



# Decommissioning ProtoDUNE

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# Thoughts on developing a new ProtoDUNE decommissioning plan

- What has changed from old plan
- What TPC components need to be saved?
- What tests need to be done on TPC components
- With CERN COVID travel restrictions difficult to send NOvA Crew now
- Do decommissioning tests at Ash River?
- Tools and equipment, we would need to send back?



# Updated Decommission Plan

Two major changes from the original commissioning plan which was to do the installation steps in the reverse order entering from the access port. The decommissioning documents are located on EDMS:

<https://edms.cern.ch/project/CERN-0000207261>

- Now they are opening the TCO from the outside so we will have access through the cleanroom
- The design of ProtoDUNE II has changed enough that we are basically not saving any of the TPC components except for the CPAs.

**The new issue is travel with COVID, can this be done remotely without a few experienced AR crew?**



# What TPC components are saved

These plans may have changed over the last year and need to be confirmed by the consortia if they are still correct

## HV Consortia:

- CPAs
- Resistor chains
- HV Doughnut
- Profiles?
- Ground Planes?

## APA Consortia:

- Test some number of the APAs but not save them

## CE Consortia:

- I would assume they want everything off the APA but do not know.

## PD Consortia:

- At one point Dave said they wanted the ARAPUCA modules

DSS assume this all stays in place

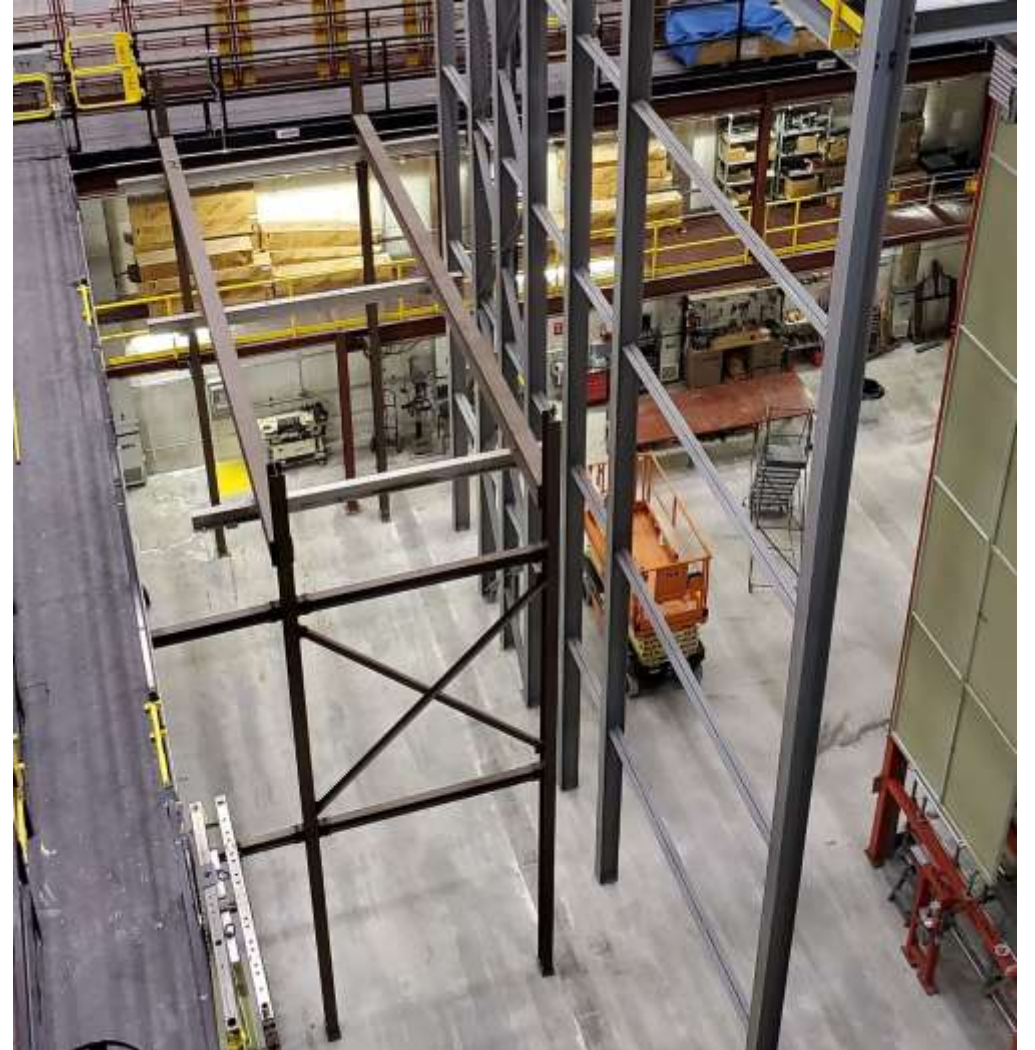
# Version 1 ProtoDUNE Decommissioning Plan

A plan based on having ~2 FTE of the Ash River crew was developed back in January 2020.

<https://edms.cern.ch/document/2450481/1>

It assumed several things:

- Entry was from the access ports and that we had to un-deploy the left drift using the confined space protocol that we used during construction
- Once this was completed CERN technicians cut open the TCO and work resumed with access via the cleanroom
- We also assumed that many more of the TPC components where saved.
- Tom will write and updated draft of this with the TCO being opened from the outside and we could test steps at Ash River



# TCO access concept

Basic Concept entering from TCO:

- Remove bottom End Wall section in manageable pieces. (More Later)
- Remove Bottom Field Cages by cutting FR4 beams and make movable pieces
- Install temporary floor sections as you go
- Remove some number of profiles or bottom section of downstream end wall
- Install floor sections and scaffold outside of drift volume

Then basically follow the decommission plan from before. This is just a basic document it outlines the steps but not the details



Upstream End Wall next to TCO

# Details to resolve

1. What tools and equipment are still at CERN. Somewhere I have a list!
2. What would we need to send from Ash River, shipment takes at least a month
3. The current plan has enough information for our crew since we put it together, we should add more detail if this work is done by CERN technicians
4. Is it feasible to travel, possible in late winter/spring, our old house is available
5. Need to re-write plan and add more details

## 4 Beam Left TPC Removal Sequence

- o Position Second scaffolding as shown in the figure 3.

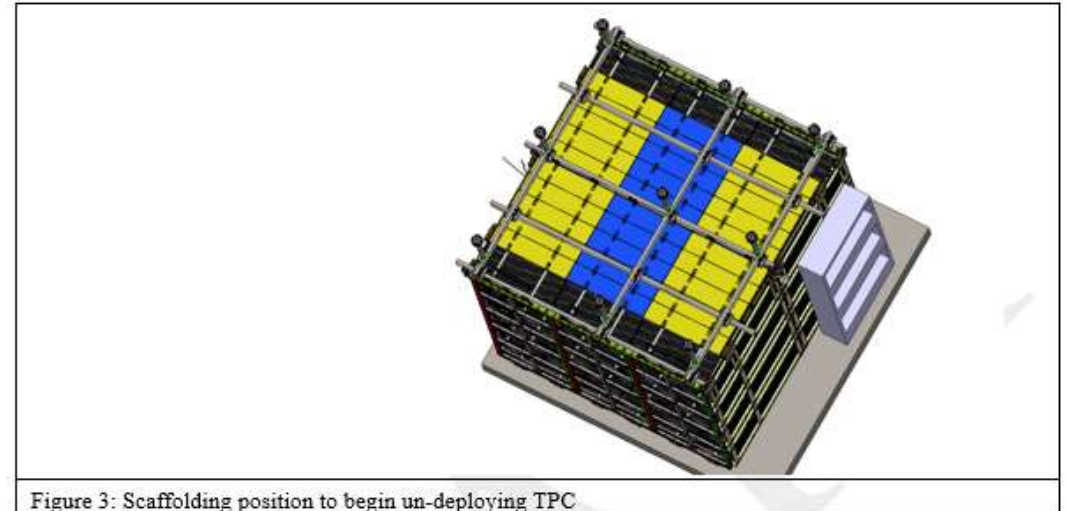


Figure 3: Scaffolding position to begin un-deploying TPC

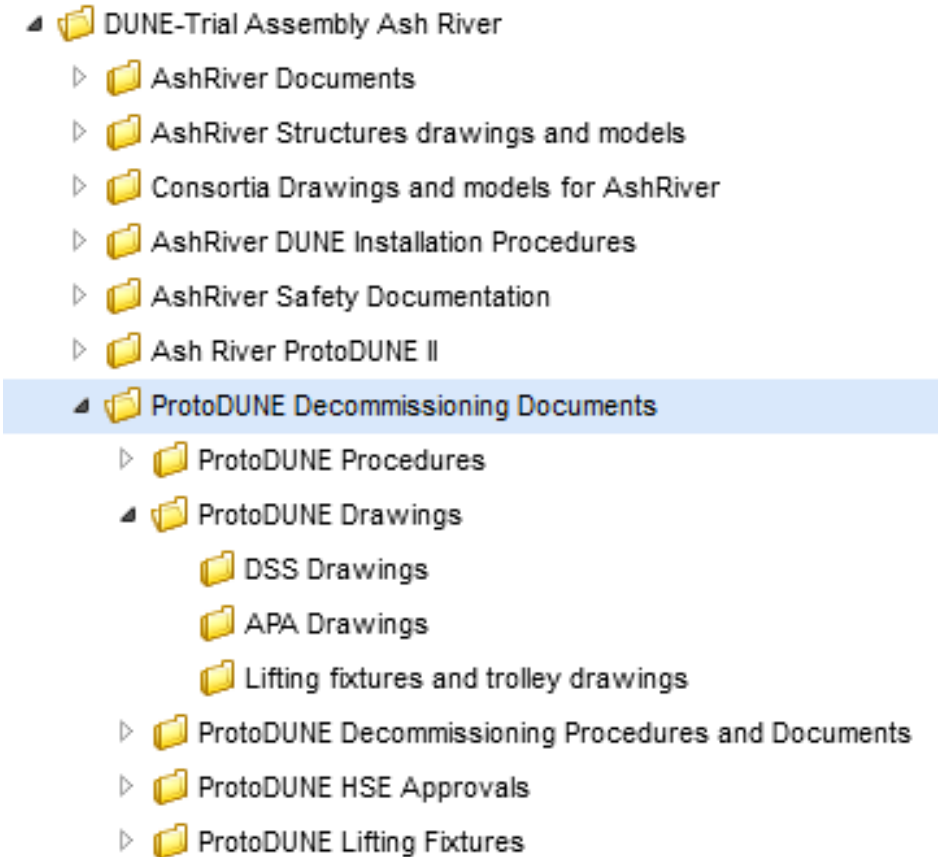
- o Add downstream beam trolley to D beam
- o Install the winch trolley on the D beam
- o Remove any cameras, any other instrumented devices and/or electrical connections attached to the FC before lowering. Check for anything that may interfere with FC lowering
- o Connect winch trolley to FC using the metal tube and short strap
- o Use the long extension socket and a cordless drill to lift up slightly on the FC
  - o Using the extendable boat grapple, release the top latches on the APA side
  - o Slowly lower the field cage to the vertical position while the D beam follows along, the TPC should now look like Figure 4

# Other tasks we can do to help

- Tom has already organized the majority of ProtoDUNE documents

<https://edms.cern.ch/project/CERN-0000207261>

- We have lots of pictures, we could try and add more details to the decommissioning plan
- Work directly with Filippo, Francisco and Daniela on this process so they can communicate to CERN technicians
- Check the list of equipment at CERN and ship the rest of the required tools.
- I do have all our weekly reports and photo's those could be better organized and posted on EDMS





# Summary

- It would be doable to decommission ProtoDUNE without the experienced Ash River crew but certainly more difficult.
- If we are less concerned about damage to TPC equipment and mostly worried about personnel safety we could consider doing things in a more BRUTAL way
- We could set up weekly meetings during the planning stages to get things ready
- We could have daily zoom meetings once the process starts to give direct input to specific questions

