

**Operational Readiness Clearance (Non-beam operation)  
Liquid Argon Purification Demonstrator  
4 Dec 2021**

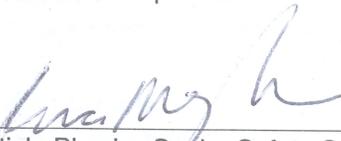
AUTHORIZATION TO RESUME UNATTENDED OPERATION OF LAPD IN PCA

**REVIEWED AND APPROVED BY:**

**DATE**

  
\_\_\_\_\_  
Particle Physics Division Head  
Comments/Exceptions:

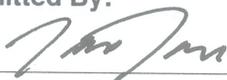
6/12/2012

  
\_\_\_\_\_  
Particle Physics Senior Safety Officer  
Comments/Exceptions:

6 Dec 12

  
\_\_\_\_\_  
Committee Chair  
Comments/Exceptions:

6 Dec 2012

**Submitted By:**  
  
\_\_\_\_\_  
Requester      Terry Tope

12/6/12

Electronic approvals for this form are acceptable. Please forward your responses to all recipients. A signed paper form (copy) of this document will exist in the Particle Physics Division Office. The original signed document will stay with the experiment requesting clearance.

From Leo Bellantoni

- 1) You have a list of findings from Steve Chappa
- 2) Likewise Karen Kephart
- 3) and from Jim Priest, a single additional finding.

I have the following notes:

After looking at FESHM 6020.4 I don't think it is required to open space between the RTD pipe and the High Voltage rack - still, if this can be done, it would be an improvement.

*The HV rack was not moved due to the other constraints.*

Similarly, I do not find a specific height that is required for an altitude that the cables that need to be strung from the TPC electronics rack to the top of the vessel; but obviously, the higher that they can be strung the better.

*The TPC has been cabled. A 6' tall person can easily walk under the cables.*

From Steve Chappa:

1. The DC and AC power wiring inside of the CCU chassis, which is a custom-built chassis, is not clear from the schematic and description. Therefore, I will need to physically look inside the chassis to examine the safety grounding and power wiring details. Also, the schematic needs to be updated/completed so as to include this information.

*One spare CCU chassis is at the Proton Pole Building (PPB) ready for inspection. We also updated the documentation for the CCU chassis:*

*[http://lartpc-docdb.fnal.gov/0008/000860/006/CCU information v2.pdf](http://lartpc-docdb.fnal.gov/0008/000860/006/CCU%20information%20v2.pdf)*

*which provides dialog to accompany CCU schematics:*

*[http://lartpc-docdb.fnal.gov/0008/000860/006/CCU PAD schematics bromberg.pdf](http://lartpc-docdb.fnal.gov/0008/000860/006/CCU%20PAD%20schematics%20bromberg.pdf)*

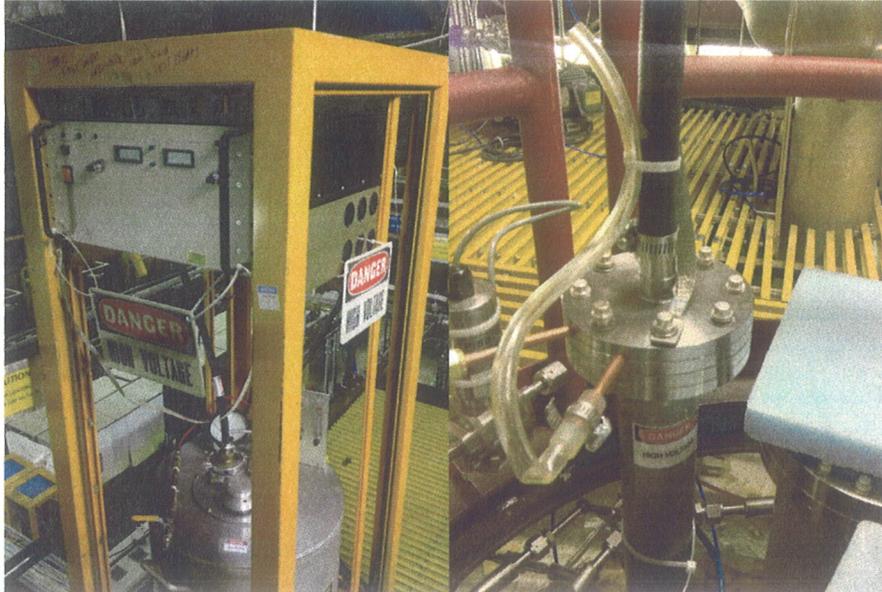
2. The power cords for the two scaler chassis, located within the Long Bo Counter rack, need to be strain relieved so that the weight of the cord does not pull on and stress the connector contacts.

*The power cords are strain-relieved.*



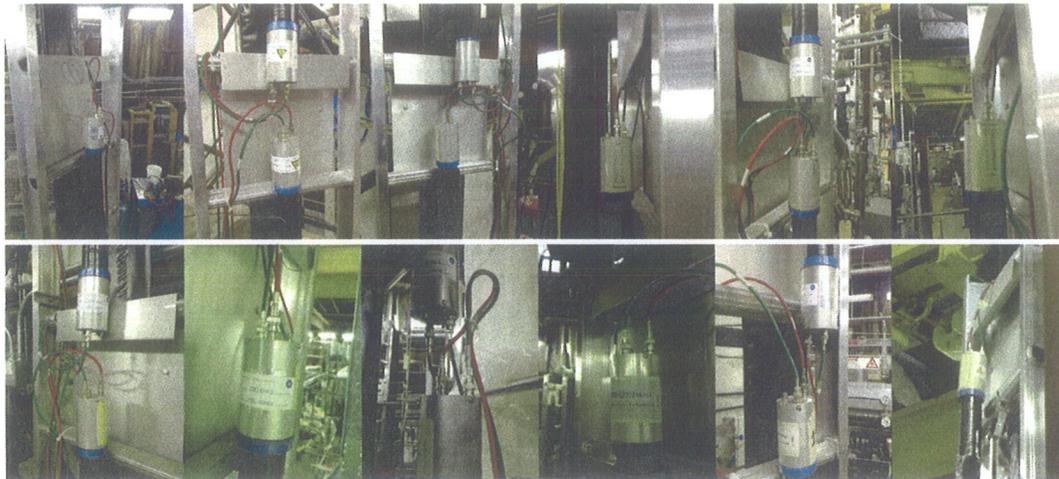
3. HV danger signs need to be located on the HV rack up on the upper platform. In addition, HV Danger labels need to be attached to the black HV cable.

*HV signage has been posted.*



4. The HV and signal RG58 cables connected to the large PMTs need to be checked for proper strain relief to prevent damage to the cables' shield crimp connection.

*All the cables are strain-relieved.*



5. One cold DAQ card installed has been revised since the review of these electronics back in 2011 (at PAB). Therefore, the revised module's documentation needs to be examined to verify proper DC power implementation within the module.

*As used in LAPD Run II, 1 of the 9 preamp cards inside the cryostat, the CMB-16 cards, has been modified to include an ASIC preamp chip from BNL.*

*The documentation for the modified TPC cold electronics inside the LAPD vessel is <http://lartpc-docdb.fnal.gov/0008/000860/006/Note-ASIC-Card.pdf>*

*The documentation for the modifications to the special WRP-16 card in the warm receiver crate is*

<http://lartpc-docdb.fnal.gov/0008/000860/006/WRP-16-modification-note.pdf>

*The schematic for the ASIC control box is*

<http://lartpc-docdb.fnal.gov/0008/000860/006/ASIC-control-box.pdf>

6. Documentation for the electronics installed within the vessel needs to be examined. I did not see where this documentation is located.

*This documentation is located at*

[http://www.pa.msu.edu/~edmunds/LArTPC/Bo\\_Cold\\_DAQ/Safety\\_Review/cold\\_bo\\_daq\\_safety\\_review.txt](http://www.pa.msu.edu/~edmunds/LArTPC/Bo_Cold_DAQ/Safety_Review/cold_bo_daq_safety_review.txt)

7. The PC-4 ODH Alarms Control Enclosure has been modified with the addition of two additional monitors. The updated drawing will be added to the documentation.

*Updated drawings for item 7 were provided on 11.15.12 and are posted here:*

[http://lartpc-docdb.fnal.gov:8080/cgi-bin/RetrieveFile?docid=553;filename=EN\\_LAPD\\_CONTROLS%20-%20Rev\\_A.pdf;version=123](http://lartpc-docdb.fnal.gov:8080/cgi-bin/RetrieveFile?docid=553;filename=EN_LAPD_CONTROLS%20-%20Rev_A.pdf;version=123)

A follow-up review should be conducted that will include the final installation of the DAQ cables, power supply connections, rack protection installation, etc.

**From Karen Kephart:**

Scintillation counters need to have all the signal and HV cables going to PMT bases checked and appropriately strain-relieved.

*All the cables are strain-relieved, please see picture on page 2.*

Bubble wrap draped over one of the counters must be removed. If long term protection is needed, a non-flammable material must be chosen.

*Bubble wrap will be removed when the mastic work is done and prior to system startup.*

Any other plastic sheeting that has been draped to prevent splatters while insulating should be removed before start-up (I noticed a piece that was obstructing a visual on a shut-off valve, for example).

*All other sheeting will be removed when the mastic work is done and prior to system startup.*

The TPC electronics rack located on the catwalk at the top of the vessel needs to have rack protection provided of the type that includes (at a minimum) a smoke detector wired to turn off power to the rack in case of an alarm.

*Rack protection is installed and tested to be functional.*



Open areas of the catwalk should have toe panels provided so that equipment cannot roll off onto personnel passing below.  
*The panels have been removed and do not store items in this area signs have been posted.*



I would like to revisit when the TPC is cabled to the rack on the catwalk.  
*The TPC has been cabled. A 6' tall person can easily walk under the cables.*



From Jim Priest:

Terry was going to provide the FD with a diagram of the shut-off valves. The FD has already walked through the H2 part of LAPD. I would suggest the same walkthrough and when the shut of diagrams are ready before operation.

*The FD has been sent the documentation and invited for tours. The documentation is here:*

[http://lartpc-docdb.fnal.gov:8080/cgi-bin/RetrieveFile?docid=868;filename=run 2 emergency shutoff valves for Fire Department1.pdf;version=2](http://lartpc-docdb.fnal.gov:8080/cgi-bin/RetrieveFile?docid=868;filename=run%20emergency%20shutoff%20valves%20for%20Fire%20Department1.pdf;version=2)

From Russ Rucinski and Tug Arkan

The plywood under the ladder should be repositioned.

*The plywood has been repositioned.*



**From:** Angela M Sands <asands@fnal.gov>  
**Subject:** RE: LArPD Run II ORC Review Findings  
**Date:** December 4, 2012 1:32:40 PM CST  
**To:** Leo Bellantoni <bellanto@fnal.gov>

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Hello Leo,

All environmental issues associated with LAPD have been properly addressed, and I approve for operation.

Angela

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**From:** Leo Bellantoni  
**Sent:** Tuesday, December 04, 2012 9:48 AM  
**To:** Steve J Chappa; James L. Priest; Tug T Arkan; Russell A Rucinski; Angela M Sands  
**Cc:** Tingjun Yang; Terry E Tope  
**Subject:** Fwd: LArPD Run II ORC Review Findings

Dear ORC members

Please let me know when / if you are ready to approve LAPD's upgraded configuration for operation. Thanks!

*Leo*

---

Dr. Leo Bellantoni (630)730-2155  
MS 357, Fermilab Batavia, IL 60510

Begin forwarded message:

**From:** Tingjun Yang <[tjyang@fnal.gov](mailto:tjyang@fnal.gov)>  
**Subject:** Re: LArPD Run II ORC Review Findings  
**Date:** November 29, 2012 6:20:38 PM CST  
**To:** Leo Bellantoni <[bellanto@fnal.gov](mailto:bellanto@fnal.gov)>  
**Cc:** Terry E Tope <[tope@fnal.gov](mailto:tope@fnal.gov)>, Karen M Kephart

From: Tingjun Yang <tjyang@fnal.gov>  
Subject: Re: LArPD Run II ORC Review Findings  
Date: December 5, 2012 10:14:20 AM CST  
To: Steve J Chappa <chappa@fnal.gov>  
Cc: Leo Bellantoni <bellanto@fnal.gov>, Terry E Tope <tope@fnal.gov>, "James L. Priest" <priest@fnal.gov>, Tug T Arkan <arkan@fnal.gov>, Russell A Rucinski <rucinski@fnal.gov>, Angela M Sands <asands@fnal.gov>

Hi Steve,

Thank you very much for your review. We have checked the PEM mounting screws at PC4 and they are secure. We also wrote "3 AMP MAX" on the rear panel of the CCU chassis. We will provide the schematic you mentioned as soon as possible. I hope we have addressed all of your concerns. The following documentation has been updated with the new information. Some links are also modified so they do not require a password.

[http://lartpc-docdb.fnal.gov/0008/000868/005/ORCReviewComments\\_responses.pdf](http://lartpc-docdb.fnal.gov/0008/000868/005/ORCReviewComments_responses.pdf)

Jim, Russ and Tug, your comments have also been addressed in the document above. Could you please let us know if you are satisfied or need more information? Thanks.

Best regards,

Terry&Tingjun

On Dec 4, 2012, at 6:48 PM, Steve J Chappa wrote:

Hi Dr. Leo,

I reviewed the CCU chassis with Carl and Walt yesterday afternoon. Apart from a few minor fabrication infractions, the chassis is cleared for operation with the understanding that 1) the PEM mounting screws are checked so that they are secure (since they provide the safety ground connection to chassis), and 2) recommend that the fuse value for the PEM inserts are labeled on the rear panel. However, a top-level schematic does not appear to be available. One should be generated and included with the documentation package at the earliest opportunity.

In addition, I was at PC4 and had the opportunity to examine the corrections listed in Tingjun's pdf document. I also reviewed the updated documentation websites. The electronics inside the vessel are the same as they were when I did the 6-15-11 ORC review so that is OK. I clicked on the link for the PC-4 ODH alarms and the website required a username and password. These I do not have. Since they are included, however, this will not prevent the recommendation for the ORC.

I did examine the Cold Electronics rack's smoke interlock and it was connected and operational. This looks OK. The cable connections to the crate mounted on top of the

**From:** Karen M Kephart <karenk@fnal.gov>  
**Subject:** RE: LAPD review and walk-through  
**Date:** November 15, 2012 4:14:08 PM CST  
**To:** Leo Bellantoni <bellanto@fnal.gov>, Robert J Bushek <bushek@fnal.gov>, Eric D McHugh <emchugh@fnal.gov>, Angela M Sands <asands@fnal.gov>, Walter F Jaskierny <waltj@fnal.gov>, Teri L Dykhuis <dykhuis@fnal.gov>, Tug T Arkan <arkan@fnal.gov>, Steve J Chappa <chappa@fnal.gov>, Russell A Rucinski <rucinski@fnal.gov>, Kathy J Graden <graden@fnal.gov>, Jim Priest <drpriest@fireresearch.org>, Terry E Tope <tope@fnal.gov>, Tingjun Yang <tjyang@fnal.gov>  
**Cc:** Karen M Kephart <karenk@fnal.gov>

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Leo et.al.:

Below are my findings:

Scintillation counters need to have all the signal and HV cables going to PMT bases checked and appropriately strain-relieved.

Bubble wrap draped over one of the counters must be removed. If long term protection is needed, a non-flammable material must be chosen.

Any other plastic sheeting that has been draped to prevent splatters while insulating should be removed before start-up (I noticed a piece that was obstructing a visual on a shut-off valve, for example).

The TPC electronics rack located on the catwalk at the top of the vessel needs to have rack protection provided of the type that includes (at a minimum) a smoke detector wired to turn off power to the rack in case of an alarm.

Open areas of the catwalk should have toe panels provided to that equipment cannot roll off onto personnel passing below.

I would like to revisit when the TPC is cabled to the rack on the catwalk.

I believe Steve Chappa will address any missing electrical/electronics schematics and custom equipment inspections.

K.

Karen M Kephart  
Fermi National Accelerator Laboratory

**From:** Karen M Kephart <karenk@fnal.gov>   
**Subject:** RE: LArPD Run II ORC Review Findings  
**Date:** November 30, 2012 8:02:02 AM CST  
**To:** Leo Bellantoni <bellanto@fnal.gov>  
**Cc:** Terry E Tope <tope@fnal.gov>, Robert J Bushek <bushek@fnal.gov>, Eric D McHugh <emchugh@fnal.gov>, Angela M Sands <asands@fnal.gov>, Walter F Jaskierny <waltj@fnal.gov>, Tingjun Yang <tjyang@fnal.gov>

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Dear All:

I am satisfied that the pictures show reparation to the findings I listed. I do have a separate observation based on the picture showing the High Voltage signage: What is the piece of Tygon tubing for? If it is supposed to provide venting, it is crimped ...

K.

Karen M Kephart  
Fermi National Accelerator Laboratory  
Particle Physics Division  
Assistant Head for Technical Support  
630-840-6625  
630-485-0587  
[karenk@fnal.gov](mailto:karenk@fnal.gov)

---

**From:** Tingjun Yang  
**Sent:** Thursday, November 29, 2012 6:21 PM  
**To:** Leo Bellantoni  
**Cc:** Terry E Tope; Karen M Kephart; Robert J Bushek; Eric D McHugh; Angela M Sands; Walter F Jaskierny  
**Subject:** Re: LArPD Run II ORC Review Findings

Dear ORC Members,

Thank you again for your valuable comments after the walkthrough on Nov 15. We have addressed all of your concerns in the attached pdf file.

We have a space CCU chassis at the Proton Pole Building (PPB) for Steve to inspect. Carl Bromberg would like to be around when Steve does the inspection. We are hoping the other members will be satisfied by the pictures in our responses, but you are welcome to come and look at things again. Please let us know if you have questions. Thanks.

Sincerely,  
Tingjun&Terry

**From:** Terry Tope <tope@fnal.gov>   
**Subject:** Re: LArPD Run II ORC Review Findings  
**Date:** November 30, 2012 8:21:58 AM CST  
**To:** Karen M Kephart <karenk@fnal.gov>  
**Cc:** Leo Bellantoni <bellanto@fnal.gov>, Robert J Bushek <bushek@fnal.gov>, Eric D McHugh <emchugh@fnal.gov>, Angela M Sands <asands@fnal.gov>, Walter F Jaskierny <waltj@fnal.gov>, Tingjun Yang <tjyang@fnal.gov>

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There is a bit of oil at the top of the HV feed thru to help prevent breakdown. The tube was kinked to keep the oil from coming out. It's actually been replaced with a vertical hard clear plastic tube.

On Nov 30, 2012, at 8:02 AM, Karen M Kephart <[karenk@fnal.gov](mailto:karenk@fnal.gov)> wrote:

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K.

Karen M Kephart  
Fermi National Accelerator Laboratory  
Particle Physics Division  
Assistant Head for Technical Support  
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**From:** "James L. Priest" <priest@fnal.gov>  
**Subject:** Re: LAPD review and walk-through  
**Date:** November 15, 2012 9:48:44 PM CST  
**To:** Leo Bellantoni <bellanto@fnal.gov>  
**Cc:** Karen M Kephart <karenk@fnal.gov>, Robert J Bushek <bushek@fnal.gov>, Eric D McHugh <emchugh@fnal.gov>, Angela M Sands <asands@fnal.gov>, Walter F Jaskierny <waltj@fnal.gov>, Teri L Dykhuis <dykhuis@fnal.gov>, Tug T Arkan <arkan@fnal.gov>, Steve J Chappa <chappa@fnal.gov>, Russell A Rucinski <rucinski@fnal.gov>, Kathy J Graden <graden@fnal.gov>, Terry E Tope <tope@fnal.gov>, Tingjun Yang <tjyang@fnal.gov>

---

Karen covered all my comments except one.

Terry was going to provide the FD with a diagram of the shut-off valves . The FD has already walked through the H2 part of LAPD. I would suggest the same walkthrough and when the shut of diagrams are ready before operation.

Jim

Dr. James Priest PhD / MS119  
Senior Fire Strategist / Researcher  
ES&H Section  
Fermi National Accelerator Lab  
Office of Science/U.S. Department of Energy  
Managed by Fermi Research Alliance  
PO Box 500  
Batavia IL 60510  
Tel. 630-840-4283  
Cell. 312-636-6259  
Fax. 630-840-3390

On Nov 15, 2012, at 4:14 PM, Karen M Kephart <[karenk@fnal.gov](mailto:karenk@fnal.gov)> wrote:

Leo et.al.:

Below are my findings:

Scintillation counters need to have all the signal and HV cables going to PMT bases checked and appropriately strain-relieved.

Bubble wrap draped over one of the counters must be removed. If long term protection

**From:** "James L. Priest" <priest@fnal.gov>  
**Subject:** Re: LArPD Run II ORC Review Findings  
**Date:** December 4, 2012 9:54:46 AM CST  
**To:** Leo Bellantoni <bellanto@fnal.gov>

---

I have no issues

James Priest PhD  
Fire Strategist / Researcher  
ES&H Section  
Fermi National Accelerator Lab  
Office of Science/U.S. Department of Energy Managed by Fermi Research  
Alliance [PO Box 500 Batavia IL 60510](#)  
Tel. [630-840-4283](#) Cell. [312-636-6259](#)  
Fax. [630-840-3390](#)

On Dec 4, 2012, at 9:48 AM, "Leo Bellantoni" <[bellanto@fnal.gov](mailto:bellanto@fnal.gov)> wrote:

Dear ORC members

Please let me know when / if you are ready to approve LAPD's upgraded configuration for operation. Thanks!

*Leo*

---

Dr. Leo Bellantoni  
(630)730-2155  
MS 357, Fermilab Batavia, IL 60510

Begin forwarded message:

**From:** Tingjun Yang <[tjyang@fnal.gov](mailto:tjyang@fnal.gov)>  
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**To:** Leo Bellantoni <[bellanto@fnal.gov](mailto:bellanto@fnal.gov)>  
**Cc:** Terry E Tope <[tope@fnal.gov](mailto:tope@fnal.gov)>, Karen M Kephart <[karenk@fnal.gov](mailto:karenk@fnal.gov)>, Robert J Bushek <[bushek@fnal.gov](mailto:bushek@fnal.gov)>, Eric D McHugh <[emchugh@fnal.gov](mailto:emchugh@fnal.gov)>, Angela M Sands <[asands@fnal.gov](mailto:asands@fnal.gov)>, Walter F Jaskierny <[waltj@fnal.gov](mailto:waltj@fnal.gov)>

Dear ORC Members,

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**From:** Russell A Rucinski <[rucinski@fnal.gov](mailto:rucinski@fnal.gov)>   
**Subject:** RE: LArPD Run II ORC Review Findings  
**Date:** December 5, 2012 10:23:37 AM CST  
**To:** Leo Bellantoni <[bellanto@fnal.gov](mailto:bellanto@fnal.gov)>

---

Hi Dr. Leo,

I approve the mechanical safety aspects of the LArPD run II request for ORC.

Russ

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**From:** Leo Bellantoni  
**Sent:** Tuesday, December 04, 2012 9:48 AM  
**To:** Steve J Chappa; James L. Priest; Tug T Arkan; Russell A Rucinski; Angela M Sands  
**Cc:** Tingjun Yang; Terry E Tope  
**Subject:** Fwd: LArPD Run II ORC Review Findings

Dear ORC members

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*Leo*

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