

Argonne HPR Contamination

Problem

- Upon removal of the filter that is at the bottom of the spray nozzle for the Argonne HPR System a *Brown Contaminant* was found

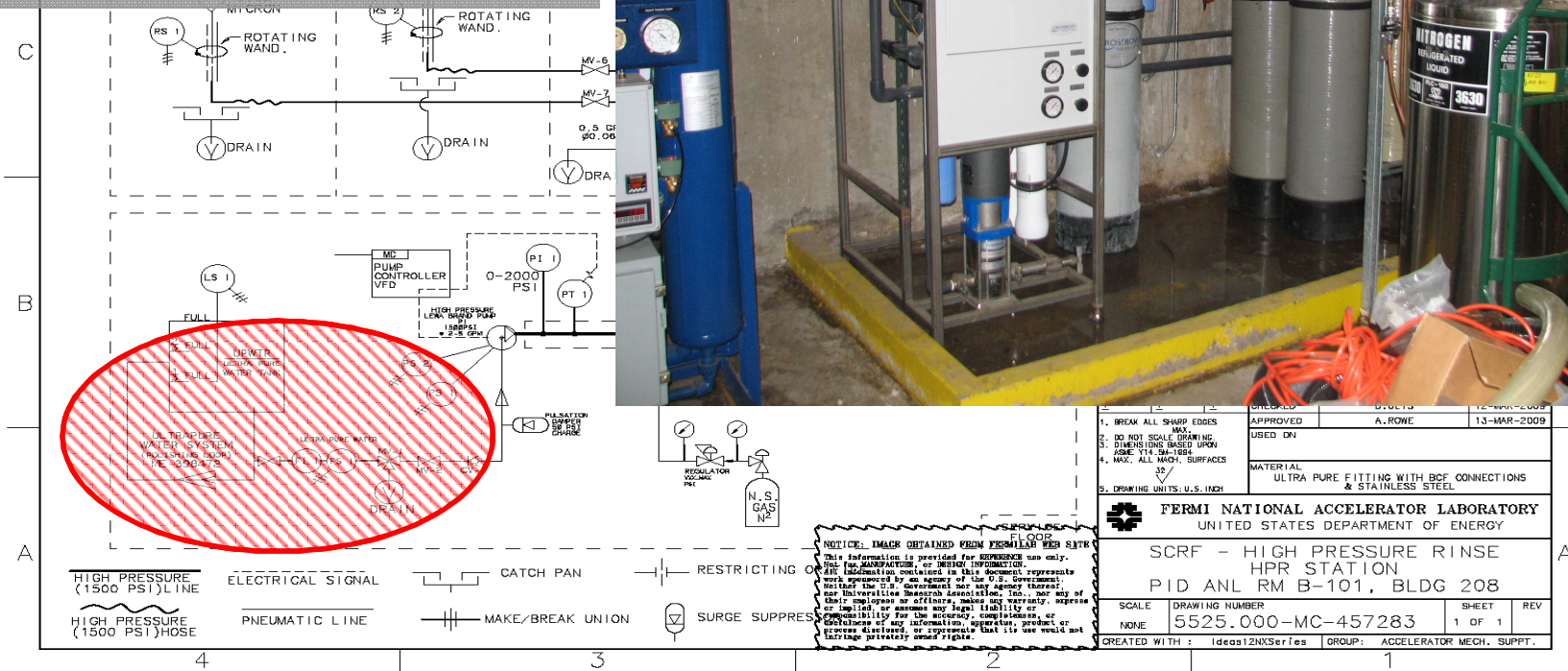
Filter Location



Proposed Contaminant – UPW System

Crossbow Ultrapure Water Plant

- Put filter at outlet from water plant
- No discoloration
- GC/MS done on water by Argonne
- No contaminants found

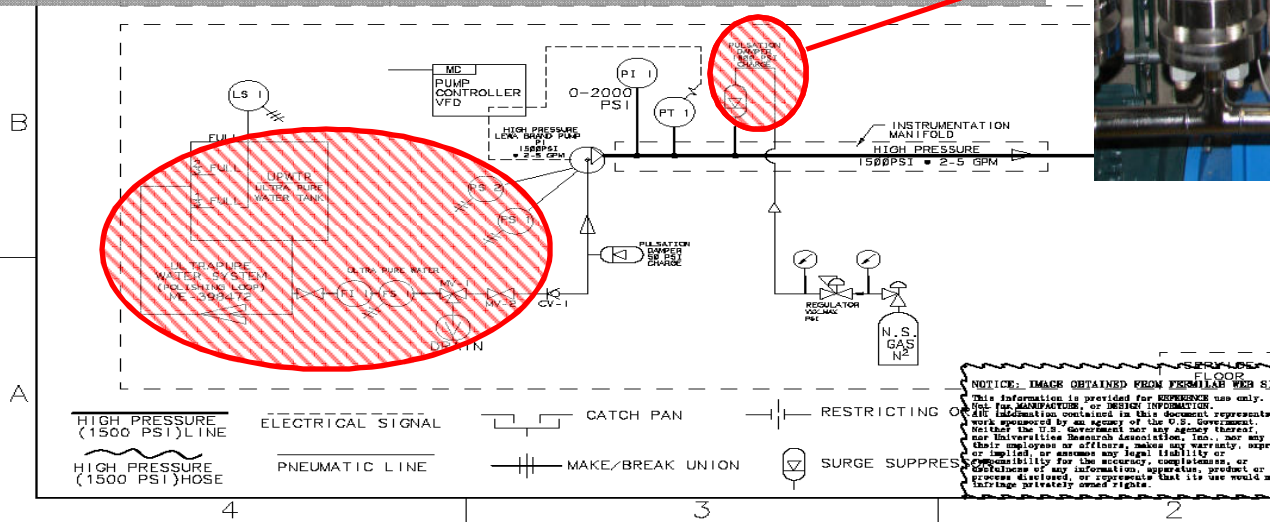


C. Cooper

Proposed Contaminant – HP Pulse Dampener

High Pressure Pulse Dampener

- In Wrong Location (Moved)
- Not Most Sanitary Design
- Bladder Gas Filled
- EPDM Rubber Bladder (dissolves in hexane and is black)
- contaminant does not dissolve in hexane and is brown



UNLESS OTHERWISE SPECIFIED		ORIGINATOR	D.O.L.S	10-JUL-2008
±	±	DRAWN	T.HAMERLA	12-MAR-2009
		CHECKED	D.O.L.S	12-MAR-2009
		APPROVED	A.ROWE	13-MAR-2009
1. BREAK ALL SHARP EDGES 2. DO NOT SCALE DRAWING 3. DIMENSIONS BASED UPON ASSE. T.Y. DIM. 4. MAX. ALL MACH. SURFACES 5. DRAWING UNITS: U.S. INCH		MATERIAL ULTRA PURE FITTING WITH BCF CONNECTIONS & STAINLESS STEEL		

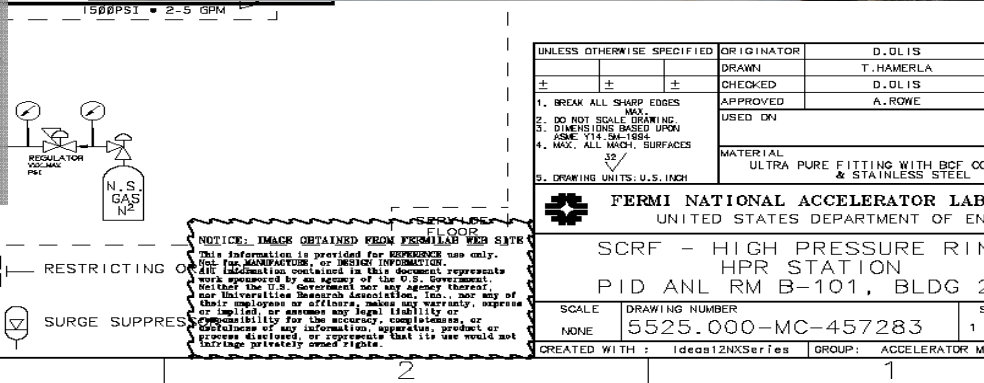
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FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
SCRF - HIGH PRESSURE RINSE HPR STATION PID ANL RM B-101, BLDG 208			
SCALE	DRAWING NUMBER	SHEET	REV
NONE	5525.000-MC-457283	1 OF 1	
CREATED WITH: Ideas12NXSeries		GROUP: ACCELERATOR MECH. SUPPT.	

Proposed Contaminant – Pump Oil

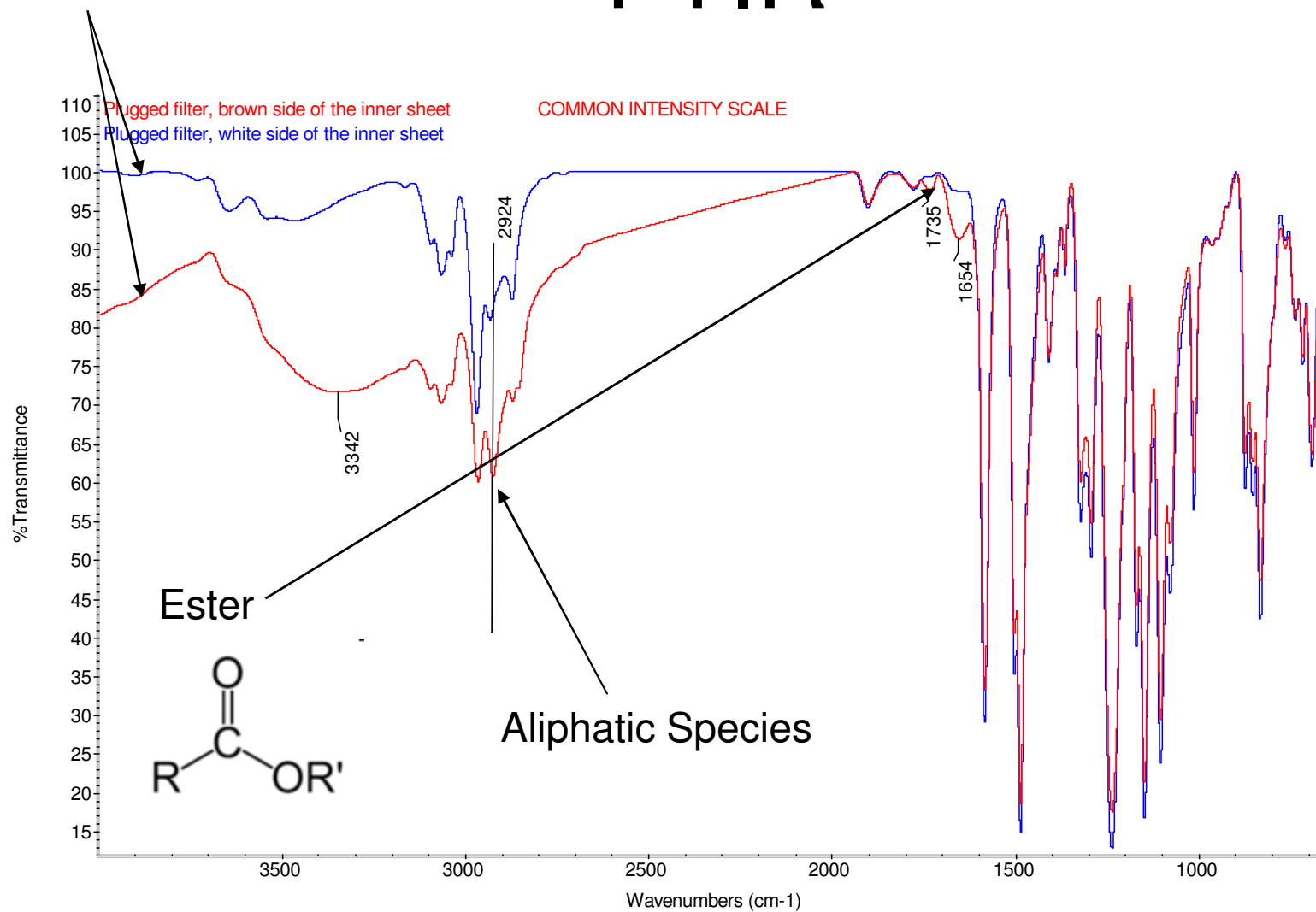
Pump Oil

- Oil is yellow, contaminant is brown
- Replaced Diaphragm (Probably some bacteria and possibly some oil found)
 - contaminant still present
- Used diaphragm sent back to company – trying to recover to evaluate
- Replaced entire pump
 - contaminant still present
- Pump oil solvated by hexane
 - contaminant not solvated by hexane
- FTIR shows trace amounts of aliphatic hydrocarbon – possibly pump oil – “not enough to be a bulk of the contaminant”



Evidence of Non-adsorbing Species

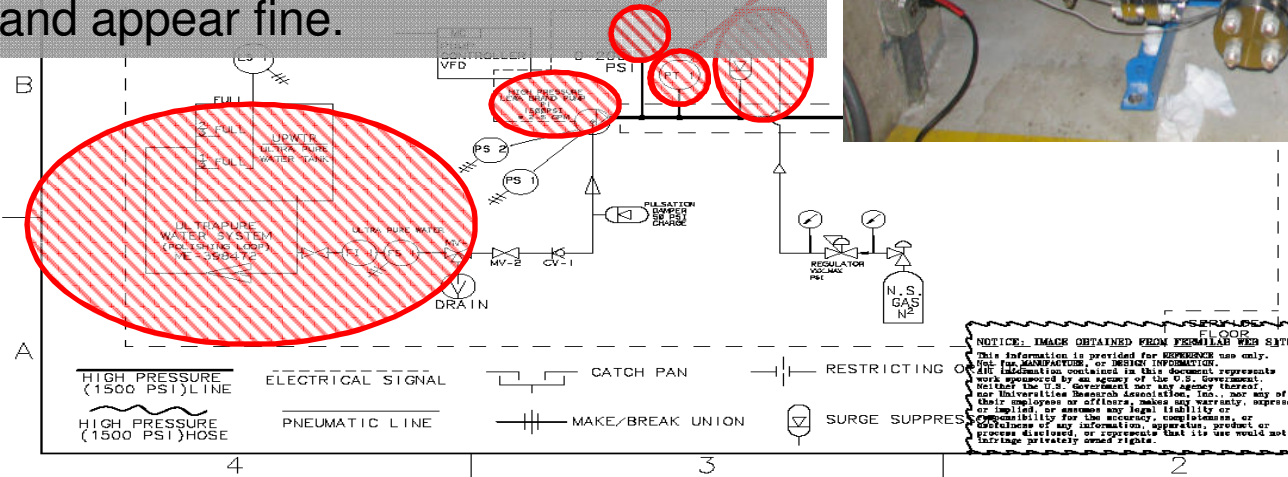
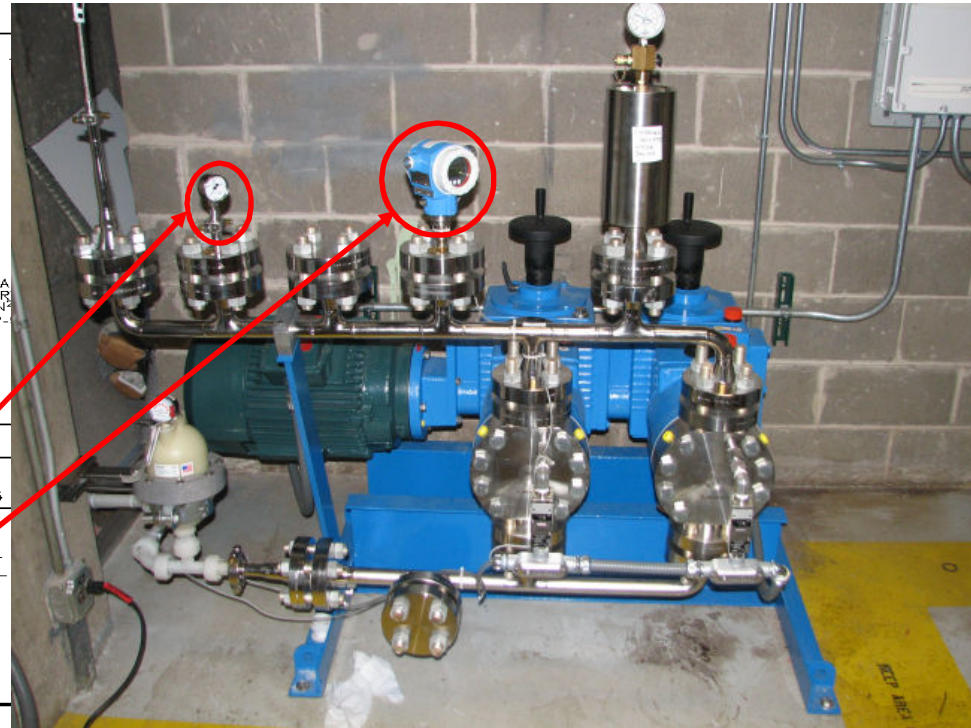
FTIR



Proposed Contaminant - Pressure Gauge/Transducer

Pressure Gauge/Transducer

- Contain Silicon Oil
 - Silicon oil is clear, Si unseen by EDS
- Transducer has a SS membrane to separate process flow from silicon oil
 - the SS membrane may have some other coating
- Functioning and visually inspected and appear fine.



UNLESS OTHERWISE SPECIFIED		ORIGINATOR	D.O.L.I.S.	10-JUL-2006
±	±	DRAWN	T.HAMERLA	12-MAR-2005
±	±	CHECKED	D.O.L.I.S.	12-MAR-2005
1. BREAK ALL SHARP EDGES		APPROVED	A. ROWE	13-MAR-2005
2. DO NOT SCALE DRAWING		USED DN		
3. DIMENSIONS BASED UPON ASSE. 114-SW-1004		MATERIAL		
4. MAX. ALL MACH. SURFACES		ULTRA PURE FITTING WITH BCF CONNECTIONS & STAINLESS STEEL		
5. DRAWING UNITS: U.S. INCH				

FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

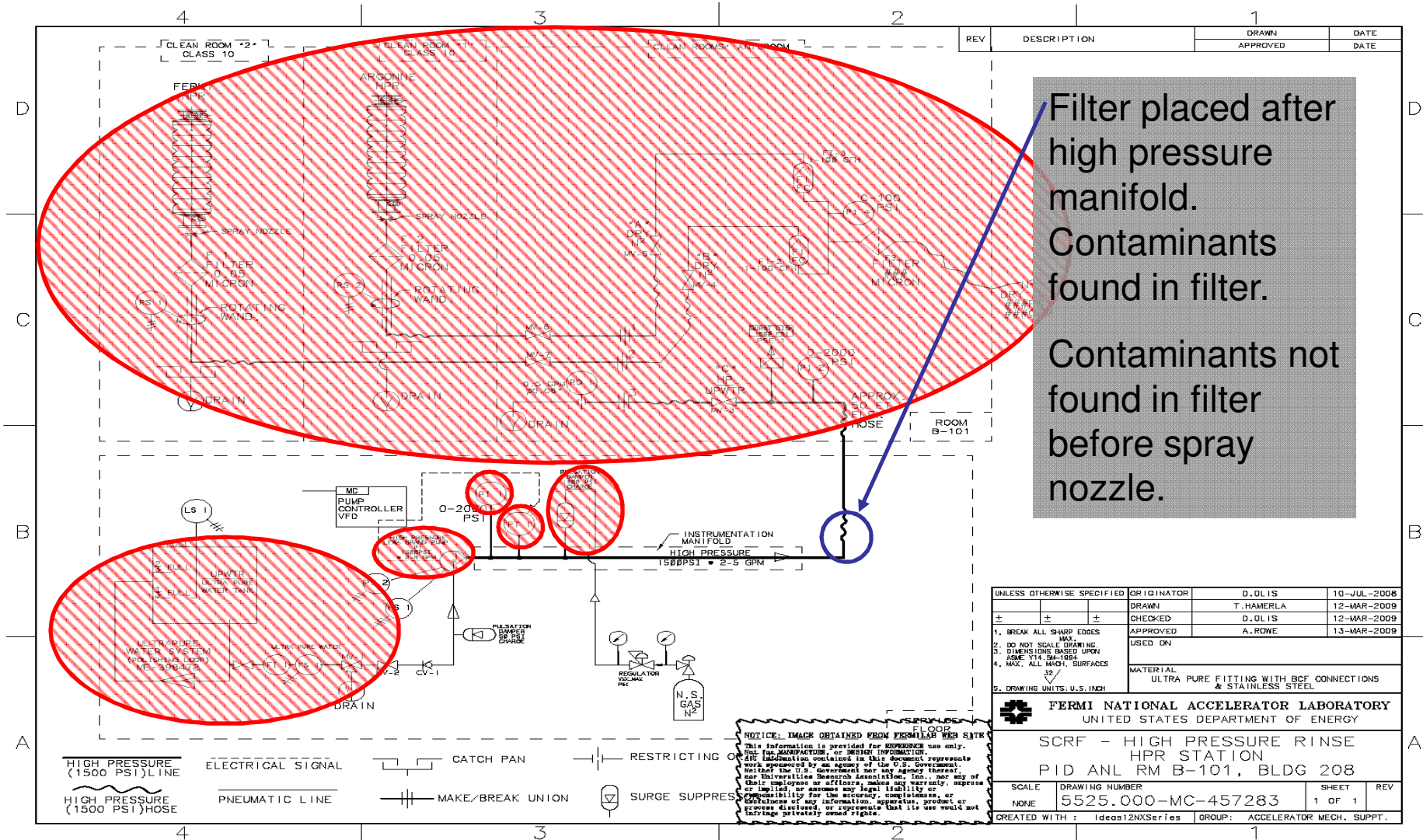
SCRF - HIGH PRESSURE RINSE HPR STATION
PID ANL RM B-101, BLDG 208

SCALE	DRAWING NUMBER	SHEET	REV
NONE	5255.000-MC-457283	1 OF 1	

CREATED WITH: **IdeaS12NXSeries** GROUP: **ACCELERATOR MECH. SUPPT.**

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Proposed Contaminant – Downstream of High Pressure Manifold

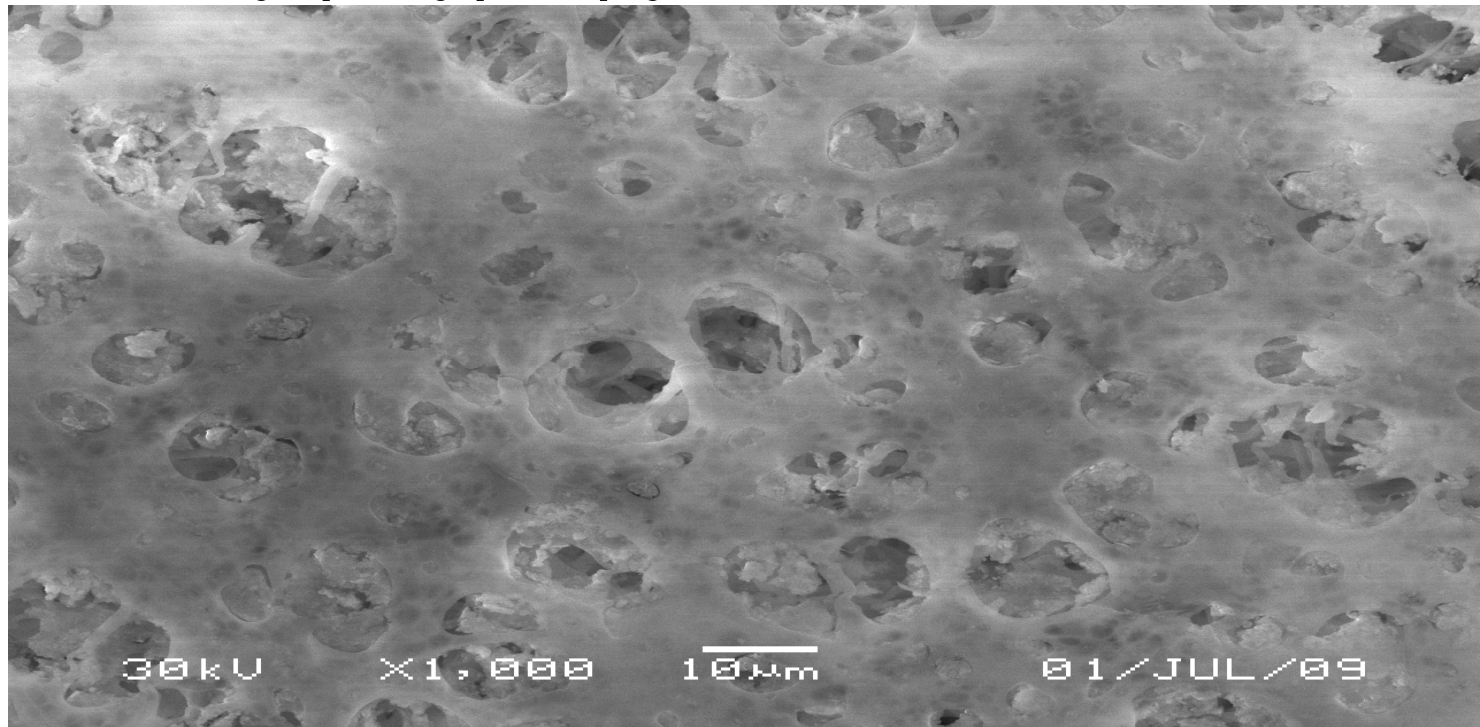


UNLESS OTHERWISE SPECIFIED			
ORIGINATOR	D. OLIS	10-JUL-2008	
DRAWN	T. HAMERLA	12-MAR-2009	
CHECKED	D. OLIS	12-MAR-2009	
APPROVED	A. ROWE	13-MAR-2009	
USED ON			
MATERIAL			
ULTRA PURE FITTING WITH BCF CONNECTIONS & STAINLESS STEEL			
DRAWING UNITS: U.S. INCH			
FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
SCRf - HIGH PRESSURE RINSE HPR STATION PID ANL RM B-101, BLDG 208			
SCALE	DRAWING NUMBER	SHEET	REV
NONE	5525.000-MC-457283	1 OF 1	
CREATED WITH : Ideast2NXSeries		GROUP: ACCELERATOR MECH. SUPPT.	

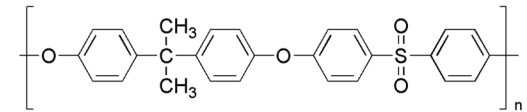
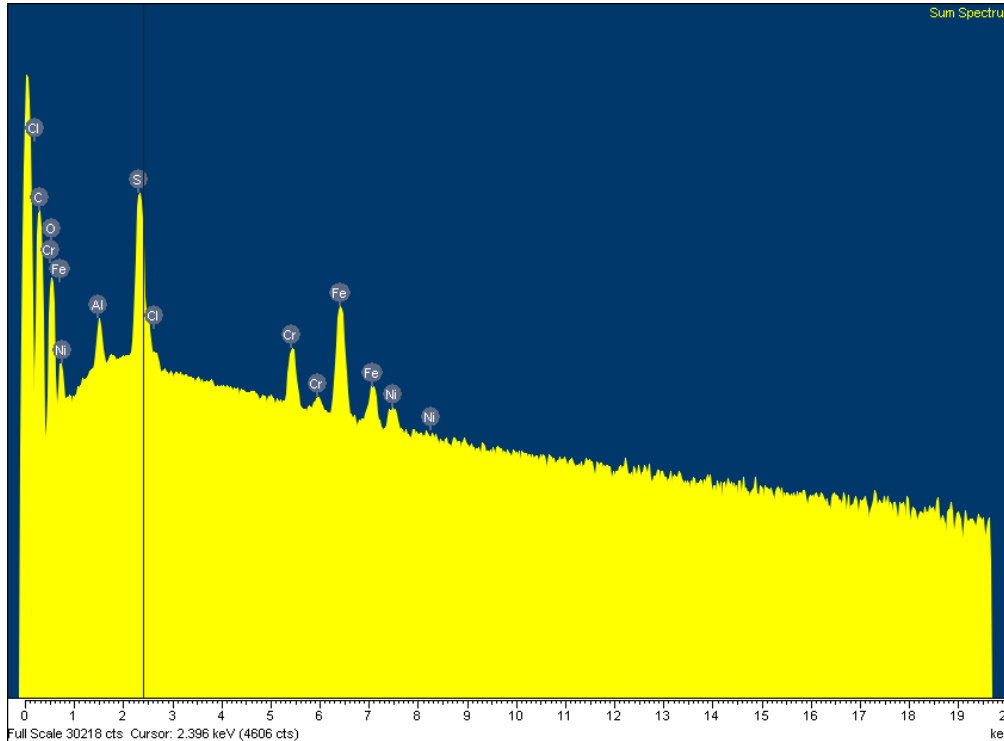
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Analytical Work on Contaminant & Filter

- Filter is primarily a polysulfone thin film sandwiched in some other polymer, possibly polypropylene.



SEM/EDS



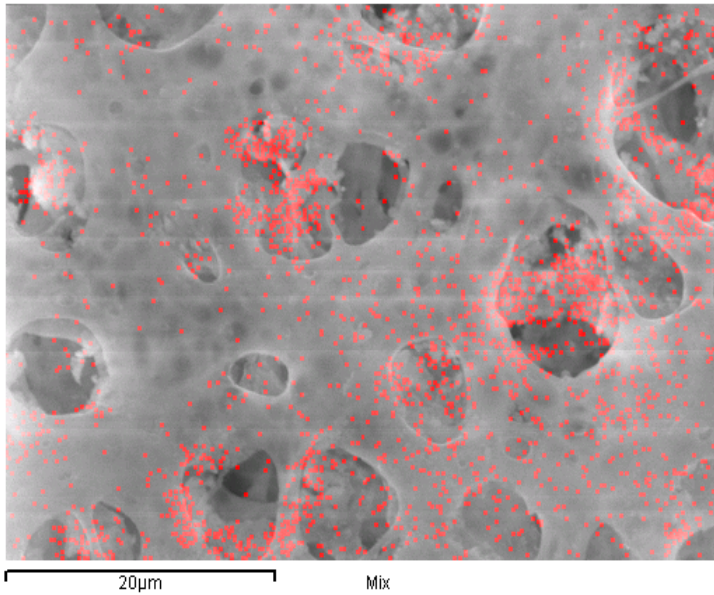
Polysulfone

Al from sample prep

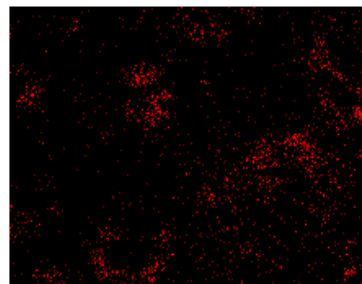
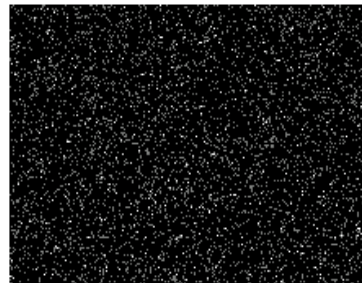
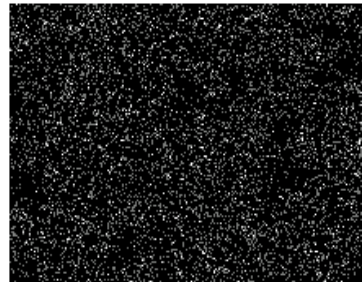
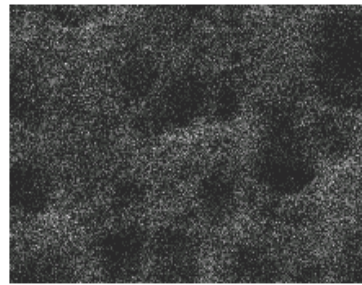
S from membrane

Fe, Ni, Cr from?

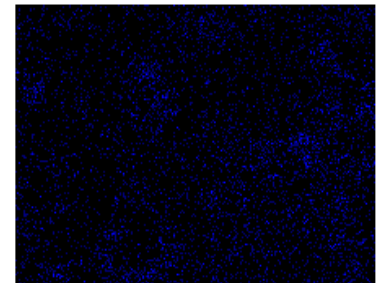
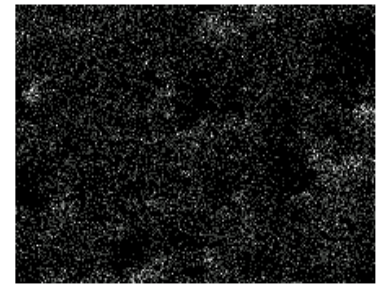
Elem.	C	O	Al	S	Cl	Cr	Fe	Ni	Total
Wt %	66.45	22.66	0.45	7.53	0.14	0.53	2.10	0.15	100.



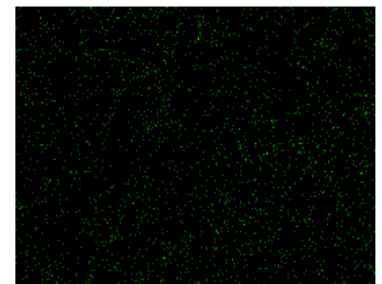
Elemental Maps of
Polysulfone Filter. –
Red Dots Fe.



Fe Ka1



Cr Ka1

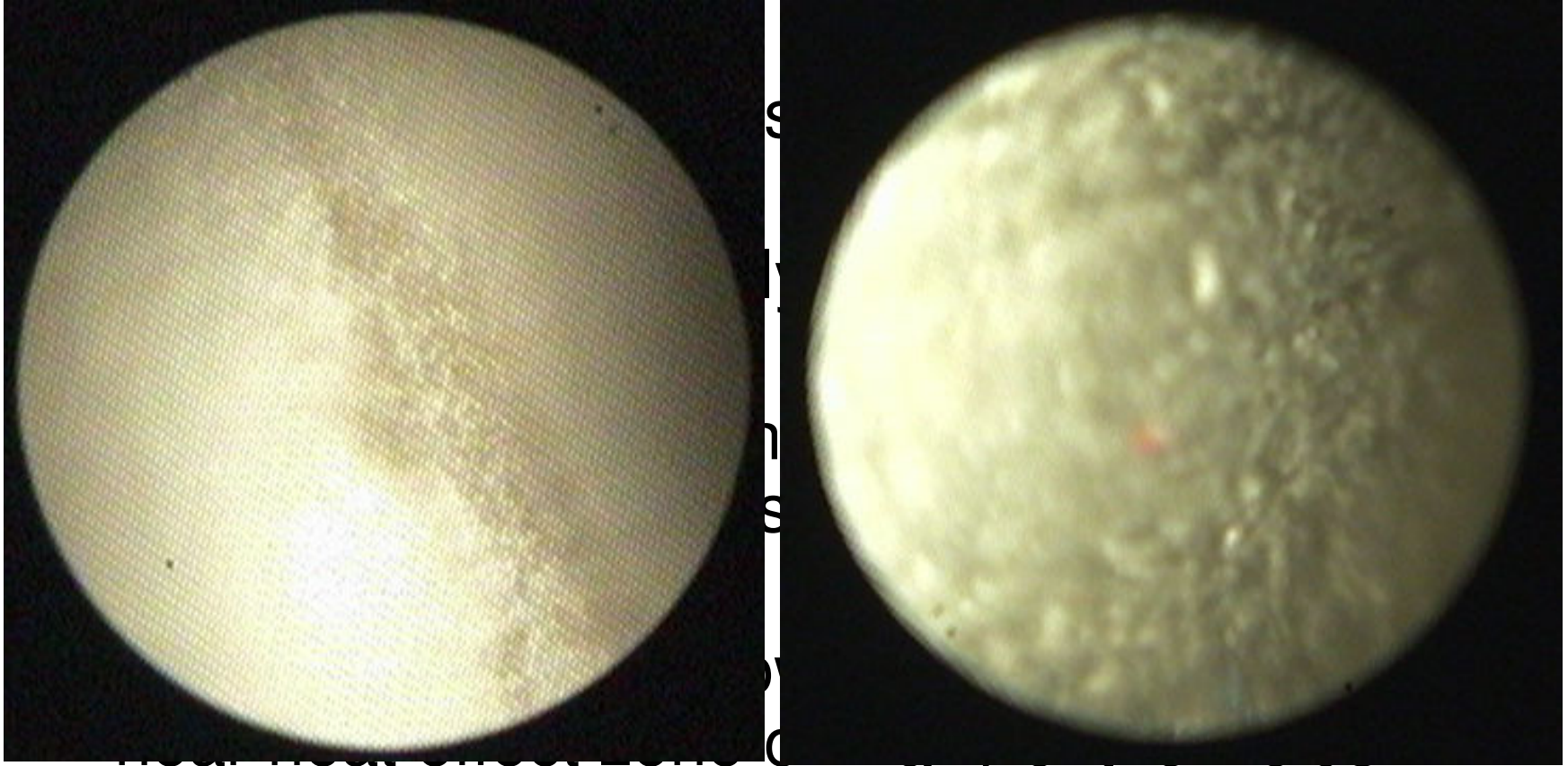


Ni Ka1

Solvating Contaminant

- Hexane
 - Dissolved pump oil but not contaminant
- NMP
 - Dissolved polysulfone but not contaminant or pump oil
- Alcohols, Acetone, and Nitric Acid did not dissolve oil, contaminant or polysulfone.
- 50% Sulfuric acid solvated contaminant alone in about 12 hours. 316 SS is dissolved by sulfuric acid.

Manifolds



Suspect Contaminant -

Microbiologically Influenced Corrosion



C.Cooper

Current Progress

- Sanitized system and flushed completely.
- Run system with 2 filters.
- Rinse single cell cavity and cold test.
 - If favorable test results achieved continue using system as is temporarily.
- Manufacture new manifolds with better specification of weld beads and surface finish. (Possibly fix old manifolds)