

Mars Desert Research Station

2018-2019 Handbook

Shannon M. Rupert, Ph.D., Editor

NOTE: This handbook will not be updated until Summer 2019. Updated information and corrections will be collected in a master list throughout the field season. Please contact the editor for a copy of these updates.
(srupert@marsociety.org)

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The Mars Society
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Mars Desert Research Station Mission Management Team

Dr. Robert Zubrin, President of the Mars Society
Dr. Shannon Rupert, Director/Program Manager
Atila Meszaros, Assistant Director (January-March 2019)
Dr. Jonathan Clarke, Science Advisor
Peter Detterline, Director of Observatories/Astronomy Team Coordinator
Scott Davis and NorCal Chapter, Spacesuits
David Murray, GreenHab Manager
Gael Mariani, Lead CAPCOM Trainer/CAPCOM Coordinator
Bernard Dubb, CAPCOM IT Manager/Assistant CAPCOM Trainer
Michael Stoltz, Liaison, Media & Public Relations
James Burk, Webmaster
Susan Holden Martin, MBA, J.D., Steering Committee/Advisor
Kay Radzik, Advisor at Large

Contact List

Dr. Shannon Rupert	srupert@marsociety.org
Dr. Jonathan Clarke	jon.clarke@bigpond.au
Dr. Peter Detterline	pdetterline@gmail.com
Bernard Dubb	bmdCAPCOM@gmail.com
Michael Stoltz	mstoltz@marsociety.org
Scott Davis	mars.sim@gmail.com
James Burk	jburk@marsociety.org
Gael Mariani	gael.redplanet@gmail.com
Atila Meszaros	atilameszaros1@gmail.com
David Murray	

Mission Support and HAB email:	mdrs-mission-support@marsociety.org
CAPCOM Email List:	mdrs-CAPCOM.gp@marsociety.org
Reports email:	mdrs-reports.gp@marsociety.org

WHAT THE MANAGEMENT TEAM WANTS YOU TO KNOW

Top Ten Things to Remember at MDRS

1. Priorities at MDRS are “safety, sim, science, public relations, comfort” in that order. The more fidelity you can give to your sim, the better.
2. Treat (analog) Mars right. Vehicles are to be driven on approved roads only, and are not to be used within the Hab’s NO FLY zone (within 1 km of the Hab). Do not drive off the roads under any circumstances. This is why you

have legs. Remember not to handle or collect vertebrate fossils. Markers of any kind cannot remain on the landscape.

3. Always buddy up. No one can be at the Hab or on EVA alone. If someone is in the GreenHab or ScienceDome, they are required to have a radio and someone in the Hab must be their contact.
4. Do not leave anything at the Hab. If you bring it, you will need to take it with you when you leave. In addition, you must take any chemicals you bring, including chemical waste, with you when you go.
5. Do not touch the power system (solar and generator) for any reason except a safety emergency.
6. Contact Shannon first in any emergency except those involving life threatening injury. In that case, call 911 and be sure to do what is necessary to preserve life first.
7. Treat the Hab as if it were your own home but make no changes to anything without written permission from Mission Support. This includes making no changes to computer hardware or software configurations and attaching anything (even tape) to walls, doors, or anywhere.
8. Respect the people who worked so hard to create this amazing campus and do nothing to damage our facilities and our reputation.
9. Water conservation is important as all water is trucked to MDRS. Use environmentally friendly products as much as possible while at MDRS.
10. You are working as a researcher in a unique Mars analog environment - a test bed for future investigations on Mars. Your activities should advance the goal of putting humans on Mars. Avoid purely entertaining activities. Please treat ALL of the MDRS resources as if you were on Mars. Everything there would be life-supporting and could not be replaced.

Part One: INFORMATION FOR CREW APPLICANTS

2018-2019 Mars Desert Research Station Application Instructions and Information

Please read through this document carefully and follow all instructions.

Failure to follow instructions may result in your application not being considered.

Greetings! Thank you for your interest in participating as a crewmember at the Mars Society's Mars Desert Research Station. We welcome applications from individuals who would like to be placed with a crew of compatible Marsnauts and from self-organized teams who would like to come to MDRS together. If you apply as a team, please read the following guidelines for self-organized crews and meet them as much as possible. In addition, both individuals and teams should review the crew documents on the MDRS website as they will assist in the application process.

Please read through this application carefully as some procedures have changed since last year.

1) All individuals, as well as members and alternates of self-organized teams, must complete this Crew Application by the application deadline. The priority deadline is November 1, 2017 and final deadline for consideration is February 1, 2018. Crew selection will begin shortly after the priority deadline, and any application received after that date will be given consideration on a space available basis only. Some rotations have already been assigned and competition for crew spots will be greater than in the past.

2) External directors may apply on behalf of a team. External directors may be supporting an educational team made up of students from a single department and/or course, organizing a team from a particular country, region or organization, or developing a research project requiring a single crew to complete. If you want to apply as an external director, please contact us for additional guidelines prior to completing your application (email rupert@marssociety.org). Be aware that any crew accepted into the MDRS program as part of any group with an external director will still be required to comply with all of the MDRS programs regulations and protocols. MDRS does not "rent" the campus to other groups.

3) Please use the following information as guidelines for developing a self-organized

crew. Self-organized crews must meet these guidelines in order to be selected for a rotation. If you have any questions or concerns, contact us.

Please note that self-organized crews can consist of between 6-7 people. Six is a fully functioning crew. Please indicate the number of people in your team on your application. **Guidelines for self-organized crews will be strictly enforced. If you do not meet these guidelines you must address why you don't and how you will solve the loss of that component of your crew.**

Guidelines for self-organized crews:

- All must be healthy people, used to outdoor activity such as hiking and camping. They should all be people capable of eating all normal types of food.
- At least three of the six must speak English well. At least one must be fluent.
- All teams from a single university must have a faculty advisor who will assist the team with their research proposals and also be available to the crew and Mission Support during their stay at MDRS. This person must write a letter of commitment to the rotation that must be submitted with the team's application.
- At least two of the crew should be natural scientists or natural science students. This is because the activity of the crew will be field exploration. If a crew does not have anyone who can fill the role of field scientist, along with their application they should submit a plan outlining the plan and purpose of their field activities.
- At least two members of the crew should be people who are very good at fixing mechanical or electrical equipment. This is because in the desert things frequently break down and a crew needs to have some ability to deal with such events.
- At least one of the crew should be a person capable of expressing himself or herself well in writing, and be willing and able to send an account of each day's activity for publication on the Internet.
- One of them must have the maturity and judgment and experience to serve as crew commander. In order to be commander of a self-organized crew, the applicant must meet one of the following criteria:
 - Must have served satisfactorily as crew commander in a prior field season
 - Must have served satisfactorily as a crew member in a prior field season and show previous leadership experience in their field
 - Must have served satisfactorily in a leadership role in a field expedition and/or a remote location
- All crew commanders will be screened and approved by the selection committee prior to assignment.
- One person should have some medical experience, either first aid/CPR or wilderness first responder. Another person will need to have experience or an interest in managing crops in the GreenHab.

- We welcome student and professional artists in all disciplines, including fine art, graphic art, photography, film, journalism, and writing. In order to qualify as Artist-In-Residence, you must demonstrate that you make your living in that field.
- All should be people enthusiastic about space exploration in general, and Mars exploration in particular.
- All of them must be serious, responsible people. No people should be sent who like to do dangerous things for fun, or who are not careful with other people's property, or who are otherwise excessively immature.
- All crewmembers will need to spend two weeks at the station, arriving and leaving together. At least two of them should be able to drive a car.
- You need to choose a crew of people who can get along and work together well. You are **STRONGLY** encouraged to have 2-3 alternate crewmembers. They will need to fill out an application as well. We will no longer approve an alternative crewmember after the selection process. If you find you need a replacement crewmember, it will be at the discretion of the Crew Selection Committee on who is assigned to your crew.
- The crew must all understand that they need to follow orders given to them by Mars Society's Mission Support. We do not direct all the crew's activity. Much of their research program, for example, will be self-generated. But when we tell them they need to do something, or that they must not do something, they need to follow instructions. Crews that do not follow directives from Mission Support will be removed from the station.

Mars Desert Research Station Strategic Goals for the 2018-2019 Field Season

This field season's priority goals are a focus on field testing of engineering and technology designed to assist humans in exploration and life on Mars. Earth field science research is also encouraged, particularly in the area of microbiology and biosignatures. Astronomy research (not observation) is strongly encouraged.

MDRS Crewmember Fees Field Season 2018-2019

Every participant is expected to pay fees no later than six weeks prior to the start of your mission, or on the first day of the field season, whichever comes **LATER**. These fees cover the costs of hosting your crew at MDRS.

The following are the crew fees from Crew 197 and beyond:

Professional fees are \$750 a weeks or \$1500 for a standard two week rotation.

Recent students (will require proof of graduation within one year of rotation) pay \$500 a week or \$1000 for a standard two-week mission.

Students who qualify will pay fees of \$375 per week or \$750 for a standard two-week rotation.

Included in the participation fee you pay to The Mars Society is:

- Transportation by car to and from Grand Junction, Colorado
- All food and beverages provided during your time at MDRS
- Water, heating, electrical power at MDRS (except batteries)
- Use of science and engineering and general equipment, etc., ATVs, rovers, and HabCar per established protocols
- Use of EVA spacesuits

Not included in the participation fee:

- Fuel for the trip from Grand Junction to MDRS and the return trip to Grand Junction. (160 miles one-way)
- Costs of two hotel nights for the overnight stay on Friday night before your rotation and Sunday night after your rotation.
- Cost of any hotel stay in Hanksville except as approved by the Director in an emergency
- Any medical expenses incurred as a result of your participation
- Travel expenses from your home to Grand Junction and back.
- Meals not consumed at MDRS.

In order to qualify as students, applicants must be full-time students in a degree-seeking program at an accredited institution of higher learning. Students must send proof of their educational status to the Mars Society one month prior to your rotation or when requested. Failure to be pro-active about this may result in you being assessed a professional rate. For a crew that all attend the same university, a single letter from the registrar or the department chair will suffice as proof. Other documents we will accept are a current unofficial transcript and a letter from the registrar or a university for a single individual. These documents must be in English.

Recent graduates are also eligible for a reduced fee. In order to qualify, recent graduates must send proof that they have finished school within one year of their rotation at MDRS. It must be clear from the paperwork provided that this requirement has been met. These documents must be in English.

A \$250 deposit will be due from each participant within sixty days of notification of crew selection (\$1500 for a six person crew). This deposit will be refundable after your rotation provided your crews does not damage, destroy or willfully mismanage

MDRS facilities and resources. This also includes the understanding that if they do not leave the station clean and organized for the next crew, each crewmember will be charged a cleaning fee. This deposit will not be refunded should the crewmember not attend their crew's rotation.

Part Two: PRE-MISSION INFORMATION FOR CREWS

Once you are selected for a rotation:

Shipping materials to MDRS prior to your mission. Currently the only way to ship materials to MDRS is via the USPS to:

Shannon Rupert
P.O. Box 82
Hanksville, Utah 84734

Be sure to let Shannon know what you are sending and when you expect it so she can pick it up.

Conducting research at MDRS:

Crews are responsible for their own research while at MDRS. While every research project needs to be declared to the Mars Society, we no longer review and approve research. We will, however, shut down any research that is deemed unprofessional or dangerous. All human factors research needs an IRB or clearance from your institution that it does not require an IRB. That documentation needs to be presented to the Mars Society upon request. Any illegal or unethical research will not be permitted at MDRS and any one found conducting such research will be banned from returning to MDRS or any Mars Society facility.

Crew Travel Logistics:

MDRS Travel Information Field Season 2018-2019

MDRS is located in Hanksville, UT, a small town in the southern Utah desert. All MDRS crews are required to travel to the station via Grand Junction, CO, the nearest town with good commercial air service. Having a common meeting point facilitates the sharing of the CrewCar for transportation between crews. Any crewmember wanting to arrive at the station by other transportation methods must first clear it with the Director.

Once assigned to a crew, contact your crewmates and begin to make your travel plans. Grand Junction Regional Airport (GJT) at Walker Field in Grand Junction, is served by five airlines connecting through hubs in Denver, Salt Lake City, Phoenix, Los Angeles, Dallas and Houston. You must plan to arrive in Grand Junction on or before the Friday preceding your mission. That Friday night, you can stay over at the Days Inn near the airport, where the Mars Society has negotiated a competitive

rate. Sharing rooms with your crewmates will keep your travel costs down. The hotel has free wifi internet, a free shuttle service to and from the airport, and a complimentary breakfast each morning.

Days Inn Grand Junction

1-970-243-4150

1-800-329-1992

You are not required to stay at this hotel and can make arrangements to stay anywhere you like, but this has traditionally been the place crews have stayed.

The CrewCar aka Crew Transport Vehicle is a silver/gold Chevrolet Suburban that is parked at the Day's Inn between crew changeovers. The incoming crew can request the keys from the front desk as early as NOON on Friday of their arrival at Grand Junction. Check the section in the Handbook on care and operating of the CrewCar before you get the keys. Those instructions and restrictions on use of the car are important.

Plan to leave Grand Junction early Saturday morning to arrive at Bull Mountain Market in Hanksville at Noon. This is not a suggested time, it is a mandatory time. Only in an emergency should you be later than Noon. Contact Shannon before you leave to let them know if you will be late. The trip will take you about 2.5 hours without stops if the weather is good.

Once in Hanksville, stop at the Bull Mountain Market. Two crewmembers from the current crew will meet you there in the Hab Car. Load your food into the HabCar and follow them out to MDRS.

Saturday is handover time – Your crew will learn about the Habitat's systems, equipment, and ongoing scientific research projects from the outgoing crew, who should have the place tidy and shipshape for you. They will train you to use the rovers, the EVA suits and the COMMS system that evening. Both crews will remain and sleep in the Hab Saturday evening unless prior approval for early departure or sleeping in town as been given by the Director. The outgoing crew will take the CrewCar back to Grand Junction on Sunday morning.

Sunday morning you will be briefed by the Director on MDRS procedures and protocols, and trained on simulation methodology. Expect that this will take most of the day, and do not plan to go into sim until later that evening at the earliest.

Two weeks later, or at the end of your rotation, the campus will be inspected on Saturday morning (details to follow) before you will welcome the next crew coming out from Grand Junction. You will train and hand over the Hab to them later that day, and depart Sunday morning for Grand Junction in the CrewCar. Back at Grand Junction, you will return the CrewCar keys to the front desk at the Day's Inn, stay

overnight again or depart for home. Be sure to plan your return trip so that you depart no earlier than noon on Sunday.

Changeover Schedule:

The changeover schedule is mandatory and crews must plan their arrival and departure accordingly.

Saturday:

8 am. Arriving crew Picks up CrewCar and prepares for trip to MDRS

10 am. Outgoing crew check out. Everything must be clean as per the check out instructions and all personal belongings must be removed from the Hab. Pack a small bag of what you need for overnight.

Noon. New crew arrives at Bull Mountain Market in Hanksville and is met by members of departing crew. They load food and go to the Hab.

Afternoon. Departing crew trains and debriefs arriving crew using 2x2 method

5 pm. Dinner

7 pm - 9 pm. COMMS Training with departing crew

Sunday:

8 am- 10 am. Departing crew leaves to return the CrewCar to Day's Inn and return home

10 am. Arriving crew Pre-Mission Briefing

Noon. Lunch break

1 pm. Rover training

3 pm. Field briefing

5 pm. Training completed, crew determines if they will go in sim at this time or the following morning

Note on restrictions of use of Crew Car:

Crews are allowed to pick up the keys to the CrewCar on either Friday night or Saturday morning.

However, they are only given a 200 mile allowance from the time they pick up the car until they arrive at MDRS. It is a 160 mile trip from Grand Junction to Hanksville. That allows crews to do last minute errands before or after their time at MDRS. It does not, however, allow for side trips to tourist locations. If a crew wants to be tourists, they should rent a car to do so. The CrewCar is only for official MRDS use.

Once a crew has the keys they must:

1. Record mileage

2. Check gas (tank should be full)
3. Note any damage to the vehicle.
4. Do a safety check and check the oil before leaving Grand Junction.
5. When they arrive at MDRS, they should fill the tank at Hollow Mountain. This is their financial responsibility. Do not put the fuel on the Mars Society account.
6. Meet the outgoing crew at Bull Mountain.
7. Report the above information in that evening's Operations Report.

When a crew leaves MDRS to return to Grand Junction:

1. Record mileage
2. Check gas (tank should be full)
3. Note any damage to the vehicle.
4. Do a safety check.
5. Before turning in the keys to the front desk of the hotel, fill the tank with gas. This fuel is their financial responsibility.
6. Record mileage.
7. Report all of the above to Mission Support so the new crew can add it to their Operations Report.

Failure to do any of the above will result in a \$300.00 fine per crew. Any willful or negligent damage to the vehicle resulting in needed repairs will be the responsibility of the crew who was operating the vehicle at the time of the damage.

Part Three: MISSION SUPPORT/COMMS INFORMATION

Mars Desert Research Station 2018-2019 Field Season Mission Support COMMS procedures:

These procedures are to be followed anytime anyone is in residence at MDRS, whether or not they are in sim.

1. All operational COMMS must go through Mission Support using the Mission Support eList (mdrs-mission-support@marsociety.org). Most Mission Support personnel are on this eList, as well as the current crew, the crew immediately prior to the current crew, and the crew that will be next at MDRS. All COMMS must be text; send no attachments except photos.
2. The COMMS window is from 7:00-9:00 pm MT. Crews must submit the day's reports and photos between 7:00-8:30 pm via email.
3. At the beginning of the COMMS window, the CAPCOM on duty will send a sign on to the Hab that will include addressing any of the crew's concerns sent to Mission Support since the following evening's sign off. CAPCOM duty hours will begin at 2 am MT on the day of duty through 2 am MT of the following day. For example, a CAPCOM working on Monday will be reasonable for all COMMS from 2 am MT early Monday morning until 2 am MT early Tuesday morning.
4. The crew should ACK the sign on as soon as it arrives to let Mission Support know that COMMS are nominal and also to let Mission Support know the status of crew reports. A list of reports to be sent that evening will suffice for this or if the Sol Summary has already been sent, a list is not needed.
5. During the COMMS window, Mission Support personnel will ACK and review the crews' reports. CAPCOM will address any crew and Mission Support concerns. Aside from the Director, only CAPCOM will be in direct communication with the crew. Mission Support people wanting to send a message to the crew should send it to the CAPCOM eList so that whoever is CAPCOM can forward it on.
6. CAPCOM will relay comments/questions/suggestions to the crew on their reports. Crew should rewrite reports according to these edits. One of our goals is to raise the quality of our crew reports. These edits should be completed as soon as possible, preferably before the end of the COMMS window, although that will not always be possible. Any report requiring edits that are not resubmitted by the end of the COMMS window will be posted the following day.
7. CAPCOM will send the sign off promptly at 9:00 pm MT. It will include information on the status of reports, requests for any missing reports and any suggestions on the crew's submitted EVA plan.
8. Both crew and CAPCOM will ACK and respond to any emails sent between the Hab and Mission Support as soon as possible during the COMMS window.

9. The crew's daily responsibilities include submitting all reports, including any special ones (Mission Plan, Summary, etc.) requested by Mission Support. They will also be responsible for submitting six-eight photos representative of their day's work. One of these photos should be selected by the crew as the Photo of the Day. COMMS may be submitted at any time, with the understanding that depending on who is the CAPCOM on duty, COMMS may not be answered until the next COMMS window.
10. Mission Support's daily responsibilities include responding to all COMMS sent by the crew during the COMMS window, receiving, editing and posting the reports and photos on the MDRS website.

During the first few months of the field season, COMM protocols may change as needed, including but not limited to changes in report templates, protocols and reporting requirements. Please be flexible.

Additional information for Mission Support Personnel:

There is a two-hour communications window for us to assist the crew in their mission. This is done asynchronously via email. At 7:00 p.m. Mountain Time you will contact crew at MDRS, gather the day's information, review reports, forward the reports and support the crew as needed. COMMS concludes at 9:00 p.m.

All MDRS (HAB) communication first goes through mdrs-mission-support@marssociety.org

The COMMS window is open from 7:00 p.m. until 9:00 p.m. Mountain Time. Please be aware of your time zone and when time changes between daylight savings and standard time. We ask that the CAPCOM on duty monitor their email for the entire day they are on duty in case there is an emergency at the MDRS.

Be careful when replying to the MDRS crew. Often it is their personal email and if you simply hit respond then you will only email them. In your reply you must make sure to add in the mission support email address: **mdrs-mission-support@marssociety.org**. The crew may send direct individual emails about a project after CAPCOM gives permission. For example, CAPCOM advises crew that astronomy email has been forwarded to Peter Detterline and they can email him.

Add a very brief summary weather report for Hanksville, Utah with your opening CAPCOM email. Three day forecast with the high and low temperatures, wind and precipitation. Do not copy and paste, and no graphics as the MDRS has very limited internet.

We ask the MDRS crews to try and send the reports in early and to try and limit their email between the hours of 6:00 p.m. to 9:00 p.m. so that any emails outside of the CAPCOM window are reserved for emergencies. MDRS crews must send text

emails and the only attachments allowed are journalist photos, mid-rotation video and End of Mission Summary, which is a Word document.

There are three general emails that you will send to the crew during COMMS:

- 7:00 p.m.** Open CAPCOM window: Include crew and date in subject line, weather, which reports have been received, address any questions, and if EVA request submitted review and respond.
- 8:00 p.m.** Mid CAPCOM window: Acknowledge all reports received, respond to EVA request and address any questions. If no EVA request received advise the crew that if it is not received by 8:30 p.m. then the EVA will be denied.
- 9:00 p.m.** Officially close the CAPCOM window and summarizes the day's events. Give a final list of all reports received and if you have forwarded them yet. Advise the Crew of the status of any questions or issues they may have brought up.
- Reports** During COMMS (preferred or you can do it right after), review and forward individually each report to the following email: mdrs-reports.gp@marssociety.org

Please note that if there are ANY questions or concerns then use as many emails as needed to address those matters.

Review Reports

Reports that you receive need to be reviewed for accuracy and possible legal matters. For example in an HSO report they can't state the name or gender of the patient. Pictures can't show legal or MDRS policy violations. Watch for this because they will happen.

If there are any issues with a report, reply back to the Crew and state the issue and ask them to make the change. In some cases, the Director will ask for minor changes to be made by CAPCOM prior to posting, instead of asking the crew to do them.

Posting Reports to Website via Email

Daily Crew Reports from MDRS are now being posted to the MDRS website using a new process which ensures automated posting via email and reduces workload for our volunteer staff. The reports are to be submitted via email in Draft mode, and reviewed by the MDRS Web Team before going live on the website.

If you have any questions on this process for submitting crew reports, please contact the Web Team using the email address mdrs-reports.gp@marssociety.org

Please read through all of these instructions. It's very important they are followed exactly to ensure a smooth workflow for everybody.

1. Open a new email message with the Web Team alias (above) in the TO: line and the following email address in the CC: line of your new email:

zafa277fusi@post.wordpress.com

Do not use this email address for anything else, because it is an automated email address and nobody except for the website itself is on the receiving end. If the emails sent to it are not in the proper format, they will be ignored.

2. The subject of your email should use the standard formatting procedure mentioned in the CAPCOM Guide:

Crew XXX ReportName dd-MMM-yyyy

3. Paste in your entire report to the body of the email. Again, please do not change your fonts as they will not be reflected on the website.
4. This **Step Is Important:** include the following tags in your email. The exact order is below, followed by a description of each tag.

[title Your post title - MONTH DDth/rd]

[status draft]

[category sol-summary]

YOUR REPORT INFORMATION HERE

[end]

Here is a description of each of these tags:

For the [title] tag, here are the available options:

Commander Report

Sol Summary

Operations Report

Crew Photos

EVA Report

Journalist Report

GreenHab Report

Science Report

Astronomy Report

Creative Report

Mission Plan

Mission Summary

And the date format should be "MONTH DDth/rd" - for example: "December 25th"

Include the following tag to ensure that your report is uploaded to the website in **Draft** form and not **Published** form, which would be very bad; if you don't do this correctly or omit this tag, your report will show up on the website without any review, and this fact will be noticed by others (including who did it!!)

[status draft]

Next, include the type of report:

[category ReportName]

where "ReportName" is one of the following:

sol-summary
operations-report
commander-report
crew-photos
eva-report
journalist-report
GreenHab-report
science-report
astronomy-report
creative-report
mission-plan
mission-summary

Complete your email with this tag:

[end]

Make sure this [end] tag is on its own line with a blank line above it. Everything after this tag is ignored (i.e. signatures). Again, please use separate emails to ask other questions, conversations, or for personal comments.

6. Include any images as attachments to your email. Be sure and follow the standard procedures for photos including their approx. sizes and the naming conventions. Naming photos with spaces is OK, as the names of photos can then easily be converted into captions by the Web Team, if that is desired.

Example Report

Here is an example report so you can see the exact format in action:

TO: mdrs-reports.gp@marssociety.org
CC: zafa277fusi@post.wordpress.com
SUBJECT: Crew 500 Commander Report 25Nov2020

[title Commander Report - November 25th]
[status draft]
[category commander-report]

Commander Report
Mars Guy, Commander of Crew 500

Today we landed on Mars! We are the first successful human mission to the Red Planet and everybody back on Earth is celebrating our awesome accomplishment! We are going to make sure our ISRU fuel system is working correctly so we can get home.

[end]

It is preferred that you do this procedure as you receive them, but make sure it is done within an hour of CAPCOM closing.

Crew Instructions for Reports

Have the crew title and subject line each report with: Crew Number, Report Name, and Date. E.g.: Crew 191 Operations Report 21Jan2018

Questions and Concerns from Crew

Any questions to Mission Support, other conversations, and/or personal comments need to be sent in separate emails with subject:
"Mission Support [query] or [greetings] Crew XXX"

Any concern by your MDRS Crew during the CAPCOM window requires a quick response. If you do not have answers then forward the matters to the appropriate department. Primarily this will be the Engineering Team. Ask the crew to send pictures if possible.

Passdown Log

At the end of your CAPCOM shift, prepare a brief Passdown Log containing a few lines summarizing things that still need attention. It will allow the upcoming CAPCOM to know what they need to do, if anything, about things that are happening at MDRS.

Send this to Shannon and tomorrow's CAPCOM.

This is the basic CAPCOM shift although there are some additional duties that may arise as Crews arrive and Depart from the MDRS.

COMMS Daily Example

You may personalize as you wish. But include the basics in your initial opening email:

“Good Evening Crew 101, CAPCOM is now signed on at 06:58 p.m. on 05 Nov 2001. Mars 3 day weather forecast: High of 10° C and a low of -5° C. High chance of snow and wind gusts up to 20 knots. I have received an EVA request, EVA report and the GreenHab report. A reminder to all personnel monitoring these channels; Please direct all communications to the MDRS through mdrs-mission-support@marsociety.org and all requests/comments through CAPCOM via the email: mdrs-CAPCOM.gp@marsociety.org. Thank you! CAPCOM”

Review reports and work with the crew if changes are needed. Once the reports are ready, use the procedure above to post them to the website via email.

Unless there are issues send a second email at 8:00 p.m. letting them know which reports have been received and what reports you lack. It is your job to review any EVA request and approve or deny the request.

“Hello Crew 101. Received all reports except GreenHab report. Understand concern of low water and will report this in my passdown log. In the engineering report you stated the flux capacitor is not generating 1.21 gigawatts and thus your time travel experiment is not working. I have forwarded that email to our engineering team. Will advise once a solution from the engineering team comes in....”

Pay attention to the EVA requests! You must approve them. The general research has already been approved so try to find a way to say yes as long as safety is not compromised.

“Hello Crew 101. EVA approved as requested.” Or “Hello Crew 101! Before approval of your EVA request please clarify. EVA request is 20 kilometers, Did you mean two kilometers? You also have Crewperson 3 listed on both ATV 3 and 4. Can you please clarify before I approve your EVA request?”

There are some extra tasks that take place at the beginning and end of SIM.

Crews usually arrive at the MDRS on Saturday and depart 15 days later on Sunday. Each crew trains with both the outgoing crew and the Director. Each MDRS crew determines when they will start SIM, usually on Monday, and after the previous crew departs, although it may vary.

As CAPCOM we need to make sure the crew takes care of some additional tasks when they show up at MDRS and leave MDRS.

Begin SIM: At the beginning of SIM please verify with each crew member that they are able to receive and send via mdrs-mission-support@marsociety.org

Update the web team (webmaster@marsociety.org) with any crew member's name and email address who needs to be added to Mission Support email list.

Email the crew in one email the following from this CAPCOM guide: general email procedure, general report submission procedure, photo formatting, and basic internet information.

Ensure your crew has turned in their crew biographies, photos, and mission patch (if they have one) to the web team. If they haven't, make sure that is done as soon as possible. Crews have been asked to send these to the web team prior to arrival.

End of rotation: On the last Friday before the crew ends their SIM a Mission Summary Report is to be sent to Dr. Zubrin at zubrin@aol.com and Mission Support.

The Mission Summary Report is a summary report of the mission suitable for general distribution to the Mars Society which is 500 to 1500 words, (with a few photos and graphics if you choose), submitted in MS Word format.

A complete Food Inventory is also required. This is sent to the crew on Thursday night and need to be completed by Friday night COMMS. Please remind the crew this is due by Saturday morning.

Hab must be cleaner than when Crew arrived. Mission Support will send the Checkout Checklist to the crew on Friday night.

General Email Procedure: (send to crew at beginning of new crew rotation)

1. We require email sent as text, not http. Your email client should be configurable to do this as a default.
2. If sending an email regarding a new subject please start a new email. Do not reply to a previous matter or an existing thread.
3. ALL email should be sent to the mission support elist at mdrs-mission-support@marsociety.org.

DO NOT send copies to a bunch of recipients individually.

Write your crew reports using the standard crew report templates, using a text editor or Microsoft Word. Be sure and save a copy on your local computer in case you need it for your own purposes after the mission. Bold and Italics are ok but fonts will be ignored and converted to what is used on the website. Please ensure the line breaks and paragraph breaks are single instances. This is to avoid an excessive amount of whitespace in your report, which looks bad on the website and typically needs to be manually fixed by the Web Team.

Emergencies: If you feel it is an emergency then put **HELP** in the subject line with a brief description. Examples: **HELP: crew broke arm, HELP: power loss, HELP:**

almost out of water, HELP: Fire, etc. Then in the body of the email quickly describe the event, what is being done, what the crew is planning on doing.

General Report Submission Procedure: (send to crew at beginning of new crew rotation)

All reports forwarded to Mission Support

Reports to be text within email with photos as attachments.

General Photo Formatting Procedure: (send to crew at beginning of new crew rotation)

Our standard format for pictures is as follows: 800 x 600 pixels, 300 dpi.

Picture naming format is:

< UTM coordinates (NAD27) of picture location> <date(mmdyyyy)> <picture description>.jpg

Example: a b c.jpg (use space as separator)

No coordinates are required for pictures immediately in and around the HAB

Crew Reporting

Forward all Reports to: mdrs-mission-support@marssociety.org

Title and subject line each report with:

Crew Number, Report Name, and Date. E.g.: Crew999 Operations Report
21Feb2017

Reporting Requirements

Daily posted reports:

1. Sol Summary
2. Journalist Report and/or Commander's Report
3. GreenHab Report
4. Operations Report
5. EVA Report
6. PHOTOS! 6-8 of your best
7. Photo of the day (sent full size)

One time posted reports:

1. Crew biographies, photos and mission patch (should have been submitted prior to rotation)
2. Mission Plan (due first Monday of your rotation)

3. Mission Summary (due final Friday of your rotation)
4. Mid-rotation video (encouraged)
5. Research Report (due at least once, but encouraged as often as every day)

Reports that will not be posted:

1. HSO Report (as needed)
2. EVA Plan (the COMMS prior to an EVA)
3. HSO Pre-Mission Checklist (due first Monday of your rotation)

General Video Procedure:

Here are the instructions to upload videos for the MDRS (Mars Society) youtube site:

1. Sign out of all Google / Gmail accounts.
2. Go to: <https://drive.google.com/a/marsociety.org/#my-drive>
3. Sign in with these credentials:
Username: mdrs.videos@marsociety.org
Password: MDRS.Rocks!
4. Click on MDRS_Videos folder
5. Click on Folder for your crew #
6. Click the Upload button (next to the red "Create" button) and select Files... then select the video file you are uploading.
- Note: Feel free to create new subfolders here if you are uploading a lot of videos.
7. Once your video is uploaded, send an email to **mdrs-reports.gp@marsociety.org**
- Subject: Crew Video Uploaded
- Body: leave empty or feel free to provide some notes on the video

You don't need to provide the link to the video(s), since we know where they are. The Web team will post the videos online within 24-48 hours.

You may be prompted for additional information, sign-in, call back with code, etc. If so, then you will have to coordinate obtaining a Code from Google via someone with a phone, e.g. CAPCOM

RAW VIDEO: We would love to have access to any raw video footage shot during your rotation. Please upload to our dropbox:

<https://www.dropbox.com/request/yEz1u5pMBFaElR9FHWyG>

Part Four: CAMPUS OPERATIONS

A note about caring for MDRS: You would not want to go to Mars with anyone who did not treat the infrastructure and equipment that keeps you alive with the utmost care. You are here because you want to experience what it would be like to be on a mission to Mars. Treat everything at MDRS with as much care as if your life depended on it.

General Operations

Appearance/cosmetic alterations

No permanent modifications can be done to any building, equipment or furnishings without written permission from Mission Support. In addition, no temporary modifications, such as taping things to the walls are allowed.

Water

We get our water at MDRS from the tested well within the Hanksville municipal water system. There is no need to boil it before use. Particulates that may have been introduced during the transfer process are also filtered out of the system right before use by the large filter system next to the loft tank. It is recommended that you use the filter pitcher if you don't like the taste. In addition, it is important that while transferring water from the delivery tanks to the Hab you keep the pump and hoses clean and free from dirt and other materials.

Crews are required to transport their own water from Hanksville, depending on weather conditions. Once the crew arrives at MDRS, one or two members of the new crew will go to town in the HabCar with members of the outgoing crew in order to collect water from the well at Hollow Mountain. The tank used to transport water is 125 gallons, and it is mandatory for crews to fill at minimum the static and GreenHab tanks for a two week mission. Use of the auxiliary tank for additional water is optional. However, crews need to plan for their water use seriously because no additional water will be delivered to a crew except in extraordinary circumstances.

There are five different water different tanks. The Loft tank (upstairs on top of the rooms), the Static Tank (outside on left side of engineering hatch), the Auxiliary Tank (next to the Static Tank), the Transfer Tank in the HabCar and the GreenHab Tank in the Greenhab. There is an additional water tank at the Director's House.

Winter caution: Fill up the loft tank at night so that you will have water just in case the pipes freeze.

To fill the loft tank, there is a switch located to the at the top of the loft ladder (the ladder on your right). Included is the "Potable Water Meter" which is to be used for

the Operations Report. While this number has no unit of measure, it is helpful when Mission Support is looking for changes in water use. The static tank pumps water up to the loft tank. The static tank has 2 very important things, the heater and the pump. Make sure that the heater is always working, otherwise the static tank will freeze and you won't have a very good day. The Auxiliary tank is not connected to the static tank and if it freezes the Crew may have to break the ice to pump water out.

Keep the Hab temp at 70 degrees F to prevent freezing. The pipes should all be wrapped and heated but if the pipes freeze wait until 10 a.m. and generally they will thaw. If it is very cold turn on the loft pump every 2 hours (day and night) and run a little water. Every 2 hours takes a toll on the Crew so take shifts.

Water to Hab: On the lower deck is a blue container (rather large). It contains the pump you need to pump water from the auxiliary to the static tank outside.

Put the pump in the auxiliary tank.

Put the hose in the static tank.

Remember that this is your water supply, so keep that hose off the ground!

Plug in the pump to the power cord, and then unplug it when the static tank is full.

NOTE: The large filter system's filter should be changed when it becomes dark orange or every three months, whichever comes first. Mission Support will have information on when it should be changed. Please ask if you are concerned about your water filter.

Power

Power is supplied to the campus by a 15kW solar array augmented by a 12kW battery bank. A 12 kW diesel generator supplies additional power as needed. Crews are not to touch any part of the power system without explicit permission from the director. Crews who do will be walked off campus.

Simply put, here is how our system works:

Solar panels supply power to the charge controllers.

Charge controllers supply power to batteries.

Batteries power the inverters which then deliver AC power to the Hab.

The default for batteries on the systems is 50%, but we decided to go with 80%.

Once the SOC (state of charge) goes below 80%, the generator autostarts.

NOTE: As of Nov 1, 2018, we still do not have the system programmed for autostart.

Please DO NOT under any circumstances unplug or disconnect in any way the remote access to the powercontrol system. It is that small black box attached to the wall near the south window of the upper deck in the

Hab. Without that, we will not be able to solve our solar control system problems. It will not be an issue for your power consumption or internet.

Propane Tank

The propane tank is against a hill near the Director's residence. You will need to lift the top and the pressure gauge is located on the right. The gauge records % propane remaining in the tank, not psi. It is a 1000 gallon tank. A request for a delivery of propane should be made when the tank reaches 40% or when Shannon's tank is in the red zone, whichever comes first.

Heat/AC

The main source of heat for the Hab is a forced air propane heater located above the shower room and bathroom. Check and change air filters as needed (generally every crew should change this filter during the winter months). There is a circuit breaker for the furnace that is labeled "Furnace". During winter the temperature must be kept at 70 degrees to prevent freezing of pipes.

This heater will occasionally switch to blowing unheated air. We don't know the reason why this happens but incidents are considerably lower when crews set the temperature at 70 degrees AND DO NOT ADJUST IT. The thermostat is upstairs between the middle two staterooms. When operating, it must be turned on "AUTO" and "HEAT". Do not use "COOL" ever as this is a furnace and it does not have AC. Do not use "ON" for the fan either. If cool air continues to blow when the thermostat has not been changed, make sure the filter is clean. If it is, reset the heater by turning it completely off, setting it to 70 degrees F, then turning it back on. One or both of those two things will correct the cool air problem.

There is a second wall mounted ductless propane heater on the lower deck for when temperatures get really low. It is easy to operate and generally safe, as long as crews do not position combustible material near it. The fan in this unit does work, but makes a horrible noise and so we do not use it. This heater is scheduled to be replaced when the IKEA units come in.

There is AC in the Hab, GreenHab and ScienceDome. The Hab and GreenHab both have wall mounted swamp cooler units, which provide cool air by using the evaporation of water across a fan. These units, in high temperatures, will use considerable water. Be sure to check with Mission Support to make sure the water has been turned on to these units before using them. Both have remote controllers, or can be controlled at the unit and operating them is relatively simple. The ScienceDome has a wall mounted AC unit that is to be used by management only. This AC unit was installed for the protection of the batteries, not crew comfort, so please do not touch it at all. If it has been operating during your mission, and appears to have malfunctioned in some way, please notify Mission Support.

Street-legal Vehicles

MDRS has two large SUVs for use off campus. The HabCar is a Ford Expedition that is mainly used to haul water to MDRS, and is also used in rare instances as a PEV (Pressurized Exploration Vehicle) if a crew needs to conduct a long-distance EVA while in sim. The CrewCar (or Crew Transport Vehicle) is a Chevrolet Suburban used to transport crews to and from Grand Junction. The HabCar is in fair condition and has some operational flaws (dashboard flashes on and off and windows don't roll down) but it is well-maintained and safe. The CrewCar is in good condition with only minor issues (the rear driver's side window sometimes acts quirky) and seats 7 people and luggage.

Both vehicles are valuable to our program and need to be treated with respect. On Cow Dung Road or any unpaved road, the maximum speed limit for both vehicles, regardless of conditions, is 15 MPH. You may have to drive even slower, as this road is unpaved and washouts are common. Driving on this road must be cautious and crews must be aware of the road conditions at all times. Any crew found not respecting this speed limit will be grounded from using any of our vehicles, and will need to find their own way back to Grand Junction at the end of their mission (that's how serious we are about this). On paved roads, crews must follow all laws and rules of the road.

Both vehicles are AWD and 4 wheel drive. The HabCar is in AWD all the time, while the CrewCar has both, as well as 2 wheel drive. The CrewCar should be driven in 2 wheel drive unless there is ice, snow or mud on the road. Then it can be driven in AWD. Both should only be driven in 4 wheel drive if the conditions require it. This generally means thick mud or sand. Unless the snow is very deep and on top of ground that isn't frozen, you should not need 4 wheel drive. If you do need 4 wheel drive, please stop the vehicle, put it in N (Neutral) and shift to 4 H. Wait until the gears have settled and then move forward. There will probably never be a need for 4 L, unless the mud is very deep. Use 4L only as a last ditch effort to avoid getting stuck. Again, put the vehicle in N, shift to 4L, wait until the gear settle (this will be very pronounced in 4L) and then move forward. As soon as safely possible, shift back into 4H and/or AWD/2 wheel drive. Using these special gears on roads that are dry will damage them. Again, a reminder here that on any unpaved roads, including Cow Dung Road, the speed limit for both vehicles is 15 mph.

Tunnel System

There are metal mesh (cattle panel) tunnels connecting the Hab, ScienceDome, Solar Observatory and RAM. The tunnels are covered by heavy tarp material, but this may be damaged in high winds, so the crew engineer should monitor it for damage and add additional zip-ties as needed. Use of the tunnels during sim is limited to quickly walking to your destination, because on Mars these structures between habitat spaces will not be residentially safe. Tunnels should not be used if damaged, instead crews should effect repairs. This would be the protocol on Mars.

Cleaning Materials

There are three shop vacuums at MDRS, one on the upper deck, one on the lower deck and one in the ScienceDome. These are to be kept in their respective work areas and cleaned at the end of each rotation. Do NOT throw away the filter. Clean it by banging it on an exterior surface until the dust is removed, then replace it. There are brooms/dustpans in each building. There is a commercial mop and bucket set on the lower deck for use in all areas, and it is important that both be cleaned after each use. Cleaning supplies, in general, are kept on the shelf outside the bathroom or under the kitchen sink. When a crew uses up a cleaning supply, they should request a replacement via Mission Support.

Cleaning Fee: There is a \$200/hour cleaning fee for crews that do not successful check out at the end of their rotation.

Hab Operations

Hot Water Heater

Hot Water is supplied by a DIRECT VENT PROPANE GAS TANKLESS GAS WATER HEATER. This is an on demand system. It is located on the lower deck next to the ductless propane heater and the control knobs must not be adjusted. The left one is for elevation and the right one is for water temperature and they have been set to where they should be. This water heater was new in December 2017 and will be replaced again once the IKEA units are installed, as it is not completely compatible with our water system.

The single biggest secret to using the hot water heater is to make sure when you turn on the hot water, make sure it is full on in order to signal the sensor that you want hot water. You can reduce the water pressure in several seconds if needed. This is the number one reason why crews think the system is broken. Do not attempt any other “repair” of the system until you confirm you have done this correctly. If in doubt, go to the shower and turn the hot on all the way. Wait to see if the water turns hot. It should take no longer than 10 seconds. Dishes must be washed in a wash basin. Fill it completely with soapy water, fill the sink with clean rinse water. Do not wash dishes using a trickle of water.

Bathroom/Shower Room/Toilet Area

The toilet is a porcelain RV model with a foot pedal for flushing. There is a holding tank below the toilet that must be emptied by the crew engineer only when it is completely full. Never empty the holding tank when it is not full as it will clog and smell badly.

Using the toilet is easy. For urine, just go and then gently hold the flush pedal until the bowl clears. For solid packages, you may first want to fill the bowl with a little more water. Hold the pedal down a little bit and the bowl will fill without the flap opening. Once you have the desired amount of water, go and then flush. Remember, you do not have to slam your foot on the pedal, please use gently.

DO NOT PUT TOILET PAPER OR ANY NON-BIOLOGICAL WASTE IN THE TOILET. All toilet paper goes in the tall waste bin in the toilet room. Remember this is burnable waste, so do not put any non-burnables in this bin. Also, do not wait until the bin is stuffed full to change the trash bag. It is easier to burn this waste if the bag is changed when it is loosely full and not compacted.

To clean the toilet: Use toilet bowl cleaner or a general cleaner like Mr. Clean only. DO NOT PUT BLEACH IN THE TOILET. It will destroy the seals.

How to check to see if the toilet is full: Shine a light down into the toilet while holding down the flush pedal. Waste should be higher than the tank and beginning to fill the bowl before emptying.

To empty the toilet (this is only done by the crew engineer): Pull the lower tank handle GENTLY upward. Once the valve is open, allow 1-2 minutes for the tank to empty. When it is mostly empty add some water to flush it out by holding the flush pedal down for about a minute. Then close the lower tank handle by gently pushing it down. Continue adding water once the valve is closed until you have 2-3 gallons in the tank. While you are adding the water, also add 4 oz of the digester and if you want, a deodorant pack. Do not add digester to the tank between emptying and do not add additional deodorant. Under normal use, the toilet will not smell bad. If it does, consult with the Director. It does smell bad when you empty it.

Please keep the toilet room and shower room clean. Showers should be as short as possible and crews should schedule a shower for every few days, not every day. Normal environmentally friendly products can be used.

EVA Room

Suits must be in mission ready condition at all times. This means they should be correctly put away and be charging. Helmets need to be kept in their protective bags at all times.

The following are kept in the EVA room and must be returned to their proper place after use: jumper cables, air compressor, tow ropes, helmet cleaning cloth and cleaner. Please notify Mission Support if any of these things are missing.

Lower Deck

The lower deck has been prepped for remodel and so is currently configured for multiple use. Crews are encouraged to work on the lower deck on projects rather than taking research materials into the living area. The lower deck is scheduled to be remodeled by IKEA, date currently unknown.

Door Locks

There are interior locks on both outer and inner airlock doors. These doors should remain unlocked (all 4 of them) during the day for safety reasons. During high

winds you may want to secure the exterior doors to prevent them from being blown open. If you are uncomfortable sleeping with the doors unlocked, secure one set or the other, but not both. In other words, you should only need to unlock one lock per door in an emergency.

Food and Cooking

List of kitchen appliances available at the Hab: four burner propane stove and oven, large toaster and convection oven, electric kettle, bread maker, slow cooker, microwave, small refrigerator, coffee maker. A few set of dishes to serve two crews at once, and pots and pans for large crews are also available. Food is kept in a mouse proof cabinet and no food should be left out where rodents may help themselves.

Food at MDRS is all shelf-stable and was selected based on research that suggests that this is what will be consumed by crews on a Mars Mission.

It's hard to eat food at MDRS if you can't cook. Shelf stable food products are not easy to use and nothing is pre-made. So talk amongst yourselves about this. Some questions:

1. Who can cook? Who likes to cook? Who hates to cook?
2. Should we eat our meals together each day? I highly recommend this but it takes time. At a minimum, eat dinner together.
3. Who has food allergies? Restrictions? If you are on a low salt diet, this is a problem you must address before you get here and will probably require you bring additional food supplies. You need to let your crew know what you cannot eat so they can work around it. For example if a person has a salt restriction you will not be able to salt community food but each can season to their liking once it is cooked.
4. Who has food dislikes? For example, I can't stand canned meats so I wouldn't eat them. But I can just skip the meat for one meal and eat whatever else is available. It won't kill me and it won't put the rest of the crew out by making them cook an entire meal with me in mind. This is not the same as a food allergy or a food restriction and you must not make your issue a crew issue.
5. Who has a food lifestyle? Are you vegetarian or vegan? Do you prefer to eat only certain foods? Do you avoid fats or sugars? Again this is not the same as a medical food allergy or restriction and it's your issue NOT the crew's. Often it is our instinctive desire to eat as we always have that causes friction over food. It's two weeks. Be prepared to be flexible in your food desires. If you can't, then bring your own food and cook it yourself. Don't put that responsibility on your crew. They don't have to eat the way you do.

It is best to discuss this before you come because when there is a conflict that comes

up here, it generally comes up in anger and is not easily solved. Pre-mission discussions also allow you to plan to bring additional supplies your crew may want to include that aren't on this list.

Remember that there is no alcohol allowed at MDRS. If you have a special occasion, (New Years, Christmas, a religious event) that you feel warrants alcohol. Please contact the Director and request a specific type and amount and give the reason. If you don't, and you are caught with alcohol on the campus, you will be asked to leave immediately. This applies to both an individual and a crew.

An inventory of what is provided for each crew is listed in the Appendix of this handbook. Crews may not get everything on the list, and some items may be substituted dependent on crew needs and availability. Crews will be required to inventory their food reserves on the final Friday of their rotation and submit it to Mission Support that night, so that food for the next crew can be packed and ready when they arrive on Saturday.

Garbage/Trash/Rubbish

Crews need to separate burnable from unburnable trash very carefully. Burnable material will be burned in the burn barrel, located outside the rear airlock behind the old generator wall. When a bag of burnable garbage is ready for burning, crews may contact Mission Support and place it in the rear airlock and Shannon will retrieve it and burn it. Burnable trash must be clearly marked with the letter "B".

Cans must be flattened before being put in the trash. Remove the unopened end and crush. We have an electric can opener so this should not be a problem. Once crews have a full bag of unburnable garbage, they should put it in the rear airlock for transfer to town. Unburnable trash must be clearly marked with the letters "NB" and if leaking they should be double bagged.

Keeping burnable and non-burnable trash separate has been a challenge for crews in the past. No food is to be considered burnable, and it is acceptable to put plastics in with the burnable materials. Each deck of the Hab and all of the other building have both a "Burnable" and "Not burnable" trash container. If a crew does not properly separate their trash, they will be asked to separate it a second time, which is not a pleasant experience, so pay close attention to what you are doing the first time.

Basic Internet Information

Internet is provided by Hughes Satellite. Restrictions only apply for downloads. No restrictions for uploads. There is approximately 1.67 GB of additional 'bonus' data available between 2:00 – 6:00 am.

1. We are extremely bandwidth limited, around 500MB of data per day.
2. The bandwidth we do have is to be used primarily for communications with MDRS. It is not intended for personal communications of any kind nor is it intended

for outreach activities that may result in the high consumption of available bandwidth. Crews are required to make sure they have enough bandwidth each day for COMMS.

3. Internet enabled devices such as smart phones, iPads, special instrumentation, ip cameras, rovers, and the like, are not to be used without prior permission. This means both WiFi and hard wired devices. Devices such as smart phones (an iPad is really just another smart phone) tend to be very chatty on the network, both cell comms and WiFi. We honestly would prefer that equipment as described in this section be turned off and left off until the mission is over unless otherwise approved. If internet service is unreliable or unavailable then turn OFF all cell phone and WiFi devices (laptops, tablets, etc...) for 24 hours. Do not leave in Airplane Mode. Use a single computer only. Report internet status if possible.

4. Technologies that utilize streaming audio or video are specifically prohibited unless otherwise approved. Examples would be:

- a. Skype or perhaps mumble.
- b. Uploading and downloading large files (>100KB)
- c. Do not attach document files (Word, Writer, or the like) to emails.

Email should be in text format, not http.

5. Network bandwidth at MDRS is a consumable resource, just like water or food, and must be managed in a similar way. If you use the daily allowance that's all there is until the next day. Crews can monitor their internet status by going to www.systemcontrolcenter.com. Click on *system status* and it will show you your data usage, allocation remaining and other stats.

6. Obviously, in case of a life emergency or property issue you must do what you have to do to get a message out. Nothing in this message is meant to preclude that. Having said that, stopped up toilets, low water, dead lined ATVs, and the like, are not such emergencies. Use normal com channels and we'll solve the problem together.

7. None of the MDRS network equipment is to be power cycled, reset, or otherwise configured unless given specific direction to do so.

What has been outlined above has been part and parcel of MDRS operations since its inception. We trust that you understand this and will help us manage a valuable resource.

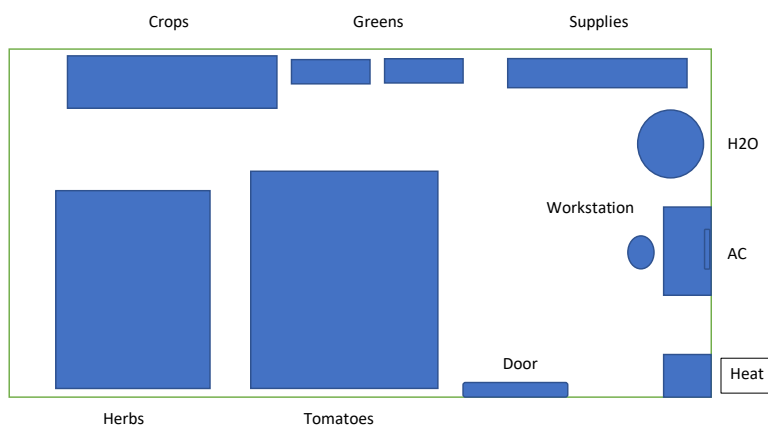
GreenHab Operations

The GreenHab houses crew crops and research plants. It is automatically heated by a propane furnace and manually cooled by a swamp cooler. We are working to automate the two systems together. The swamp cooler operates as a fan for most of the season. In spring, once the temperatures are high, crews can request the water be turned on the swamp cooler for active cooling. There are two large grow lights on a timer system that are used for supplemental light during the winter for the crops. Crews are responsible for keeping all plants watered and healthy, under the direction of the GreenHab Manager.

Water for the GreenHab comes from two sources: 1) a frost-free faucet outside the GreenHab but inside the tunnel, and 2) a tall blue water tank inside the GreenHab. This container is to be filled by the crews between rotations. The easier way to do this is to back the HabCar filled with water up to the GreenHab on the north side of the tunnel and use the extra water hose to reach the tank. Do not use the outside faucet except in an emergency. Water from this faucet comes from the Hab and every time it is used, we lose a liter of water into the soil which then bubbles up in the clay and resembles a leak. Make sure to use the short hose on the blue tank to fill your cans. Never hang a watering can on either faucet.

There is a GreenHab notebook for crews to make notes during their tenure as GreenHab Officer. The most important thing to record is the mass and identification of any harvested material, as that is being tracked for a research project. Only the GreenHab Officer can harvest crops. Once they have been harvested, they must be weighed on the scale in the GreenHab and both what they were and what they weighed must be recorded in the GreenHab notebook as well as in the GreenHab Report. Failure to do so will jeopardize our project so please be aware of the importance of this action and do it consistently.

GreenHab Layout 2018-2019



ScienceDome Operations

The ScienceDome is a basic geology and biology lab and should only be used for scientific research. No engineering, exercise, 3D printing or any other non-lab use is allowed without permission. The building also houses our power control center.

Instruments available for use by crews: autoclave, two lab ovens, a small incubator, dissection scope, two microscopes, mechanical balance, microwave, small refrigerator, laminar flow hood, grow tent, stirring hot plate, and scientific freezer (-80 degrees).

The lab has some general lab supplies, but crew scientists are encouraged to bring their own rather than assume we have something they will need.

No chemicals are provided to crew scientists. Everyone should bring their own, and be aware that any and all remaining chemicals and/or waste needs to be removed and taken off campus when they leave.

RAM Operations

The RAM is a separate building (made from the fuel tank of a Chinook helicopter) that serves as the new engineering bay. Tools and engineering supplies are kept in the RAM, tools to the east and consumables on the west. The RAM is powered by a 30 amp service..

MDRS Observatories Operations

The MDRS Observatories include both the Musk Observatory and the MDRS Robotic Observatory. The Musk Observatory is used for solar observing only. The MDRS Robotic Observatory is for nighttime imaging, and is used by both Crew Astronomers and students. MDRS Crew Astronomers have top priority however. To use either observatory requires online training.

To begin, go to the observatory page on the MDRS website:

<http://mdrs.marssociety.org/mdrs-observatories/> and follow the instructions to go to the online training site. The training site will guide them through the necessary steps to use both observatories. When approved, Observatory Director, Peter Detterline will contact the Crew Astronomer and MDRS Director Shannon Rupert.

MUSK OBSERVATORY

The Astronomy Box is kept in the Musk Observatory. The Astronomy Laptop is kept downstairs on a shelf in the hab. No one enters the Musk Observatory wearing a spacesuit. At the beginning of their mission Crew Astronomers are required to take an image of the Astronomy Box and the Musk Observatory from the doorway with

the cover off the telescope, and send those images to Observatory Director, Peter Detterline.

MDRS ROBOTIC OBSERVATORY

This is fully automated, and no one enters the observatory without consent from the Observatory Director. This may occur from time to time. The MDRS Director and CAPCOM will be apprised of this in advance and of the procedure.

ASTRONOMY REPORT

The following astronomy report is available on Hal and should be submitted only when the observatory is used. The Observatory Director will assign an Astronomy Support person to the Crew Astronomer for the duration of their mission. The Astronomy Support Person will respond to CAPCOM regarding any questions or problems encountered in using the observatories.

Astronomy Report

Name:

Crew:

Date:

MDRS ROBOTIC OBSERVATORY

Robotic Telescope Requested (choose one) MDRS-14 MDRS-WF

Objects Viewed:

Problems Encountered:

MUSK OBSERVATORY

Solar Features Observed:

Problems Encountered:

IMAGE FORMAT

This format is used for the file names when naming astronomy photos:

Object Name_ Date (YYMMDD)_ time_exposure

Example: M42_140222_0130_90s

File size not to exceed that suggested by Mission Support

CONTACT

Any questions please direct to Observatory Director, Peter Detterline:

pdetterline@marssociety.org

Director's House

The Director lives on campus in a fifth wheel trailer where the old Antarctica Pile used to be. The residence is privately owned and is NOT part of the MDRS available to crews. Crews may enter only with permission of the Director. Unauthorized entry is not allowed. In addition, the Director has one rover for her use only. It is parked at her house and it not to be used by crews.

Part Five: EVA PROTOCOLS

General Rules

Pressurization/depressurization in the airlock is generally 5 minutes each way, although crews can choose their own time. Less than 5 minutes is not recommended.

Two mission related EVAs per day is the maximum allowed without special permission. More than one EVA must be mission justifiable. Engineering EVAs are not included in this restriction. On Mars, you would never even do a single EVA each day as EVAs will be planned to collect information that will need to be analyzed before another EVA will be planned. The reward for each EVA (research return) must outweigh the risk, AS IF YOU WERE ON MARS.

Do not schedule any EVA activity until 30 minutes after dawn or later than 30 minutes before sunset for safety reasons.

We do not allow night EVAs. This will not happen on Mars.

Length of time and distance on EVA must be justified by EVA goals. As a general rule, 1/3 of your EVA time should be spent traveling to your research site and 2/3 of your EVA time should be spent doing your research.

Do not use the rovers within a 1-km radius around the HAB. Schedule a walking EVA only.

No double riders on the ATV's regardless of the circumstances. Anyone towing a rover with an ATV must be out of sim for safety reasons and they also need to be very careful not to tip the ATV on top of them by pulling too fast or hard. The HabCar can also be used to tow rovers on Cow Dung Road.

Vehicles must stay on marked MDRS approved roads only. This is federal law.

When turning around on the roads, do not drive off of them in a circle. Instead turn in the road, being careful not to "break the berm" or the raised edges of the road. This may require a three (or more) point turnaround. Park on the side of the road as close to the berm as possible but do not park off the road when going off exploring on foot.

We do not allow EVAs when mud and/or snow are present. It generally only takes a day for things to dry out enough for safe travel, and delayed due to the outdoor conditions will also happen on Mars. If you muddy a vehicle, you will be responsible for cleaning it before you leave.

Please do not attach cameras of any type to a moving vehicle or spacesuit.

An EVA team cannot outnumber the people who remain at the Hab. If an EVA goes horribly wrong, the remaining crew will need to rescue them.

An EVA team cannot split into two groups in the field. You must all remain at the same location, within visual view of each other.

Never take your vehicle's keys with you when you leave the vehicle. If you are not going out of sight, simply leave them in the ignition. If you are traveling where you will not see them for some time, leave the keys somewhere on the vehicle where they cannot be easily found. Suggested places are the front grill or the back tire which does not face the road.

EVA Planning

You will be required to request permission for your EVAs the evening before you execute them. EVAs should be divided into 1/3 time driving, 2/3 time walking and exploring, unless your EVA goals are specifically different enough to support another time schedule. Your goals should determine who is going on the EVA, not some set schedule that you have set up for your mission. Do not waste a scientist's time in the field by having them go on an exploration EVA in any area they are not interested in. You should also not schedule EVAs for the same time period(s) each day, as the light changes throughout the day and will allow for a different perspective of the landscape at different times. Think about what you want to accomplish, how best to accomplish it, and plan accordingly. You need to list the time you will be out on EVA in your request. It is important that you stick to the time you request. If you need to delay an EVA by an hour, you need to let Mission Support know you are delaying it, and you cannot then extend your EVA time by an additional hour. Be sure you are back at the Hab when you say you are going to be back. The Director will go on a rescue mission if you are even 5 minutes late if HabCOM has not heard from you. We do not dictate your daily plan at the station, but once you submit an EVA plan you need to stick to it with no variations. For example, do not decide mid-way through an EVA that you still have time and you are done with what you came to do at the place you said you were going to do it and so you decide amongst yourselves to go check out another site. That is a safety violation. If you were to have an emergency at this other site, and someone went out to help but could not find you, you could put someone's life in jeopardy.

ATV's

The ATVs have been retired as of this season and will no longer be used by crews unless they have permission based on research activities they have done in the past. One ATV(the Honda) will be parked on campus for use as a tow vehicle only.

If you are given permission to use the ATVs (and for the the Honda), the following information is useful:

Ethanol free gas (obtained at Stan's Chevron in Hanksville) is the only gas to be used for the ATVs. There are four 5-gallon red 'Jerry' cans that hold gas for the ATV's. ATVs must be full of gas at the beginning of every EVA.

ATV 4-stroke oil is kept in the RAM. Only this oil must be used in the ATVs. Oil must be checked every other use of an ATV.

ATV Battery information

Manufacturer: YUASA battery, inc. Model : Super Sealed MF Model Number: YTX14AH 12V 12AH

This is a lead battery.

We have 5 ATVs. The red Honda is the only 4x4 model. It is also a manual machine. There is a blue Yamaha 300. This machine has a low and high gear and they must be used correctly. There are three blue Yamaha 350s, which are automatic. It is recommended that beginners use these machines. All of the Yamaha's are 2x4.

Two selected members of each crew will be given instruction on ATV operations, riding and towing. These two should be experienced with riding ATVs.

Rovers

We have 5 Polaris All Electric Rangers at MDRS (one is assigned to the Director and is not for crew use). These have been modified so crews can use them with the spacesuits. They are two seaters and are 4x4. Crews will be given instruction on their use when they arrive at MDRS. These machine must be plugged in at all times when not being used, and they must have a 100% charge before they can be used for an EVA. They handle very poorly and correct use is imperative for safety. At any during an EVA that the charge gets to 60%, crews must immediately return to the campus without stopping. The max range of these vehicles is 50 miles per charge in perfect conditions (70 degrees F, flat terrain, M gear, two wheel drive). Crews will be able to go anywhere allowed at MDRS with them as long as they do not treat them poorly. If you push them to perform at their highest speed at all times, regardless of gear, you will run them down in a manner not safe for their range. Drivers are highly encouraged to focus on the view and not the high speed in order to enjoy the EVA more and safe the rover from misuse. Rovers may be towed with an ATV or the HabCar depending on where the breakdown occurs. Extreme care should be used in towing regardless of the vehicle used.

All rovers used by the crews are packed on the east side of the RAM. Plug/unplug them at the vehicle, not at the power box, which should never be opened by crews. Remember to only use the emergency brake when needed in the field and never on campus.

Spacesuits and Helmet Care

We have 6 spacesuit simulators that are two piece and have a backpack and a helmet. This current generation of spacesuits is more rugged than in the past, and as a consequence they are quite a bit heavier. The backpack straps are very adjustable, and it is important that each crewmember be assigned to a particular backpack throughout their rotation in order that each person is comfortable with their spacesuit. These six two-piece suits are located in the EVA room. These suits are two years old and were refurbished prior to the field season.

There are 5 exploration suits of a one piece design. Four are Gen 2 and one is the original prototype. They also have highly adjustable frames, but each crewmember should try both of the two types to determine which one better suits them for EVA use. These 5 suits are also currently stored in the EVA room. Four of these are only one year old and were refurbished prior to the field season.

Spacesuits should be charging at all times. When not in use, helmets must be stored in their protective bags. It is important that the helmet faceplate is cleaned only with the provided materials: a spray cleaner and a soft cloth. Never use paper towels to clean them. Never apply toothpaste, dish soap, Windex, or any other chemical (including defogging agents) to the faceplate. Nothing is to ever be attached, no matter the method, to the space suit helmets.

These current suits were designed and built by the NorCal Chapter of the Mars Society. The NorCal Chapter continues to support their maintenance and repairs, so any issues will be forwarded to them and they will contact the crew to resolve the issue.

The same care rules apply to all suits. Spray cleaner (Plexis) and soft cloths are the only materials to be used/applied to the faceplate. If you run out of either, please let Mission Support know immediately, so they can be replaced.

MDRS Map

There is an official MDRS map, created by Henrik Hargatai, that is for both science and EVA use. It shows all the roads at MDRS that you can legally travel and it should be used for EVA planning. This map is available as a digital download, please request the URL from Mission Support. A small laminated version should be taken on all EVAs and large laminated copies are in both the Hab and the ScienceDome. This map should be used for all EVA planning.

Short Guide of MDRS Roads

Under no circumstances are any vehicles allowed beyond the edges of these roads.

There is one major road on the MDRS campus area. That is Cow Dung Road, and it is the road that you drove into MDRS on. Cow Dung Road ends at the Burpee Dinosaur Quarry wood fence, which is identified on the map as the "Special Area" at the far north end of the road. This road is one you can generally drive at a higher speed (Gear H in the rovers), but this year the road is so bad that there are parts where you must drive much slower than in the past. There are many exciting places to explore along Cow Dung Road. Basically you are stop at any point along this road, travel in any direction and find something amazing. Exploring off the road by foot at any point along this road is rewarding.

There are four roads branching off Cow Dung Road that can be driven on. These are generally driven in Gear M as they are not maintained at all. They are:

Road 1101. The road to Barainca Butte. This road is not on the map. It is very rough and should only be walked this season, as much of it was washed away in the heavy rains this year. It is a beautiful road that goes past Barainca Butte and into the Labyrinth. From the Labyrinth you can see Highway 24 so don't go that far if you want to avoid seeing cars. To the north of Barainca Butte is an amazing Marslike area that extends north and east to Robert's Face.

Route 1104. The next road to extend off Cow Dung Road is Galileo Road. This road is marked with a route marker on the left side of Cow Dung Road as you approach. The road appears unpromising at first as it covers grasslands, but then you drop into an area of amazing Marslike terrain. Galileo Road becomes Cactus Road (not sure why) and along the way to the Summerville at the end of Cactus Road you pass one of two entrances to Candor Chasma. There is a small dome butte that rises above the valley. Travel to the east along the south side and you will be following Cactus Road. The entrance to Candor is right before you begun traveling the straight road through the grasslands. Or you can continue south on the road until you come to the Stream Bed Connector. Park there and travel on foot on the road on the other side of the stream to find the second entrance to Candor. Or explore to the northwest on the red cliffs. The BLM has closed this road past the Stream Bed Connector to foot travel only, so do not drive any further. In addition, the two roads that branch off the east most part of Cactus Road to the north are no longer roads and all vehicle traffic there is forbidden. These roads are labelled Yellow Zebra and Maxwell on the MDRS map.

Route 1572. From Cow Dung Road at the entrance to Galileo Road, travel north to the next road, named Brahe Highway. Brahe Highway turns towards the west and also has a route marker a few hundred feet before the turn. This road goes up through the Mancos Shale to a view where you can see Skyline Rim and all of the San Rafael Swell. MDRS travel is restricted beyond the turnoff for Copernicus Highway (Route 1575) unless the crew has a specific goal. Then they should request further travel in their EVA Plan. The remaining terrain on this road is not Marslike.

The final road that extended off Cow Dung Road is Gateway to Lith. This road does not have a route marker. Crews are permitted on this road only as far as the north side of Lith Canyon (which can also be accessed via the quarry. The east (right) branch of this road, going to Green Mars) is closed to MDRS crews. Use only the west (left) branch of the road to access Lith Canyon.

Copernicus Highway (Route 1575) branches off Brahe Highway to the north near "The Moons" (not labeled as such on the map). This road takes you through a canyon past the place where the Mancos Shale and Morrison formations meet and down into a Marslike valley west of Lith Canyon. It is currently in very rough shape and crews are advised that unless they have a specific objective, they will probably not be allowed to use this road for the near future.

Route 1103 is a walking route from the Hab to Hab Ridge. Walk from the Hab north along the ridge until you find the road near the North Hills that you can walk to get a spectacular view of the MDRS campus.

Part Six: HEALTH AND SAFETY

The greatest danger you will face at MDRS probably won't be the occasional snake, scorpion or cougar in the field. By far the greatest number of accidents have been ATV/rover accidents, followed by overexposure to the elements and exhaustion, followed by trips, falls and cuts. Notice that all of these are generally the result of human error. ATV/rover accidents are always caused by excessive speed and unsafe traveling distance. Overexposure to the elements and exhaustion are often caused by the person being affected not telling their crewmates that they are too cold, too hot or too tired. Trips, falls and cuts are often caused by a person being too tired, or trying to do something too fast.

SLOW DOWN! GET ENOUGH SLEEP! Even an experienced field scientist will only complete about 50% of the goals they set for the mission. That's just how it goes on Mars. So do not push yourselves beyond what is healthy. Remember that on Mars your mission will be the most successful if it is boring and moving forward at a speed that is maintainable. Yes, you may only have two weeks here, but your primary mission is to simulate conditions as if you were living on Mars, so it won't move at the lightening pace of a Mercury, Gemini or Apollo mission. Think MIR, think ISS, and then slow it down even further. Martians will live everyday just like you and I, but their day to day routine will be different. They will get enough sleep, they will not constantly be going and going until they make mistakes. For the most part, Mars is going to boring. And that is good, because that means everyone is safe.

No names, gender or other identification concerning medical matters should go into published reports. You can send specific information in an emergency situation to Mission Support. So in a report you would write: "We had a crew member (no name) crush their finger during EVA..." but when reporting it to Mission Support or Shannon during an emergency you can write: "Joe cut his hand with a razor blade and we got the bleeding to stop but are going to the hospital in Richfield for further treatment. He takes blood thinners."

In addition to slowing down and getting enough sleep, be sure to drink plenty of water. Many crewmembers come from much lower elevations than MDRS and the effects of the higher elevation (headache, tiredness, shortness of breath) can be ameliorated by keeping yourself hydrated. Drinking enough fluids also limits the "mountain boogers" or nasal discharge and stuffiness you may also experience due to the much drier climate than most are used to experiencing.

For all crew health emergencies: Dial 911. They know where we are and can get someone out here or tell you where you should take them. When you first get to MDRS, find out who on the crew has the best phone reception. That person should be charged with making the call should it be required or everyone should know where that person's phone is to make the call. Sometime during this season, Shannon will have a cell booster and will be able to make calls to anyone.

Some other important information:

The nearest treatment is available at the Wayne County Community Health Center:
128 South 300 West Bicknell Utah 84715
435-425- 3744

911 will be able to tell you if they are open or transfer you to the hospital in Richfield.

In a life threatening emergency, you may be airlifted to St. Mary's Hospital in Grand Junction.

Some other contact numbers:

Wayne County Sherriff (9-5 M-F)
435-836- 1308
Richfield Dispatch (if Sheriff office is closed)
1-800- 356-8757
Wayne County Emergency Services Director Jeri Johnson
435-836-1319 or 435-691-0436

Part Seven: Protocols of SIM

1. Philosophy of the Sim...or how to be a Martian
 - a. EVAs
 - i. Safety first
 - ii. Need a purpose
 - iii. No night EVAs
 - iv. Staying on roads (MDRS roadmap)
 - v. Not the focus of the sim
 - b. Daily routine
 - i. Defined by crew: need to have a meeting early to decide what your crew is going to do
 - ii. What is sim/what is not sim
 1. Think like a Martian
 2. Act like a Martian
 - c. Why we do this thing we do
2. Discuss what you want out of the SIM with your crewmates.

The New Right Stuff

(in collaboration with Loretta Hidalgo Whitesides)

Appendix A. Application materials

MDRS Crew Application for 2018-2019

Please answer the following questions on the first page of your application.

Do not include the questions, only your answers.

Make sure you have answered all seventeen questions.

1. Please write your name. Include the following: Surname/Family name, Given name Title (optional). What would you like to be called by your crewmates (f not your given name)?
2. Please write your postal address complete with postal code and country and denote whether the address is: Home, Work, School, or Other (please specify)
3. Do you have US citizenship, permanent resident status, a US visa that will remain enforce through May 2017, or will you acquire a tourist or other visa in order to visit?
4. Please list your email address (one only).
5. Please give us your telephone number. Please include the country code if the number rings outside the US or Canada
6. Please give us your date of birth as day month year, e.g. 16 July 1984
7. Are you applying as: an individual applicant or as part of a self-organized team? Please list the name of your self-organized team's name, if applicable.
8. Are you applying as a student, a recent graduate, or as a professional? If applying as a student, you will need to show proof of current registration prior to your arrival at MDRS. If you are applying as a recent graduate, you will need to show proof of graduation within one year of your rotation at MDRS.
9. Please enter the dates of the rotations (listed below) that you are available to serve on a MDRS crew.

NOTE: Select as many rotations as you possibly can; the more flexible you can be, the higher your chances of being placed on a team and/or getting your preferred rotation. The Mars Society may not fill all available time slots.

In addition, we also welcome applications for one week, three weeks or four week rotations. Please indicate if you would like an alternation rotation length and the dates you would like us to consider. Priority will be given to those dates wanting a rotation of three weeks or longer.

Potential rotation dates for the 2018-2019 are:

Oct 20 - Nov 4, 2018—Crew 196 (already assigned to Team Space Hummingbirds)
Nov 3 - 18, 2018—Crew 197
Nov 17 - Dec 2, 2018—Crew 198
Dec 1-16, 2018—Crew 199
Dec 15 - 30, 2018—Crew 200
Dec 29, 2018 - Jan 13, 2019—Crew 201
Jan 12 - 27, 2019—Crew 202
Jan 26 - Feb 10, 2019—Crew 203
Feb 9 - 24, 2019—Crew 204
Feb 23 - Mar 10, 2019—Crew 205
Mar 9 - 24, 2019—Crew 206
Mar 23 -Apr 7, 2019—Crew 207
Apr 6 - 21, 2019—Crew 208
Apr 20 - May 5, 2019- Crew 209
May 4-19, 2019—Crew 210

(Please note that all rotations begin with arrival at MDRS on Saturday morning and end with departure on Sunday morning two weeks later. All crews are required to spend one overlapping day with the new crew for handover. No exceptions)

Please add any optional comments or explanations concerning your available dates. For example, if you want a rotation shorter or longer than two weeks, or if you have specific dates you would like us to consider that are not listed.

NOTE: Crew rotation numbers are tentative and may change depending on crew assignment.

10. Please list your ILR level of English language proficiency according to the self-assessment at <http://www.govtilr.org>:

Elementary 1 2 3 4 5 Native/Bilingual

11. Do you have any dietary restrictions or food allergies? If so, please describe. If not, please enter "none".

12. Do you have a driver's license valid in the US?

13. If you have served on a space analog crew or long-term expedition crew in the past, please describe your experience. Specify the facility or location, the duration of your mission, the number of crewmembers serving with you, and your role in the mission.

14. For safety reasons, MDRS crew members must be physically fit enough to perform outdoor work in cold and/or hot conditions wearing heavy mock space suits. They must have sufficient fine motor skill for typical hand writing and typing tasks, and sufficient (corrected) visual and hearing acuity for independent (non-assisted) participation in all aspects of the crew's work and communications. Please choose one of the responses - if you choose the second, and are otherwise qualified to join a crew, we will contact you to answer your questions and discuss your situation. Please write the following statement that applies to you on your application:

- I attest that I am sufficiently able-bodied to do all of these things.
- I am unsure about my fitness level, sight or hearing, and would like to discuss my situation with one of the MDRS management team.

15. MDRS is located at least 45 minutes from the nearest emergency medical service and about 2.5 hours from the nearest full service hospital. If you have a major health condition that could impact your stay at MDRS (e.g. diabetes, asthma, high blood pressure, cancer, cardiovascular disease, blood clots, mental illness, autoimmune disease, major allergies or substance abuse issues), or have a history of any of these health conditions including heart attack or stroke, we will ask you to obtain clearance from your physician before participating at MDRS and to discuss your situation privately with us before accepting you to a crew. Please write the following statement that applies to you on the application:

- I attest that I do not have, and have no history of, any of the above-mentioned health conditions.
- I would like to discuss my situation with one of the MDRS management team.

16. Crews at MDRS live in close physical proximity to each other. If you carry a communicable disease which can be passed from person to person in a normal living environment (e.g. tuberculosis, Hepatitis C) we expect you to discuss your situation with your doctor and disclose it with us. If you select the second option, and are otherwise qualified to join a crew, we will contact you. Please write the following statement which applies to you on your application.

- I attest that I do not carry any communicable diseases.
- I would like to discuss my situation with MDRS management.

(END PAGE ONE QUESTIONS)

On pages two and three of your application, please write a personal statement that addresses each of the following areas:

a) Read over the skill sets for the crew positions in a typical MDRS crew in the instructions that accompany this application and decide which ones are best suited to your skills, experience and interests. Roles include commander, executive officer, health and safety officer, crew engineer, GreenHab officer, crew geologist, crew biologist, crew astronomer, crew scientist, and crew journalist. If you are applying as a professional artist in residence, please indicate this. List the positions for which you are qualified to serve and rank them in order of preference. Please do not apply for a position for which you are not qualified. Fully justify, through your education and experience, why you are applying for the position. If you are applying as a team, please list **only** that role for which you have been assigned in that team, although you still must justify why you were selected for that role. If you are applying as both part of a team and as an individual, please indicate this in your answer to this question. Briefly describe your qualifications/training for each position and your interest in serving in each one. (250-500 words)

Professionals may indicate their preference for a crew role other than those listed above. However, it is the responsibility of the applicant to provide evidence that they are qualified for this role and also that a significant part of their work at MDRS will reflect this role. It is at the discretion of the Crew Selection Committee to grant titles other than those listed above.

b) Describe any special skills or expertise that you have that would make you a particularly valuable member of a MDRS crew. In particular: medical, first-aid, or emergency-response training; construction, home-repair, computer/electronics troubleshooting, cooking, plant care; experience in field research, living in wilderness/remote settings, extreme environments, or aerospace projects; leadership experience especially in settings involving physical danger or ambitious goals. (250-500 words)

c) Tell us why you want to spend two weeks on a crew at MDRS conducting a Mars analog simulation. Describe the interests, ambitions and values that led you here to apply for this position. Discuss how you expect the MDRS experience to change you or help you change the world. Finally, tell us about the personal qualities and experiences that make you a great candidate for a MDRS mission. (250-500 words)

(END OF PAGES TWO-THREE OF THE APPLICATION)

To complete part one of your application, please attach the following as the final page(s) of your application:

a) a simple resumé or curriculum vitae including names and addresses of three references. Please submit as a word doc and do not include a photo. If you are a student, one of your references must be an academic mentor. If you are part of a team with an external Director, he/she must be one of your references.

b) a formal one page summary of all research (scientific and engineering), outreach, education and media activities you will be proposing for your stay at MDRS. Be sure to include names of collaborators and sponsors, as well as your institutional affiliation for this research. If the research involves human factors, please include your plans for IRB approval. If you will require special permission for land use, and/or special use of MDRS facilities, please include this is your research.

c) Any additional paperwork required by your crew per application instructions.

(END FINAL PAGES OF APPLICATION)

Please email your completed application as a word document (no pdf's please) to MDRSapplications@marsociety.org.

You may also attach a team proposal to your application, as long as we also receive a separate completed individual application for all applicants.

On to Mars!

Appendix B. Legal documents for crews



THE MARS SOCIETY: MDRS CREWMEMBER WAIVER, RELEASE and INDEMNITY

I, _____, the undersigned, being at least eighteen years of age, and in consideration for the right to participate in a Mars Desert Research Station crew during the period _____, do hereby agree to this waiver, release and indemnity.

I recognize that the activity specified above is a hazardous activity carrying significant risk of personal injury. I further recognize that there are natural and manmade obstacles; hazardous surfaces and environmental conditions, and other risks which in combination with actions of mine can cause severe or fatal injury. I hereby freely agree to assume all risks which may be associated with or result from participating in the aforementioned activity.

I also specifically hereby acknowledge and confirm my understanding that use of an EVA suit constricts and limits my ability to safely conduct activities that I may undertake while participating in Mars Society activities at MDRS, including but not limited to hiking, riding all-terrain (ATV) vehicles, climbing, sample taking, and other such activities (EVA activities). Such restricted abilities in the remote and hostile Utah desert environment may be dangerous and can lead to serious injury or death. I specifically agree to assume full responsibility for, and hereby acknowledge the risk of, any bodily injury, death or property damage that may arise from riding any type of EVA vehicles anywhere while a participant on a MDRS crew.

I further agree to assume full responsibility for and to hold harmless and indemnify and hereby release The Mars Society, its agencies, departments, officers, Directors, employees, agents, and volunteers, from any and all liability, claims, demands, actions, and causes of actions whatsoever for any loss, claim, damage, injury, illness, or harm of any kind or nature arising out of or in connection with my participation in the aforementioned activity.

I hereby acknowledge and grant The Mars Society, its officers, Directors, members, servants and agents, the right to photograph me and use my picture and any other reproduction of my physical likeness (as the same may appear in any still camera photograph and motion picture) in, and in connection with, exhibition, theatrically, on television or otherwise, or any motion picture(s) in which the same may be used or incorporated, and also in the advertising, exploiting, and/or publicizing of any such motion picture(s), but not limited to television or theatrical motion picture(s). I

hereby
certify and represent that I have received valuable consideration in return for said release, and hereby waive any and all rights to compensation in connection with the utilization of my picture and any other reproduction of my physical likeness with reference to the specified activity.

This release shall be binding upon the spouse, heirs, legal representatives, next of kin, executors, and administrators of the undersigned.

By entering into this Agreement, I am not relying on any oral or written representation or statements, other than what is set forth in this Agreement. I specifically waive any defense insofar as this Agreement is concerned that may arise as a result of any state or local law and/or regulation or policy that may impact its enforceability.

CONSENT

Consent is expressly given, in the event of injury, for any emergency medical aid, anesthesia and/or operation, if in the opinion of the attending physician, such treatment is necessary.

I HAVE CAREFULLY READ AND UNDERSTAND THE CONTENTS OF THE FOREGOING AND I SPECIFICALLY INTEND IT TO COVER ANY PARTICIPATION IN THE ACTIVITY SPECIFIED ABOVE.

Date: _____

Participant

ATTACH SIGNATURE FORM FOR MDRS CODE OF CONDUCT HERE

The Mars Society Mars Desert Research Station Code of Conduct

All people taking part in Mars Society expeditions (the 'Expeditioner' or 'Expeditioners') are required to accept that their participation is conditional on their continued compliance with this Code of Conduct ('The Code'). This Code is valid in all Mars Society undertakings, whether a stay at one of the Mars Analogue Research Stations or on a Mars Society related expedition elsewhere. Also, the Code is considered to rule conduct at any Mars Society meeting/conference or sponsored event.

PURPOSE AND POLICY

The Code establishes standards of personal behavior for those taking part in Mars Society Inc. expeditions, which contribute to morale, teamwork and participation and, ultimately, a successful expedition.

The main focus of life at the Mars Desert Research Station is the collection of scientific data. This will take priority over all other aspects of the expedition and will determine the daily and weekly schedule. Expedition life is challenging, but by following this Code of Conduct and with the right attitude and work ethic, it may be one of the most rewarding experiences of your life.

STANDARDS AND OBLIGATIONS

Each Expeditioner must comply with the general standard of behavior that is recognized as reasonable by the wider community. The Expeditioner is also required to meet the additional and specific standards of behavior outlined in the Code. The Code is not intended to be exhaustive on matters of personal behavior. The Code outlines broad standards that serve as a guide to acceptable and unacceptable behavior.

COVERAGE AND ESSENTIAL INFORMATION

The Expeditioner has been provided with a copy of the Code and should understand that their participation in Mars Society Inc. expeditions and events is conditional on their continued compliance with its provisions. It is the responsibility of the Expeditioner to familiarize themselves with the contents of the Code.

THE CODE

1. WORK

1.1 Expeditioners have been selected largely because of their skills, experience, knowledge and personal qualities. The Expeditioner is expected to be efficient, effective, diligent, responsive, productive and timely in meeting their individual responsibilities. The performance of the Expeditioner should clearly show that they meet these expectations with minimal supervision. It is also

expected that each Expeditioner will work with Mission Support and the MDRS management team to comply with all procedures, protocols, and practices established both at MDRS and operationally.

- 1.2 It is expected that the Expeditioner will:
- work with others in the most effective manner to meet the objectives of the expedition;
 - assist with routine base camp chores to be completed each day;
 - assist with various infra-structural development and/or maintenance projects at the Hab as may become necessary during the expedition;
 - show leadership, consult, coordinate, delegate, negotiate and counsel as appropriate with other individuals, especially those under their control; and
 - comply with and ensure that their team understands and complies with occupational health and safety principles and practices.
- 1.3 In order to distribute the daily workload fairly, the expedition team will share on a rotational basis the following tasks:
- assisting in the preparation of food and ensuring the kitchen and eating area are cleaned after meals;
 - ensuring that the Hab is kept clean and that maintenance tasks are completed daily;
 - preparing science, survey and safety equipment for use during the day's fieldwork, and ensuring that all equipment is cleaned and stowed for the next day's use as appropriate;
 - assisting in the loading and unloading of expedition equipment.

These tasks are essential to the safe operation of the expedition and the Hab. All Expeditioners are asked to complete the tasks to the best of their ability.

2. INDIVIDUAL CONTRIBUTION TO EXPEDITION AND TEAM

2.1 The Expeditioner should manage interpersonal relationships in such a way as to promote and maintain group harmony and well-being.

2.2 Expeditioners are expected to treat others with consideration, courtesy, respect, fairness and tolerance. The general standard expected is one where conduct would not cause dissention or discord amongst Expeditioners, or disrupt programs or other responsibilities. The Expeditioner is expected to respect others' rights, opinions, duties, aspirations and privacy.

2.3 Difficulties may occur between an Expeditioner and other Expeditioners or members of other communities with which the Expedition interacts, and it is the responsibility of all to ensure that such difficulties are resolved quickly and effectively.

2.4 Smoking is prohibited in all vehicles, accommodation, dining places and shared places during the Expedition. In all other circumstances, smokers should consider the rights and comforts of nonsmoking companions. In common with all activities involving the use of fire, smokers should take all due care with respect to the fire hazard.

2.5 Use of alcohol and prescription drugs should not compromise wider responsibilities. Drug and alcohol use, including prescription drugs, have clear implications for occupational health and safety and the maintenance of harmonious relations. Therefore the Expeditioner is expected to refrain from alcohol consumption realizing that they are expected to be capable of performing their duties and other responsibilities at all times in a safe and effective manner.

Expeditioners are reminded of their legal obligations and responsibilities as they relate to the possession and use of prohibited or restricted drugs and the use of alcohol. The use of alcohol during an expedition will be restricted to moments of 'special celebrations' and those are expected to occur rarely.

2.6 The Expeditioner should not behave in a manner that may be classified as 'extreme' nor encourage others to behave in such manner. Examples of extreme behavior include:

- causing threat to personal safety;
- disorderly behavior, including being violent, threatening, insulting or abusive;
- indecent exposure and other gross, obscene or offensive acts;
- willfully or negligently causing loss or damage to property;
- causing annoyance through the use of offensive language, excessive noise or in other ways;
- recklessly driving ATVs or cars, or driving at a too high a speed to be safely followed by all members of the expedition.

3. RESPONSE TO AUTHORITY AND COMPLIANCE WITH THE LAW, LEGISLATIVE REQUIREMENTS, AND EXPEDITION POLICY AND PROCEDURES

3.1 The Expeditioner will comply with lawful directions and reasonable instructions. Lawful directions, instructions and standards of performance are normally issued or determined by the various leaders or persons in charge of any vehicle, field party or work group. Such instructions and standards shall at all times comply with the requirements of the Mars Society's Code of Conduct.

3.2 The Expeditioner will comply with relevant codes of occupational health and safety and ensure that their actions do not threaten their safety, health and welfare or that of others.

3.3 The Expeditioner will be sensitive to harassment issues and will not engage in any harassing behavior. Harassment can take many forms and may consist of offensive, abusive, belittling or threatening behavior directed at another individual or group. It is often based on some real or perceived attribute or difference. Sexual harassment is any unwanted, unsolicited and unreciprocated behavior of a sexual nature that is objectionable to another individual. Any behavior or series of behaviors, despite the intention of the individual performing the behaviors, will be considered as sexually harassing if they are experienced in that way by the recipient and/or other Expeditioners.

The guidelines against harassment apply both to interactions with other Expeditioners and to interactions with members of communities and organizations which the Expedition encounters.

3.4 The Expeditioner will comply with the requirements of all federal, state and local laws, and respect and comply with the requirements of other relevant land holders and operators in the area with whom they may interact.

4. BREACHES OF THE CODE

4.1 Breaches of the Code may result in the Expeditioner being required to leave the Expedition. Transport will be provided to the nearest location with a bus service (currently Green River, UT) and the former Expeditioner will then be responsible for their transport and accommodation requirements thereafter.

The Mars Society may refer to appropriate legal authorities any criminal conduct and/or theft of, conversion of, destruction of, or damage to any property that it believes may appropriately be handled under relevant federal, state or local law.

The Expeditioner has read, retained a copy, and understood the MDRS Code of Conduct and agrees to follow it at all times.

Date: _____

Crew # _____

Signed:

(Sign full legal name)

Name:

(Print full legal name)

TMS:11/26/2015

Appendix C. Report Templates

Crew nnn Sol Summary Report dd-MMM-yyyy

Sol:

Summary Title: (your day in less than ten words)

Author's name:

Mission Status: (How are things going?)

Sol Activity Summary: (What did you learn/do today?)

Look Ahead Plan: (How are you going to follow up? What's the plan for tomorrow?)

Anomalies in work: (Any problems?)

Weather:

Crew Physical Status:

EVA: (where did you go?)

Reports to be file: (List them)

Support Requested:

Crew NNN Operations Report dd-MMM-yyyy

SOL:

Name of person filing report:

Non-nominal systems:

Notes on non-nominal systems:

Generator (hours run):

Solar— SOC % (Before generator is run at night)

Diesel Reading – %

Propane Reading – %

Ethanol Free Gasoline – gallons.

Water (Axillary tank) – gallons

Water (static tank) – gallons

Axillary to Static tank transfer– no or yes

Gallons transferred:

Water in GreenHab – gallons

Water (loft) – Static to Loft Pump used – yes or no

Water Meter:

Toilet tank emptied: no or yes

Deimos rover used:

Hours:

Beginning charge:

Ending charge:

Currently charging:

Sojourner rover used: ASSIGNED TO DIRECTOR

Hours:

Beginning charge:

Ending charge:

Currently charging:

Spirit rover used:

Hours:

Beginning charge:

Ending charge:

Currently charging:

Opportunity rover used:

Hours:

Beginning charge:

Ending charge:

Currently charging:

Curiosity rover used:

Hours:

Beginning charge:

Ending charge:

Currently charging:

Notes on rovers:

ATV's Used: (Honda, 300, 350.1, 350.2, 350.3)

Reason for use:

Oil Added?

ATV Fuel Used: Gals

Hours the ATVs were Used today:

Notes on ATVs:

HabCar used and why, where?

CrewCar used and why, where?

General notes and comments:

Summary of internet:

Summary of suits and radios:

Summary of Hab operations:

Summary of GreenHab operations:

Summary of ScienceDome operations:

Summary of RAMM operations:

Summary of any observatory issues:

Summary of health and safety issues:

Questions, concerns and requests to Mission Support:

Crew NNN EVA Request dd-MMM-yyyy

EVA #: ____

Today's Date:

Requested EVA Date:

Purpose of EVA: (This is important, and you should clearly identify why you are going and doing what you are planning. You would not plan an EVA on Mars without a reason that outweighs the risk.)

Destination: (Name the destination, then add coordinates. If destination does not have a name, explain what it is that you going to see in that area.)

Coordinates (use UTM NAD27 CONUS):

EVA Participants:

Road(s) and routes per MDRS Map: (Be sure to mention exact end of route)

Mode of travel: (walking or driving? Remember if your destination is within one kilometer of MDRS, you need to walk)

Vehicles you will be using (If applicable): (List the specific vehicles you will be taking with you.)

Crew NNN EVA Report dd-MMM-YYYY

EVA #n

Author:

Purpose of EVA:

Start time:

End time:

Narrative:

Destination:

Coordinates (use UTM NAD27 CONUS):

Participants:

Road(s) and routes per MDRS Map

Mode of travel:

Crew NNN GreenHab Report - dd-MMM-yyyy

GreenHab Officer:

Environmental control: (Choose which of the following is appropriate and explain further if needed)

Ambient (no heating or/cooling)

Ambient with door open

Heating

Cooling (swamp or fan only)

Both heating and cooling

Shade cloth (80%) on

Average temperatures:

Low

High

Hours of supplemental light:

Daily water usage for crops:

Water in Blue Tank—gallons

Time(s) of watering for crops:

Changes to crops: Note all emergence of seedlings, death of seedlings, etc (These are also mandatory to write in the GreenHab book for 2018-2019)

Narrative: Any other information you want to share

Harvest: This is our research so it is important that all harvested crops are noted and also weighed and that weight recorded in the GreenHab book and here.

Support/supplies needed:

Crew NNN Astronomy Report dd=MMM-yyyy
Crew Astronomer:

MDRS ROBOTIC OBSERVATORY
Robotic Telescope Requested (choose one) MDRS-14 MDRS-WF
Objects Viewed:

Problems Encountered:

MUSK OBSERVATORY
Solar Features Observed:

Problems Encountered:

HSO Beginning of Mission Checklist

Submitted by:

Date:

Locate, test and confirm operation of the following:

Smoke alarms:

Upper deck

Lower deck

RAM

GreenHab

ScienceDome

CO alarms:

Upper deck

Lower deck

GreenHab

Fire extinguishers:

Upper deck

Kitchen

Lower deck

GreenHab

ScienceDome

RAM

First aid kits:

Lower Deck

EVA room (for EVAs)

ScienceDome

GreenHab

Jumper cables:

EVA Room

HabCar

CrewCar

Medical supplies:

Shelf outside Bathroom

Emergency ladder:

Storage bin on Chair under emergency exit

HabCOMM radios on and working:
Channel 12
Channel 9

Noted safety issues:

Notes health/environmental issues:

Note any missing or recommended health and safety supplies:

Here is a sample science report. It should list all of your project listed in your Mission Plan, and should include a brief description of work accomplished on each one. It can be a daily, twice weekly or once weekly report. Thanks to Doug Campbell for allowing me to use his format for this report, which I think is really great for MDRS.

Science Report 1 May 2018

Crew 193 – PHEnOM Gold Crew

Submitted by XO/Science Officer Doug Campbell

1. Emergency EVAC EVA: Two EVAs took place today; however, no new sites were noted as useful for emergency evacuation shelters.
2. Sunspot and Solar Flare Monitoring: One small, shallow prominence was photographed on the Sun. No other features were apparent.
3. Shortwave Texting on EVA's: Beartooth devices are still not working. Troubleshooting through contact with the manufacturer is occurring.
4. GPS Route Measurements: Both EVAs took the device with them to map their route. Measurements will be used by a PHEnOM colleague to map the routes taken and determine if the easiest routes were used.
5. Waterless dish cleaning: Bacteria growth and monitoring will continue over the remaining days of the mission. The study is starting to show promising results regarding the use of UV and a cloth to clean dishes on mars without the use of water. Using dirt to clean the dishes seems to have some rapid growing bacteria!
6. The MAG (Maximum Absorbency Garment) utilization study: The study has been scrapped. Results will be from blue crew only.
7. Spacesuit Helmet Fogging: Study has been discontinued after 7 days of data collection. No fogging was ever reported. One helmet fogged today on EVA during a brief rainfall. Once rain stopped, it returned to un-fogged almost immediately.
8. Crew Comfort, Health and Safety on EVA: Measurements of the crew's weight, blood pressure, SpO2 and pulse were taken before and after the EVA. Maximum heart rate was tracked by a mobile monitor during the EVA when the astronaut felt that they were working hard (normally climbing a large hill. Analysis will be done as the mission continues.

Appendix D. Food Inventory

Type	Item	Amount	Unit
Baking	All Purpose Flour	1	Bag
Baking	Baking Powder	1	Can
Baking	Baking Soda	1	Box
Baking	Bisquick Heartsmart Baking Mix	1	Box
Baking	Cane Sugar	1	Bag
Baking	Chocolate chips	1	Bag
Baking	Gold Corn Meal	1	Box
Baking	Red Lobster cheddar bay cheese biscuit mix	1	Box
Baking	Self-Rising Flour	1	Bag
Baking	Whole Wheat Flour	1	Bag
Baking	Yeast	1	Jar
Beans	Kidney beans	1	Bag
Beans	Lentils	1	Bag
Beans	Pinto beans	1	Bag
Cereal	Cherrios	1	Box
Cereal	Frosted Flakes or Crisp Rice	1	Box
Cereal	Granola	1	Box
Cereal	Oatmeal	1	Box
Cereal	Raisin Bran	1	Box
Cheese	Ceddar, colby or jack	1	Can
Cheese	Kraft Grated Parmesan Cheese 8oz	1	Jar
Cheese	Mozzarella	1	Can
Cheese	Velveeta Cheese	1	Box
Cook	Pancake Mix	1	Bag
Cook	Bear Creek Soup variety	5	Bags
Cook	Brown sugar	1	Bag
Cook	Coconut milk	2	Cans
Cook	Honey	1	Bottle
Cook	Maple Syrup	1	Bottle
Cook	Mushroom soup, large	1	Can
Cook	Preserves/Jam	1	Jar
Cook	Salsa	1	Jar
Drink	Black Tea	1	Box
Drink	Coffee	1	Can
Drink	Gatorade	1	Jar
Drink	Green Tea	1	Box

Drink	Hot Cocoa	1	Can
Drink	Iced Tea	1	Cans
Drink	Lemonade, Pink Lemonade or Fruit Punch	1	Can
Drink	Nesquik Chocolate mix	1	Jar
Drink	Tang	1	Cans
Dry	Baby wipes	2	Box
Dry	Bleach	1	Bottle
Dry	Dishsoap	1	Bottle
Dry	Garbage bags	1	Box
Dry	Hand sanitizer	2	Jar
Dry	Lysol spray	1	Can
Dry	Napkins	1	package
Dry	Paper towels	6	Each
Dry	Sponge	1	Each
Dry	Spray cleaner	2	Bottle
Dry	Toilet cleaner	1	Bottle
Dry	Toilet paper	18	Each
Dry	Water filter	1	Each
Fats	Olive oil	1	Bottle
Fats	Shelf Stable Butter	1	Can
Fats	Vegetable oil	1	Bottle
Freeze	Apples	1	Can
Freeze	Bananas	1	Can
Freeze	Blueberries	1	Can
Freeze	Broccoli	1	Can
Freeze	Chicken	1	Can
Freeze	Corn	1	Can
Freeze	Eggs	1	Can
Freeze	Onion	1	Can
Freeze	Peas	1	Can
Freeze	Strawberries, raspberries or pineapple or other fruit	1	Can
Freeze	Tomato powder	1	Can
Freeze	Beef crumbles	1	Can
Meat	Ham, canned	1	Can
Meat	Pink Salmon 14oz can	2	Can
Meat	Sausage crumbles	1	Can
Meat	Spam Lite	1	Can
Meat	Spam Turkey	1	Can
Meat	Tuna	6	Cans
Milk	Dry powdered milk	15	Bags
Season	Gravy mixes: turkey, brown, country	3	Each
Season	Hot sauce	1	Bottle

Season	Pesto Sauce mix	1	Each
Season	Taco Seasoning	1	Each
Snack	Almonds	1	Bag
Snack	Chocolate bars	1	Bag
Snack	Cookies	1	Box
Snack	Crackers, saltine	1	Box
Snack	Graham Crackers	1	Box
Snack	Granola bars	1	Box
Snack	Nutella	1	Jar
Snack	Peanut Butter	1	Jar
Snack	Peanuts dry roasted 1-2lb	1	Jar
Snack	Raisins	1	box
Snack	Walnut Halves	1	bag
Starch	Brown rice	1	bag
Starch	Couscous, varied	2	box
Starch	Instant mashed potatoes	1	box
Starch	Pasta, varied	3	bag
Starch	Potato slices	1	can
Starch	Quinoa	2	bag
Starch	White rice	1	bag
Starch	Zatarans' Jambalaya Mix	1	Box

Appendix E. Check out Checklist

Crew:

Date and Time:

Crew

MS

Notes

SCIENCEDOME

Everything in order

Everything clean

Benches washed

Floor vacuumed and mopped

Vacuum emptied

Greywater emptied

All personal items removed

If applicable: samples autoclaved

Trash emptied

Equipment clean and operational

No damage

GREENHAB

Everything in order

Everything clean

Floor swept

Plants in good condition

All dead plants removed

All personal items removed

Equipment used clean and operational

GreenHab Lab Notebook up to date

No damage

EVA ROOM

Everything in order

All suits charging

Backpacks undamaged

Helmets clean and undamaged

Compressor, jumper cables and tow ropes in place

Floor vacuumed and mopped

FRONT AIRLOCK

Swept and mopped
Front porch mud free

LOWER DECK GENERAL AREA

Everything in order
Everything clean
Floor vacuumed and mopped
Vacuum emptied
Mop clean and stowed
Trash removed and new bags installed
All personal items removed
Stairs clean
Water pump in bin and clean
Radios and earbuds clean and organized

TOILET ROOM

Toilet clean
Toilet tank emptied
Floor mopped
Trash removed

SHOWER ROOM

All personal items removed
Shower clean
Sink clean
Floor mopped

REAR AIRLOCK

Floor swept
Floor mopped
Cement pad free from mud
Tunnel cleared of debris and secure
If applicable: Solar Observatory cleaned and locked

UPPER DECK

Nothing stored in loft
Stove cleaned
oven cleaned
Refrigerator cleared of food and clean
All dishes washed and put away
All appliances clean and stowed
All appliances operational

Remaining food organized
Food inventory sent to Mission Support
Table clean and correct number of chairs
Floors vacuumed and mopped
Staterooms clean
Mattresses sprayed with Lysol and wiped
Trash removed and new bag installed
All personal items removed
Counter clean
No damage
HabCOM radios in place and operational

OUTSIDE

ATVs checked for damage/dirt
Rovers checked for damage/dirt
All rovers charging
If applicable: HabCar checked
MOOP removed from campus
All burnable trash burned
All vehicles in their proper places

RAM

Everything in order
Everything clean
No mud
Swept
Trash removed

Damages: List any damages (If applicable):

Cleaning fee:

Estimate

Actual

Appendix F. Pack list

MDRS 2018-2019 Field Season Personal Equipment List

Please read this carefully and make sure you have what you need before you arrive at MDRS.

These lists are suggested equipment for each MDRS crewmember. They do not cover all details of what you should consider bringing for your rotation. Pay particular attention to the time of year of your mission and plan accordingly.

Environment

The MDRS is located in the high desert plateau country near Hanksville, Utah. Weather can range from pleasant to very hot or cold, depending on the season. In winter and early spring, temperatures may drop well below freezing (20°F or approx. -5°C, especially early in the morning) and rise to very pleasant levels (60°F/15°C on some afternoons). The air is usually very dry, but it may snow, sleet or rain. Winds can peak to 50 kts and wind chill is an important factor to consider. The area can be muddy during the rainy season (October through March). Late spring and summer are usually quite hot and dry (100°F/ 37°C daily highs), and afternoon thunderstorms are common in the highlands. Flash floods are a potential hazard. If you plan to do field work, familiarize yourself with basic desert safety.

A few bits of MDRS jargon:

- ATV = "All-Terrain Vehicle", i.e., 4-wheeled motorbikes, retired from sim in 2018
- Rover = Polaris two person electric vehicle
- EVA = Extra-Vehicular Activity (field work done in simulation)

IMPORTANT NOTE: NOTHING you bring can stay at the HAB!!

Unless with very explicit permission of the Director!

NO EXCEPTIONS! This includes supplies you bring for your research.

Batteries

All crewmembers should bring the batteries (rechargeable or not) they will need. NOTE: please remove dead or near-dead batteries from the MDRS after use. Be sure to dispose of the batteries in an environmentally sound way and in accordance with applicable laws.

Toiletries/Personal Care Products

In the past, crews were allowed to use only a particular brand of biodegradable

soap due to limitations of the wastewater treatment system. Current crews are allowed to use their own toothpaste and biodegradable shampoo, conditioner and body soaps (liquid soaps recommended, keeping in mind that we have a septic system and are not on a sewer line). Each crewmember will have a small cubby in the shower room for storage of toiletries.

What to Pack

In the list of items below:

"Required" designates equipment/gear that each field team member **MUST** bring along. In some cases, a spare is required. You should definitely have **ALL** of this equipment in order to be properly prepared for your rotation at the MDRS.

"Recommended" designates equipment/gear that each field team member is strongly advised to bring along. These are items that are not required but are likely to make your life A LOT more pleasant.

"Optional" designates additional suggested equipment/gear. This is equipment that you should bring along if you think you will enjoy having it.

Personal Clothing and Gear

What to Bring	How Much	Need	Notes
Clothing	For 15 days with re-wearing	Required	Bring at least one change of warm clothing (heavy sweater, fleece, long pants, long/thermal underwear) as the Utah high desert can be cool at night. The station has colder and warmer sections; for maximum comfort, dress in layers.
Underclothes	8-15	Optional	There are no laundry facilities at MDRS but space is also limited so consider wearing undergarments for more than 1 day. You can handwash in a bucket as well.
Socks	8-15 pairs	Required	Bring 15 if you want to wear a clean pair of socks daily. It gets dirty out here quickly.
Bath towel, Hand towel, Washcloth	2+	Required	You'll get a 2 minute Navy shower every 3-4 days. Practice at home especially for hair washing. A washcloth is helpful for low-water-use bathing. Consider a shower cap if your hair is long. The hand towel will be used for drying your hands as you wash them throughout the day.
Baseball cap or brimmed hat	1	Optional	Great for keeping your head out of the sun when outside and not "in sim". Not for wearing on EVA.
EVA Gear	see right	Required	<u>Hiking boots</u> – (Black or brown only) sturdy and already broken in. You must wear your personal boots on EVA. Be aware that they will get extremely muddy and/or dusty. Please note that these need to be BOOTS, not shoes. You will not be allowed on EVA if you do not have proper boots. <u>Black gloves (No other color)</u> – 2+ pairs. Inexpensive work gloves are good for cool to warm weather. Use heavy winter gloves in wintertime. Expect gloves to get very dusty and muddy. <u>Long underwear</u> – or long sleeve t-shirt or turtleneck, plus full length leggings or yoga pants. Worn inside EVA suit to keep the suit clean and to protect you from chafing by the rough suit fabric.

			<u>Flight Suit</u> - Your crew needs to supply the flight suits you will use while on EVA. Coordinate with your crew to purchase these in the same color for your mission. You are encouraged to personalize your flight suits with mission patches and nametags.
EVA Gear	See right	Required	<u>Stocking Cap</u> –or “do-rag” or bandana in black or dark blue, essential to control your hair and secure sunglasses & radio mic on EVAs
Windbreaker or winter jacket	1	Required	Bring a light jacket for night-time activity in the high desert in the warm season. If your mission occurs during the cold season, a winter jacket is essential.
Slippers or indoor sandals	1 pair	Required	To reduce dust, outdoor footwear is not worn in the living space (upper floor of Hab), but going barefoot is not recommended. Also, the stairs are very hard on bare/stocking feet.
Bathrobe and/or Pajamas	1 +	Recommended	It’s a long way to the bathroom: through a cold, dark lower deck at night, and through a throng of fellow crewmembers in the morning.

Personal Items

What to Bring	How Much	Need	Notes
Duffel Bag (preferred) or big suitcase (NOT recommended)	1	Required	There is limited storage space in the Hab for personal gear. All of your personal belongings must be stored in your stateroom, except your toiletries (in washroom cubby) and hiking boots (in EVA room) Staterooms average 4’ wide x 11’ long.
Laundry bag	1	Optional	There are no laundry facilities.
Ziploc bags and facial tissue	1-2 boxes each	Recommended	Great for collecting and protecting samples as well as protecting personal gear (i.e. cameras) from dust in the field. Consider slide lock zipper bags as gloves impair manual dexterity on EVA.
Sleeping bag	1	Required	A winter bag is not recommended as the upper deck must stay warm even during the night to prevent water lines from freezing. Stateroom bunks contain NO bedding. Bag should be warm enough to survive potential loss of power in the Hab for several hours.
Sheet	1	Required	Mattresses are provided in all staterooms. You are required to cover the mattress with a sheet before placing your sleeping bag on top. No exceptions to this. The mattresses are vinyl covered. If you sleep warm, you may want to consider two sheets and a blanket for sleeping, instead of a sleeping bag
Pillow	1	Optional	Pillows are provided; bring one only if you need a special one for a good night’s sleep.
Flashlight or head-lamp	1	Required	Useful at night, for repairing stuff, on EVAs as an emergency tool... Bring spare batteries too.
Personal water bottle	1	Required	Helps you remember to stay hydrated in the dry desert climate
Hand or body lotion, lip care (e.g. chapstick, blistex)		Recommended	The high desert is an extremely dry environment. You will be more comfortable and thus more productive if your face and hands are protected by a lotion, and your lips by a lip balm.

Hydrating eye/nose drops	1	Recommended	The high desert is both dry and dusty. Required if you are prone to nosebleeds or eye irritation, or if you wear contact lenses
Sunscreen	1	Required	Desert sun can be intense; the high altitude further increases its intensity. EVA suit helmets provide only partial protection.
Sunglasses	1 or 2	Recommended	For UV protection. You cannot wear them on EVA without a doctor's note.
Personal first-aid kit		Optional	For small cuts, abrasions etc. MDRS has a well stocked first aid kit.

Personal Field Gear

What to Bring	How Much	Need	Notes
Utility knife (like a Swiss Army knife or Leatherman combo tool)	1	Strongly recommended	Very handy for repairs and field work. Note the airline restrictions on these items – bring yours in checked baggage.
Rock Hammer	1	Optional	Recommended for geologists. Rocks in the area are mostly "soft" so a standard sedimentary pick/hammer ("mason's tool") should suffice; the Hab has one sledge hammer. Ship in checked baggage. NOTE: THERE ARE NO ROCK HAMMERS AT THE HAB.
Hand Lens/Loupe	1	Recommended	10X-14X for close examination of specimens in the lab.
Personal (handheld) GPS & charger or batteries	1	Recommended	If you have one, bring it; if not, use the ones at MDRS. At MDRS, GPS data are recorded in UTM NAD 27 Zone 12 North Northings/Eastings. Know how to use the GPS and to set it to the correct measurement system. Bring spare batteries.
Field Book, Pens	1	Recommended	Waterproof recommended.
Topographic Maps	As needed	Recommended	MDRS has one or two copies of the local (Skyline Rim Quad) topo maps at 1:24,000. Detailed mapping may require additional maps at better scales; check on-line with the USGS for information. http://www.usgs.gov/pubprod/
Camera/digital camera with charger and/or extra batteries	1	Recommended	If you have it, bring it. Digital images can be downloaded to the MDRS computer. Bring the appropriate cables and thumb-drives or memory cards, spare batteries or rechargeable batteries with charger, a bag or case and if you have it, a lens care kit. It is very difficult to take pictures with a non-digital camera when wearing EVA gear.
"Canned Air"		Optional	Useful for cleaning cameras and other personal equipment in the field and in the Hab. Buy it in Grand Junction as aerosol cans are not welcomed aboard commercial flights.
Tripod, remote shutter switch	1	Optional	Extremely useful for field photos – the desert is windy and spacesuit gloves are awkward.
Photo scale or ruler	1	Recommended	Essential for taking scientific field photos.
Bungee cords	1-2	Optional	Useful for securing items on ATVs & backpacks
Bubble wrap/Foam padding	as needed	Optional	If you need to transport delicate equipment on ATVs, be sure to bring adequate padding for the ATV cargo rack. Unpadded equipment and gear can take a severe beating when jolting over the uneven desert surface.

Personal laptop	1	Recommended	Bring all necessary peripherals: cables, mouse, AC power adapter. Disable all updates before arrival at MDRS, to conserve bandwidth.
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Other Personal Gear

What to Bring	How Much	Need	Notes
Reading materials	As needed	Optional	Books, magazines, textbooks related to your field of work. Internet bandwidth is small so you can't just download everything you might need.
Movies	as needed	Optional	Note: MDRS doesn't have a DVD player – DVDs are usually watched from a crewmember's laptop.
Other fun stuff	As needed	Optional	Crew members should consider bringing something they might like to do – cards, board games, a toy, a small musical instrument, an art or craft project. However, there is no guarantee of spare time.
Food & candy	As desired	Permitted	We are no longer doing a food study at MDRS. You may bring personal food.
Personal medications	As needed	As needed	Medications stored in the Hab refrigerator/freezers must be labeled with your name and crew number. Place them in a small locked box if privacy is important to you.

Things not permitted at MDRS

Perfume or Cologne	None	Not permitted	Some individuals are sensitive to fragrance products. Be kind and don't use them at MDRS.
Alcoholic beverages	None	Not permitted	Not permitted at NASA stations and analogs and not permitted at MDRS.
Cigarettes, cigars, bongs, e-Cigarettes	None	Not permitted	Smoking and vaping are not permitted at MDRS.
Candles	None	Not permitted	Candles are allowed as part of your religious ceremonies ONLY. Please inform the Director of your use prior to your rotation.
Firearms	None	Not permitted	MDRS is a firearm free campus.
Plastic hooks or anything that you use to stick things to the wall, including tape of all kinds	None	Not permitted	Crewmembers are no longer allowed to stick hooks, nametags, crew decals or anything at all on the walls at MDRS.

One final note: In the past, in keeping with the idea that everything in a Hab would be valuable and used on Mars, we kept a varied supply of things you would commonly use at a research station. This has changed. Because we support so many crews each season, and in an effort to reduce the accumulation of supplies that don't get used, many of the small things you relied on being at the station may no longer be there. Please check with us before assuming what you need is available, and please plan accordingly and bring what you think you may need.