International Space Station (ISS)
Gas Logistics Planning in the Post Shuttle Era

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ABSTRACT

Over its life the International Space Station (ISS) has received gas (nitrogen, oxygen, and air) from various sources. Nitrogen and oxygen are used in the cabin to maintain total pressure and oxygen partial pressures within the cabin. Plumbed nitrogen is also required to support on-board experiments and medical equipment. Additionally, plumbed oxygen is required to support medical equipment as well as emergency masks and most importantly EVA support.

Gas are supplied to ISS with various methods and vehicles. Vehicles like the Progress and ATV deliver nitrogen (both as a pure gas and as air) and oxygen via direct releases into the cabin. An additional source of nitrogen and oxygen is via tanks on the ISS Airlock. The Airlock nitrogen and oxygen tanks can deliver to various users via pressurized systems that run throughout the ISS except for the Russian segment. Metabolic oxygen is mainly supplied via cabin release from the Elektron and Oxygen Generator Assembly (OGA), which are water electrolyzers. As a backup system, oxygen candles (Solid Fuel Oxygen Generators-SFOGs) supply oxygen to the cabin as well.

In the past, a major source of nitrogen and oxygen has come from the Shuttle via both direct delivery to the cabin as well as to recharge the ISS Airlock tanks. To replace the Shuttle capability to recharge the ISS Airlock tanks, a new system was developed called Nitrogen/Oxygen Recharge System (NORS). NIORS consists of high pressure (7000 psi) tanks which recharge the ISS Airlock tanks via a blowdown fill for both nitrogen and oxygen. NORS tanks can be brought up on most logistics vehicles such as the HTV, COTS, and ATV.

A proper balance must be maintained to insure sufficient gas resources are available on-orbit so that all users have the required gases via the proper delivery method (cabin and/or plumbed).