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C2Po1C-06: Helium recovery system at IB3a

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The increasing need for optimal and sustainable use of cryogenic resources to support Fermilab's scientific mission has highlighted the necessity of improving the Laboratory's helium management practices. An assessment of cryogenic test facilities identified the Technical Division's Industrial Building 3a (IB3A) as a key site requiring upgrades to integrate a helium recovery system. The IB3A facility is essential for characterizing and testing superconductors, cables, and coils for various R&D projects, including the US High-Luminosity LHC Accelerator Upgrade Project (AUP), Mu2e, and other external collaborations. Currently, the facility relies on 500 L helium Dewars and vents the vaporized helium directly into the atmosphere, leading to significant helium loss. Given the non-renewable nature of helium, recovering and reusing this resource is critical for the sustainability of Fermilab's operations.

To address this challenge, a project has been initiated to connect IB3A to an existing helium purification station and refrigeration system located in another building via a dedicated pipeline pass over the roof of several buildings. This solution will enable the efficient capture of vented helium, its transfer to the purification station, and subsequent liquefaction for reuse in future operations. The project includes a detailed design phase, specifying the pipeline route, flow control mechanisms, and integration with the existing cryogenic infrastructure, followed by phased implementation and commissioning.

By implementing this pipeline connection and upgrading IB3A, Fermilab aims to significantly reduce helium waste, lower operational costs, and align with its commitment to sustainability. This initiative provides a model for resource-efficient cryogenic operations and reinforces the Laboratory's capacity to support its science mission for the long term.

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