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Barrios ISS Analysis Tool

Description

The Barrios ISS Analysis Tool is an interactive dashboard that provides Barrios analysts:

- A high-level overview of all current analyses and predictions
- The ability to upload updated datasets for adjusted analyses and predictions
- Detailed views of usage analysis, shipment optimizations, and resupply predictions

Fall 2023 Software Engineering

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Project Iterations

- Iteration 1: Requirements
- Iteration 2: Design
- Iteration 3: RAD and First Implementation
- Iteration 4: Design
- Iteration 5: Final Design Document

Installation

+ Add a custom sidebar

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`https://github.com/4306-te`

Installation instructions are on the [Installation Instructions](#) page.

User Manual

A user manual can be found on the [User Manual](#) page.

Project Presentation

A slideshow presentation describing the project and its implementation can be viewed through the [presentation pdf](#).

Major Questions

Barrios asked three questions at the beginning of this project. Those questions were:

> 1. What is the percent difference between historical consumable usage rate assumptions and actual calculated usage rates in mission time frames between resupply?

Overall historical usage on the space station for the time period covered by client data was 1.04% less than assumed usage rates.

OVERALL USAGE

1.04% ⬇

BELOW PREDICTIONS
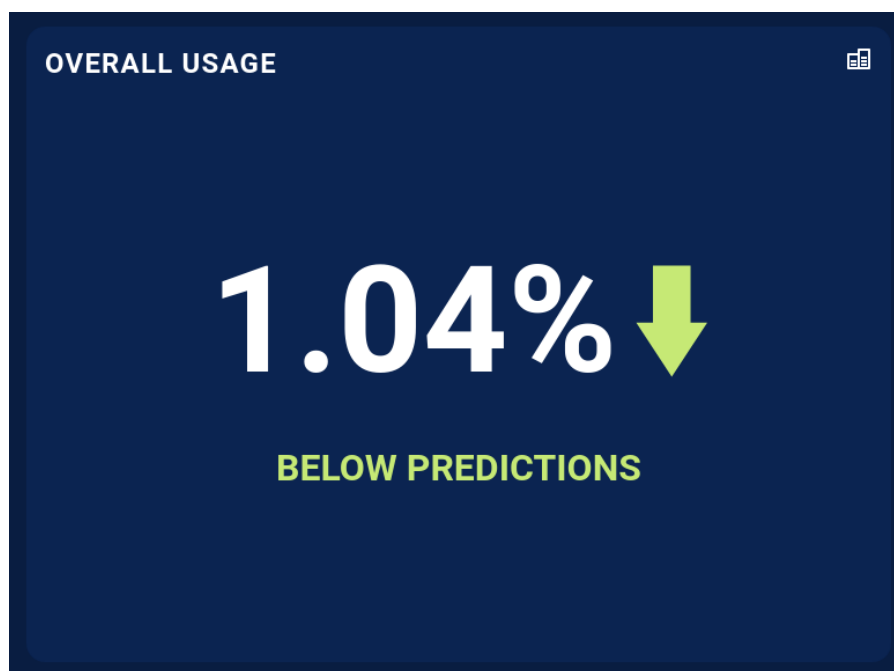
2. What resupply quantities are necessary, considering planned resupply vehicle traffic from the ISS Flight Plan, planned On-Orbit Crew counts, and historical usage rates to sustain minimum supply thresholds, plus a 10% safety factor, through the next two years?

Usage quantities can be found in the table below.

event_date	vehicle_name	ACY Inserts	Air	Filte Inser
2024-01-10	Ax-3	63	282 lbs	0
2024-01-17	DCC-1	172	484 lbs	1
2024-01-29	NG-20	155	686 lbs	1
2024-02-15	87Progress	27	121 lbs	0
2024-02-18	Crew-8	136	605 lbs	1
2024-03-04	SpX-30	346	1534 lbs	2
2024-04-11	Boe-CFT	182	807 lbs	1
2024-05-01	HTV-X1	82	363 lbs	0
2024-05-10	Ax-4	191	847 lbs	1
2024-05-31	88Progress	273	1211 lbs	2
2024-06-30	SpX-31	319	1412 lbs	2
2024-08-04	USCV-9	136	605	1

Date	Mission	Value	Mass	Count
2024-08-04	USCV-9	190	lbs	1
2024-08-19	89Progress	55	242 lbs	0
2024-08-25	NG-21	191	848 lbs	1
2024-09-15	DCC-2	611	1896 lbs	4
2024-11-01	PAM-5	291	1291 lbs	1
2024-12-03	HTV-X2	36	162 lbs	1
2024-12-07	90Progress	210	928 lbs	1
2024-12-30	SPM	9	40 lbs	0
2024-12-31	SpX-32	291	1291 lbs	2
2025-02-01	NG-22	45	202 lbs	0
2025-02-06	USCV-10	164	726 lbs	1
2025-02-24	91Progress	728	3228 lbs	4
2025-05-15	PAM-6	9	41 lbs	0
2025-05-16	DCC-3	415	1170 lbs	2
2025-06-14	92Progress	437	1937 lbs	3
2025-08-01	NG-23	27	121 lbs	0
2025-08-04	USCV-11	255	1130 lbs	2

| 2025-09-01	93Progress	273	1210 lbs	1
2025-10-01	CRS 2-24	282	1251 lbs	2
2025-11-01	NG-24	228	1009 lbs	1
2025-11-26	PAM-7	218	968 lbs	1

> 3. What resupply quantities meet the requirements of question #2 while minimizing launch vehicle quantity? (e.g., launching 10,000 granola bars would ensure the minimum thresholds are not violated, but is not a realistic or optimal strategy for balancing launch mass requirements with supply requirements)

Resupply quantities listed in the table above meet the minimum launch vehicle quantity based on the schedule represented in the `iss_flight_plan` data.

> Predictive modeling:
>
> 1. What month in the next two years of the Flight Plan timeline is most likely to incur a violation of minimum supply thresholds?
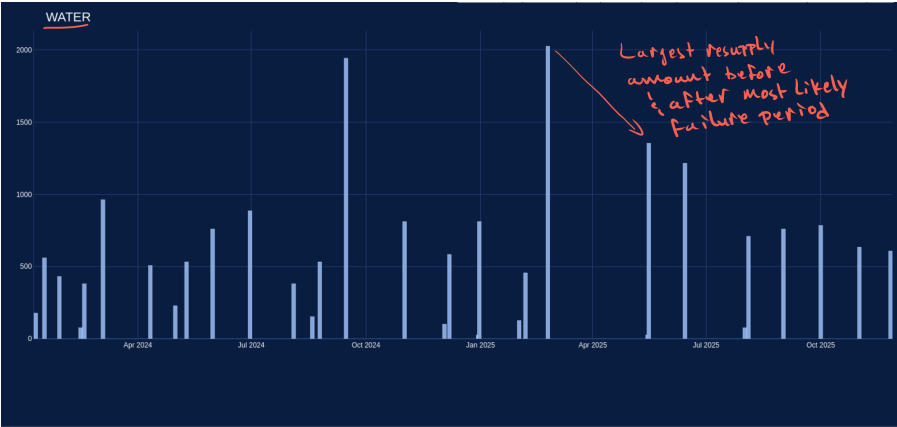
The time period most likely to incur a violation of minimum resupply thresholds is the period between launches in February, 2025 and May 2025.
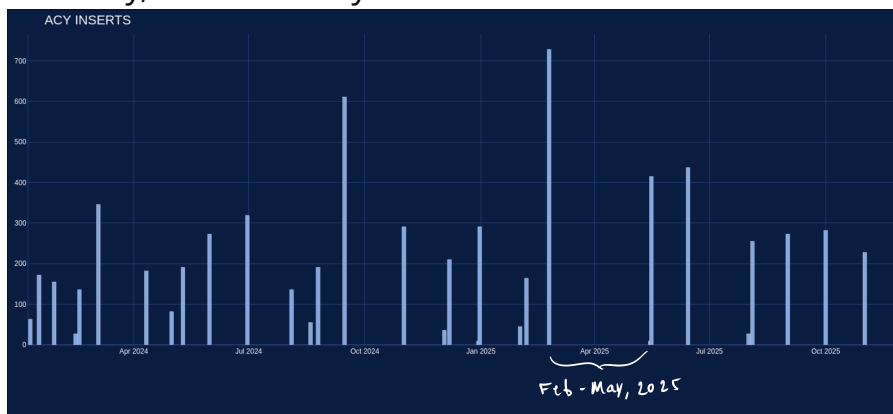
> 2. Which consumables item(s) are most likely to incur a violation of minimum supply thresholds in the next two years of the future Flight Plan

Water is the most likely consumable to incur a violation of minimum resupply thresholds.