.4 Fireside Lounge

Inside the main entrance to Hotel Aurora is a lounge area with a fireplace, where guests can relax. There is also an outdoor patio immediately adjacent to the lounge. An area for watching television is located on the second floor, just above the lounge area.

Fig. 22 - Fireside lounge

3.3.5 Guest Kitchens

There are several guest kitchens available for range users:

Location	Quantity	Size
Hotel Aurora	5	10-15 people
Balloon launch area	2	8-12 people
Sounding Rocket launch area	1	8 people
Launch Complex 3	2 (TBC)	TBD

East guest kitchen is well equipped, typically with full-size refrigerators and freezers, ovens (ordinary and microwave), stovetops, toasters, cookware (e.g., pots and pans), tableware (e.g., plates, cutlery and glassware) and various other small hand appliances. Depending on the type of request, temporary provision of additional kitchen appliances can also sometimes be arranged.

Outside one of the guest kitchens on the ground floor of Hotel Aurora there is also a large outdoor patio with barbecue equipment. This outdoor area can be accessed from inside the hotel via the sauna relaxation area.

4 RANGE USER PROCESS

4.1 Project Management

Each range user will be assigned an SSC Project Manager, who will be their single point of contact at SSC and responsible for the planning and coordination of the project from SSC's side. All communication between the range user and SSC regarding the project shall be accomplished via the relevant Project Manager.

The SSC Project Manager will, together with the range user, develop a project requirements list.

4.2 Range Scheduling

Additional information to be added in the next revision.

5 OCCUPATIONAL HEALTH AND SAFETY

All activities performed at the Esrange Space Center are subject to Swedish law, and associated safety and security regulations.

The Work Environment Act (Arbetsmiljölagen) is the basic law which defines the framework for regulations concerning occupational safety and health in Sweden. The Swedish Work Environment Authority (Arbetsmiljöverket) is the administrative agency responsible for matters relating to occupational environments - https://www.av.se/en/.

Regulations based on the Work Environment Act, and other applicable laws addressing occupational safety and health, contain detailed stipulations and requirements for a multitude of different topics, including explosives, flammable materials, toxic materials, electrical facilities, crane and lifting operations, etc.

6 SECURITY

Esrange Space Center is designated as a vital installation by the Swedish government and maintains 24-hour security for all facilities. SSC has physical and information security measures in place which adhere to all applicable regulations.

In advance of campaign operations at Esrange, SSC works with each individual range user on a mission-specific basis to ensure that all necessary security considerations will be met.

6.1 Access

Range users must obtain approval from SSC before accessing ESC.

Access to ESC should be coordinated with the relevant SSC Project Manager.

A Visit Clearance Request (VCR) form shall be filled in for access to Esrange Space Center (ESC). Relevant information to be provided for the VCR will be requested by the SSC Project Manager, who will also finalize the VCR form.

A valid passport or ID (EU/EES citizens) will be required for access to ESC. A copy should be sent together with the relevant information stated above to the SSC Project Manager.

6.2 Security badge

Individuals without a valid security badge will not be allowed access to the Base Area, KEOPS or LC-3.

All range users must pick up their security badges upon arrival to the Esrange guard post / visitor control. The badge is used to both enter and exit the base perimeter, via card readers at the main gate.

IMPORTANT: Even if multiple people are traveling together in the same vehicle, ALL individuals must 'blip' their security badge at the electronic card reader (both when entering and existing the base). This is to know how many persons are at the range in case of an emergency.

Many doors inside the facility are also equipped with card readers, which should always be used when entering buildings or rooms. Again, all individuals entering a building or room must use their own security badge when doing so.

6.3 Security zones

Esrange Space Center is segmented according to a four-tier security zone system, ranging from "Public access" (Zone 1) to "Very limited access" (Zone 4).

Range users will only have access to the security zones that are relevant to their mission.

6.4 Photography and video

Due to Esrange being designated as a vital installation under Swedish law, it is prohibited to photograph, depict, describe or measure it without prior permission.

All range users must therefore request and receive formal approval from ESC Security before taking any pictures or recording any videos at Esrange. Additionally, ESC Security always retains the unilateral right to review all material recorded at Esrange.

The process for a range user to obtain the authorizations required for photography and videography at Esrange is handled by the relevant Project Manager.

7 MEDICAL

7.1 Cardiopulmonary Resuscitation

SSC personnel at Esrange are provided regular CPR training.

7.2 Defibrillators

Defibrillators are located at marked locations throughout the facility, normally one per area (Main Building, Sounding Rocket launch area, Balloon launch area, etc.)

7.3 Esrange Rescue Team

A number of SSC employees, having received applicable recurrent medical and firefighting training, constitutes the Esrange Rescue Team. In case of emergencies during normal working hours, these will assemble and act as emergency first responders, as well as coordinating the rescue intervention with the ambulance, police and fire department in Kiruna.

During certain campaign operations and high-risk operations (e.g. count down of rockets, rocket motor loading or rocket motor arming) a dedicated rescue team will be on standby and designated roles are assigned beforehand to make the intervention more efficient.

7.4 Hospital

The nearest hospital with Emergency Room facilities is located in Kiruna (45 km from Esrange).

7.5 Pharmacy

The nearest pharmacy is located in Kiruna, but some non-prescription medicines can be found at the grocery store in Jukkasjärvi.

Common non-prescription pain relievers (e.g., ibuprofen, acetaminophen, etc.) are also available at the Esrange Reception/ Front-desk.

8 LOGISTICS

SSC's logistics function at Esrange can support range users in matters relating to logistics.

Contact: LogistikEsrange@sscspace.com

Range users need to take careful note of the following:

8.1 Information to SSC

Range users must prior to any delivery to or pick up from Esrange inform SSC about all shipments, as the freight carriers will need permission to enter Esrange Space Center for loading and unloading.

Additionally, range users must prior to any item's arrival at Esrange provide SSC with applicable

- dangerous goods declarations
- export control information, including country of origin and export control classification number from each applicable jurisdiction and legislation (e.g. munitions or dual use in EU, US or third countries)

to allow SSC to properly receive, handle and protect all items. Lacking such information, SSC may for safety and security reasons refuse to accept delivery or pickup of shipments.

8.2 Customs

Range users are responsible for clearing customs for items entering and leaving EU.

If the range user does not have a legal entity in the EU the user can employ a person or business to handle the customs process for them, such as:

- freight forwarder
- customs agents or broker
- courier/fast parcel operator

SSC may provide contact information to a customs agent, if needed.

Scientific instruments and apparatus may under certain conditions be imported to Sweden without having to pay customs duty. Refer to the Swedish Customs[1] for more information.

8.3 Dangerous goods

Range users are responsible for dangerous goods declaration and acquiring required licenses for transportation of dangerous goods, including in Sweden. Refer to the Swedish Civil Contingencies Agency[2] for more information.

8.4 Export Control

Range users are responsible for arranging authorizations

- from the user's national and applicable third country authorities for exporting controlled items to Sweden
- from Swedish authorities for exporting controlled items from Sweden

Please note: Range users not established in the EU will need a partner established in the EU for arranging authorizations for exporting controlled items from Sweden.

The user may consult SSC to assist if needed.

8.5 Shipping

Esrange is open for deliveries and collections Monday – Friday from 09:00 until 14:30 LT. Deliveries and collections outside of these times are possible by prior arrangement.

1 https://www.tullverket.se/eng/business/importinggoodstoswedenfromcountriesoutsidetheeu/scientificinstrumentsandapparatus.4.7df61c5915510cfe9e75e27.html
2 https://www.msb.se/en/

Range users are responsible for arranging transportation of the user's goods to and from Esrange, due to limitations of SSC's liability.

Range users must prior to any delivery to or pick up from Esrange inform SSC if any special equipment is required for loading / unloading in order to allow SSC to prepare such equipment and take appropriate precautions.

8.5.1 Labelling

Shipments with destination Esrange Space Center should be labelled as follows:

[Range User's Company Name]
c/o Swedish Space Corporation
Att: [SSC Campaign Manager / Range User's Representative]
Esrange Space Center
SE-981 91 Jukkasjärvi
SWEDEN

Mail to Esrange Space Center should be labeled as follows:

[Range User's Company Name]
c/o Swedish Space Corporation
Att: [SSC Campaign Manager / Range User's Representative]
Esrange Space Center
PO Box 802
SE-981 28 Kiruna
SWEDEN

8.5.2 Air freight

Air freight can be sent through the Kiruna Airport. Note that Kiruna airport has limitations on weight and volume of arriving/departing cargo.

Distance between Kiruna Airport and Esrange Space Center is approx. 40 km.

Alternative is using Stockholm Arlanda airport and further transportation by road to Esrange.

Please note: The road transport will be approx. 1120 km from Stockholm Arlanda Airport to Esrange Space Center.

IATA Code Kiruna Airport:	KRN
IATA Code Stockholm/Arlanda Airport:	ARN

8.5.3 Sea freight

Piteå port is approx. 420 km from Esrange.

Gothenburg port is approx. 1730 km from Kiruna.

8.5.4 Road freight

The city of Kiruna is accessible via the Swedish highway network, from the south via the E4 and E10 roads leading from the regional city of Luleå.

From Kiruna to Esrange there is a paved road, denominated 875 in the national Swedish system, suitable for commercial transportation carriers.

8.5.4.1 LC-3 access road

The access road from the Esrange Main Base area to the LC-3 launch site is a 5-meter-wide gravel road, suitable for commercial transportation carriers.

9 ADDITIONAL INFORMATION

9.1 Access

9.1.1 How to get to Kiruna

9.1.1.1 By air

There are daily flights from Stockholm Arlanda Airport to Kiruna Airport. At the time of this version, the airlines SAS and Norwegian traffic Kiruna Airport.

9.1.1.2 By train

From Stockholm C there are daily railway connections to Kiruna, e.g. a sleeper train.

9.1.1.3 By road

The easiest road transport would be to use the E4 and E10 roads through Sweden. (Also see 6.8.4.)

9.1.2 How to get to Esrange from Kiruna

Similar to many other launch sites around the world, the distance between Esrange Space Center and the nearest population center results in there being no public transportation options available for traveling to/from the Esrange. It is therefore recommended that visitors plan to travel either by taxi or rental car, both of which are available at the Kiruna airport.

For larger groups, SSC can assist with arranging commercial transportation between the Kiruna airport and Esrange via charter bus.

9.1.2.1 Taxis

There are a number of taxi companies in Kiruna, but the biggest is called Taxi Kiruna AB. Available taxis can normally be found at Kiruna Airport and Kiruna railway station during at arrivals of planes and trains, but it is recommended to order a taxi beforehand. They can be reached at +46 980 120 20.

9.1.2.2 Rental Cars

There are several car rental companies in Kiruna of which the biggest ones are in the table below.

Company	Telephone	Pick-up point
Hertz	+46 980 190 00	Airport / City center / Railway station
AVIS / Budget	+46 980 192 99	Airport / City center / Railway station
Europcar	+46 980 666 00	Airport / City center
Sixt Rent A Car	+46 980 200 70	Airport / City

IMPORTANT: Please be aware that the roads to Esrange can be slippery during winter conditions, and that wild animals (including moose and reindeer) are regularly encountered on the roads during all seasons!

9.1.2.3 Way from Kiruna airport

When traveling to Esrange Space Center from Kiruna Airport:

- Drive 2.4 km and then turn right, onto E10 South
- Drive 5.4 km and then turn left, towards Jukkasjärvi and Paksuniemi
- Drive 6.2 km and then turn left, towards Paksuniemi and Esrange
- Drive 6.3 km and then follow the road as it veers to the left, in Paksuniemi
- Drive 18 km (to where the public road ends at the Esrange guard post / visitor control)
- Note: You will pass an ESA Satellite Station approximately 7 km before arriving at Esrange

9.2 Accommodation

On-base accommodation is available at the Hotel Aurora, as described in 3.3.4 on page 20.

Off-base accommodation is available at various hotels in Kiruna, the IceHotel in Jukkasjärvi (halfway between Kiruna and Esrange), or private rental cottages located in neighboring villages.

9.3 Working hours

The normal workday for ESC personnel is 07:30-16:00 Central European Time (CET) Monday through Friday. Administrative personnel normally only work these hours, while campaign personnel will also work according to campaign hours as described in paragraph 6.4.1.

9.3.1 Campaign working hours

Hours worked by SSC technical personnel during each individual campaign are dependent upon the operations.

Coordination of the work schedule with the Project Manager is necessary to ensure access to required facilities and the availability of necessary SSC personnel.

Please note that, for safety reasons, SSC personnel must adhere to Swedish labor laws regarding both working days and hours.

9.4 Work amenities

9.4.1 Power network

Primary power, 22 kV, to Esrange Space Center is provided by commercial supply network. Power outlets are EU-standard (230/400 V, 50 Hz) in most locations.

In certain locations US-standard outlets (110 V, 60 Hz) are also available. In some cases transformers for converting from EU-standard to US-standard may also be able to be provided. Check with the relevant SSC Project Manager for alternatives.

9.4.1.1 Backup power

Within the Main Base there is a 22-kV redundant power ring with a centralized high-voltage backup generator system consisting of two generators. Each of the two backup generators can fully power all Esrange electrical systems, meaning the backup power supply is 'dual redundant'.

9.4.1.2 Uninterruptable Power Supply

Uninterruptable Power Supplies (UPS) are available for critical/safety-related launch site infrastructure, and SSC critical operational equipment.

Provision of any UPS which may be required by mission-specific hardware is the responsibility of range users.

9.4.2 Guest Internet

Both wireless and wired internet connections are available at Esrange.

9.4.2.1 Wireless

IMPORTANT: Due to safety reasons

- 2.4 GHz transmissions are strictly forbidden at Esrange
- 5 GHz transmissions are also strictly forbidden at the Sounding Rocket launch area and LC-3

5 GHz wireless network connections are available in the Main Building, Hotel Aurora, and at the Balloon launch area.

9.4.2.2 Wired

Wired network connections can be arranged in all locations at the Range. Please contact your Project Manager.

9.4.3 Conference rooms

There are four conference rooms in the Main Building and two in Hotel Aurora, all of which are equipped with video projection and support world-wide video conferencing.

The conference rooms can accommodate varying sized groups, ranging from 12 to 70 people.

9.5 Fire safety

9.5.1 Smoking

All indoors areas at Esrange are non-smoking areas.

Designated smoking areas exist outside the Main Building and Hotel Aurora. It is not permitted to smoke outdoors in close proximity to ventilation ducts and some other specific areas (such as fueling stations, propellant storage areas, etc.). In light of the nature of Range activities, it is extremely important to always check for local signage.

9.5.2 Fire protection

In the event of fire:

- Assist people in need, if possible
- Evacuate
- Call 112 - Emergency number in the event of danger to life, property and environment
- If possible, use manual fire extinguishers and/or hoses on the fire

9.5.2.1 Manual

There are manual fire extinguishers and fire hoses located throughout the different Esrange facilities.

9.5.2.2 Automatic

Automatic fire extinguishing systems with fire suppression gas (e.g., INERGEN) are available in crucial operational rooms.

Whenever a fire alarm sounds, all personnel should immediately vacate rooms with automatic fire extinguishing systems.

9.5.3 Firefighting

Esrange does not currently have an on-base fire brigade. The nearest municipal firefighting resources are located in Kiruna (45 kilometers away).

However, with respect to personnel safety, an Esrange Rescue Team is activated for campaign operations. Additional information is provided in paragraph 6.7.

9.6 Miscellaneous

9.6.1 Groceries and Sundries

There is a small grocery store (Coop) located in the village of Jukkasjärvi, half-way between Kiruna and Esrange. This store is open 09:00 – 20:00 on weekdays and 10:00 – 18:00 on weekends.

There are some larger grocery stores (Stora Coop and ICA Kvantum) in Kiruna, with the nearest located in an outdoor mall area with several shops and some fast food restaurants.

9.6.2 Recreation

A multitude of recreational opportunities are available for range users.

There are two lounge areas, one in the Main Building and one in Hotel Aurora, where equipment exists to play billiards, foosball or darts, watch television, or enjoy a fire-side chat.

For outdoor activities like hiking, fishing, cycling, or cross-country skiing, all necessary equipment can be borrowed from Esrange. During winter, a specially prepared cross-country ski track is available within the Main Base fenced area.

Pending availability and coordination with the relevant project manager, the possibility also exists to use a SSC-owned cottage called "Lippaniva" that is close to the Main Base area, accessible by skis or by walking.

9.6.3 Mosquitoes

Mosquitoes are prevalent in the area throughout the summer and the use of repellents is advisable. From a medical point of view, the arctic mosquitoes are harmless as they do not spread any diseases.

10 SUSTAINABILITY

As a Swedish government-owned company, SSC is required to work continuously towards a more sustainable future. The motivation is: all companies have a responsibility for the environment, ethics, equality and diversity. For government-owned companies it is especially important to be in the forefront within these areas.

SSC's sustainability work is reported to the government annually and describes all associated activities being performed, from waste separation to development of environmental satellites.

Information about SSC's sustainability work can be found in the SSC Code of Conduct, available at http://www.sscspace.com.

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