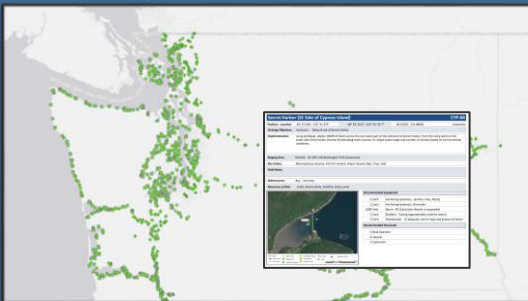


Cradle-to-Grave: Post Fire Lithium-Ion Battery Cleanup & Disposal

Sean M. Thompson, Ph.D. & Mark Furnish

Energy And Lithium-Ion Battery Symposium - February 2024

ECOLOGY HAZMAT



Prevention Section

- Commercial Deepwater Vessel and Oil Transfer Inspections
- Facility Inspections (Pipelines, Refineries)
- Maritime Traffic Risk Modeling

Preparedness Section

- Oil Industry Contingency Plans & Exercises
- Geographic Response Plans
- NW Area Contingency Plan
- Contractor Certification

ECOLOGY HAZMAT

Response Section

- Oil and hazmat response
- Drug lab cleanup
- Spill Damage Assessment and Restoration
- Firefighting and Hazmat Equipment Grants
- Spill Investigation and Enforcement



Oil	3,020
Hazmat/Pollutant	1,320
Vessel Incident	91
Vessel Spill	57
<u>Drug Lab</u>	<u>45</u>
2023 Total	4,533



ECOLOGY HAZMAT

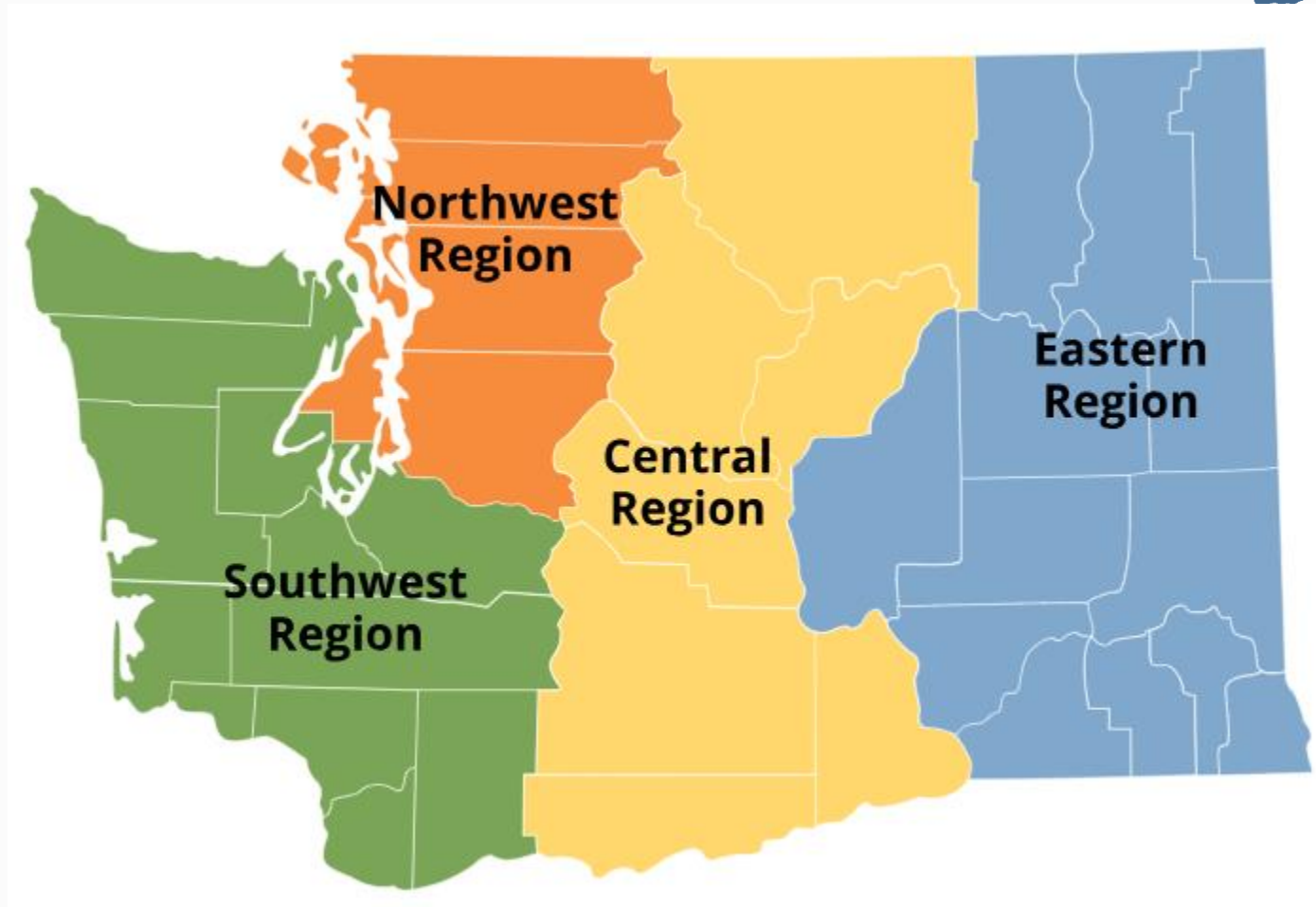
Response Section – Special Services

- Incident Management Team Support
- Community Air Monitoring
- Unknown Chemical Identification & Disposal
- Oiled Wildlife Response
- Compel Spillers to Cleanup – Regulatory Authority
- Fund Cleanup Actions and Recovery Costs

Response Staffing Statewide (FTEs:17 / After-Hours: 25)



- **Southwest Region:**
360-407-6300
- **Vancouver:**
360-690-7171
- **Northwest Region:**
206-594-0000
- **Bellingham:**
360-255-4400
- **Central Region:**
509-575-2490
- **Eastern Region:**
509-329-3400



National Response Center: 800-424-8802

WA Emergency Management: 800-258-5990



OUTLINE

- 1** **Spokane Home Depot Fire: Li-ion Batteries**
May 19, 2022
- 2** **Spokane Fire Li-ion Battery Town Hall**
October 25-27, 2022
- 3** **Fairfield Electric Vehicle Fire**
June 26, 2023
- 4** **Spokane Residential Battery Fire**
July 21, 2023
- 5** **Spokane Central YMCA Battery Failure**
January 23, 2024
- 6** **Post Fire Cleanup and Disposal**
Response Pre-Planning and Partnerships



Spokane Home Depot Fire: Li-ion Batteries

May 19, 2022



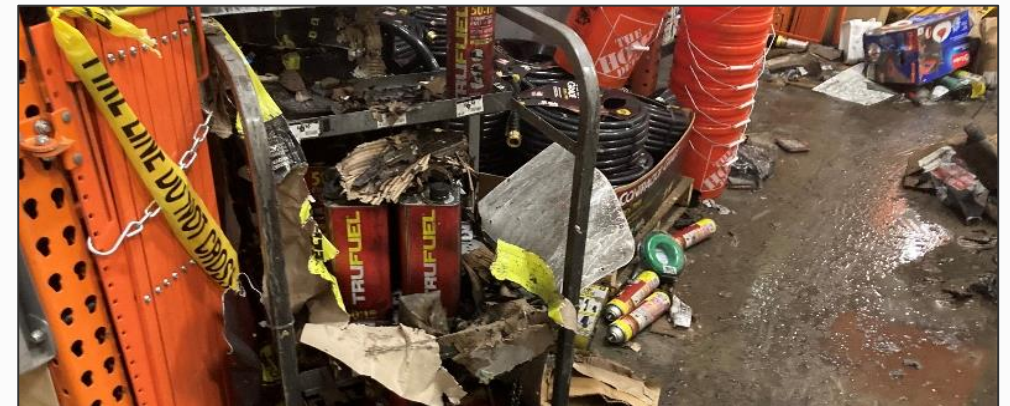
Photo: Spokesman Review



Spokane Home Depot Fire: Li-ion Batteries



Spokane Home Depot Fire: Li-ion Batteries





Spokane Fire Li-ion Battery Town Hall

October 25-27, 2022



SPOKANE



Lithium Battery Fires Town Hall

Oct. 25-27

0800-1700

Spokane Fire Department
Training Center
1618 N. Rebecca St.



Discussing Li-ion Challenges for:

- Municipal
- Fire Service
- Investigations
- Transportation
- Storage
- Tow & Salvage
- Disposal

Live Li-ion Battery Fire Experiments
& Classroom Presentations focusing
on risk mitigation.

Featured Presenters

ATF Fire Research Lab
WA National Guard 10th
Civil Support Team
WA Dept. of Ecology
US Department of Energy
FDNY - Hazmat
West Pierce Fire
UL - Fire Service Research
Institute (FSRI)
U.S. DOT
PNNL



Spokane Fire Li-ion Battery Town Hall









Method File: Air Confirm Standard
Result Date: 2022-10-27 20:59:06
Instrument: G510-00206 G510 510-00206
Last GPS Location: Lat: 47.967831 Lon: -117.417087 Alt: 668
Total number of targets: 19

Non Internal Standard Compounds

#	Ret. Time	Compound	Quant Ion	GMF	MF	RI	Conc.	Mass	Volume	Area	S/N	Quant Ion Intensity
1	0.82	Methylenecyclopropane	54	n/a	63	n/a	n/a	0	49	11.84M	0	574288
2	1.41	Benzene	78	n/a	73	n/a	n/a	0	49	47.08M	0	1182202
3	2.18	Toluene	92	n/a	89	n/a	n/a	0	49	14.79M	26.5	1798448
4	2.69	Ethylbenzene	91	n/a	86	n/a	n/a	0	49	2.765M	23.9	1313195
5	2.73	p-Xylene	91	n/a	97	n/a	n/a	0	49	6.319M	14.1	1906775
6	2.87	Styrene	103	n/a	90	n/a	n/a	0	49	5.807M	41	1989721
7	3.03	Silane, methyl-diethoxyisopropoxy-	177	n/a	66	n/a	n/a	0	49	3.376M	0	1688105
8	3.07	Bromobenzene	156	n/a	86	n/a	n/a	0	49	170439	1.2	87652
9	3.63	Phenol	94	n/a	96	n/a	n/a	0	49	48.29M	3.3	2419307
10	3.82	o-Cresol	108	n/a	96	n/a	n/a	0	49	1.993M	13.1	629716
11	3.93	p-Cresol	107	n/a	96	n/a	n/a	0	49	3.986M	25.2	1664151
12	4.06	Benzonitrile, 3-methyl-	116	n/a	78	n/a	n/a	0	49	2.944M	0	1820950
13	4.34	2,6-dimethylphenol	107	n/a	80	n/a	n/a	0	49	2.034M	76.1	1268071
14	4.43	Naphthalene	128	n/a	88	n/a	n/a	0	49	6.379M	56.4	2789584
15	4.97	2-methylnaphthalene	141	n/a	92	n/a	n/a	0	49	547378	1.3	434890
16	5.38	Biphenyl	154	n/a	98	n/a	n/a	0	49	1.297M	26.1	612417
17	5.61	Acenaphthene	154	n/a	65	n/a	n/a	0	49	123195	2.7	72789
18	5.72	Acenaphthylene	152	n/a	94	n/a	n/a	0	49	933738	49.6	690244
19	5.81	2,2-dimethylbutane	71	n/a	70	n/a	n/a	0	49	41990	2.8	19181

Non Internal Standard Compounds

#	Ret. Time	Compound	Quant Ion	GMF	MF	RI	Conc.	Mass	Volume	Area	S/N	Quant Ion Intensity
1	5.27	p-Cumenol	121	n/a	75	n/a	n/a	0	1	1.833M	42.5	619801
2	5.77	Benzene, 1-ethyl-2,4-dimethyl-	134	n/a	71	n/a	n/a	0	1	503715	15.4	145953
3	6.18	Biphenyl	154	n/a	71	n/a	n/a	0	1	380708	16	149716
4	6.28	1-Octanol	55	n/a	78	n/a	n/a	0	1	62229	15	46953
5	6.33	2,2-dimethylbutane	57	n/a	89	n/a	n/a	0	1	83284	11.8	68233
6	6.56	Acenaphthylene	152	n/a	84	n/a	n/a	0	1	362341	11.4	114901
7	7.24	2-Propyl-1-pentanol	55	n/a	68	n/a	n/a	0	1	249268	27.1	138053
8	7.27	Tridecane	57	n/a	80	n/a	n/a	0	1	215247	25.6	183224
9	8.09	1-Hexadecanol	55	n/a	76	n/a	n/a	0	1	411471	0	315285
10	8.43	10-Nonadecanone	57	n/a	62	n/a	n/a	0	1	108028	0	73860





UNRECYCLED
POLYETHYLENE
TEREPHTHALATE (PET)

UNRECYCLED
POLYETHYLENE
TEREPHTHALATE (PET)

UNRECYCLED
POLYETHYLENE
TEREPHTHALATE (PET)

SPO
AMB

S
A



Fairfield Electric Vehicle Fire

June 26, 2023



Fairfield Electric Vehicle Fire



Fairfield Electric Vehicle Fire



Fairfield Electric Vehicle Fire



Fairfield Electric Vehicle Fire





Spokane Residential Battery Fire

July 21, 2023



Photo: Spokane Fire

Spokane Residential Battery Fire



Spokane Residential Battery Fire



Spokane Residential Battery Fire

- CellBlockEX





Spokane Central YMCA Battery Failure

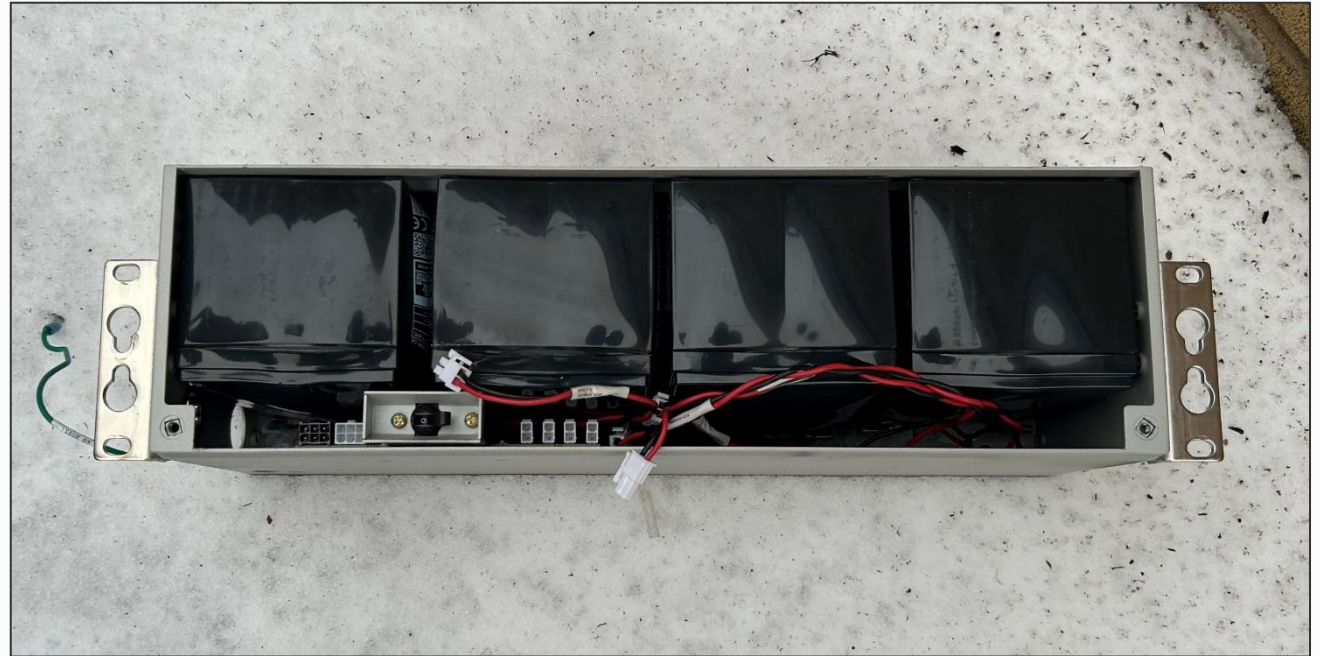
January 23, 2024



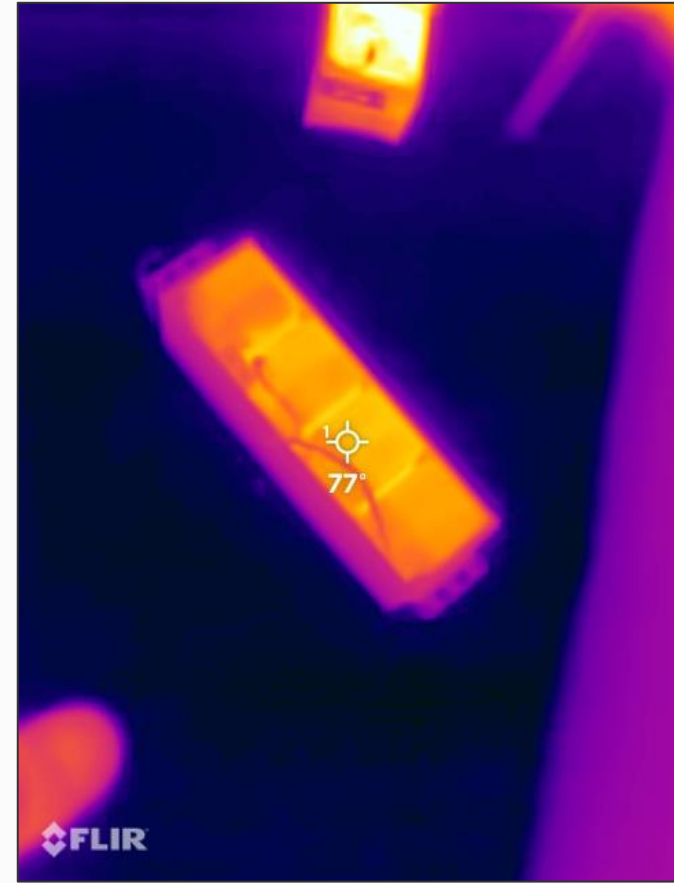
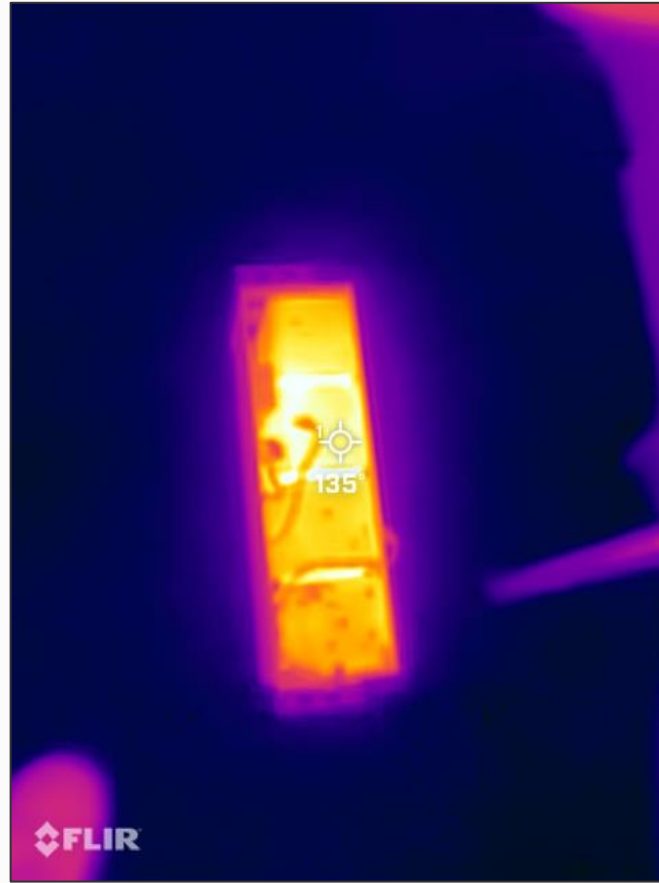
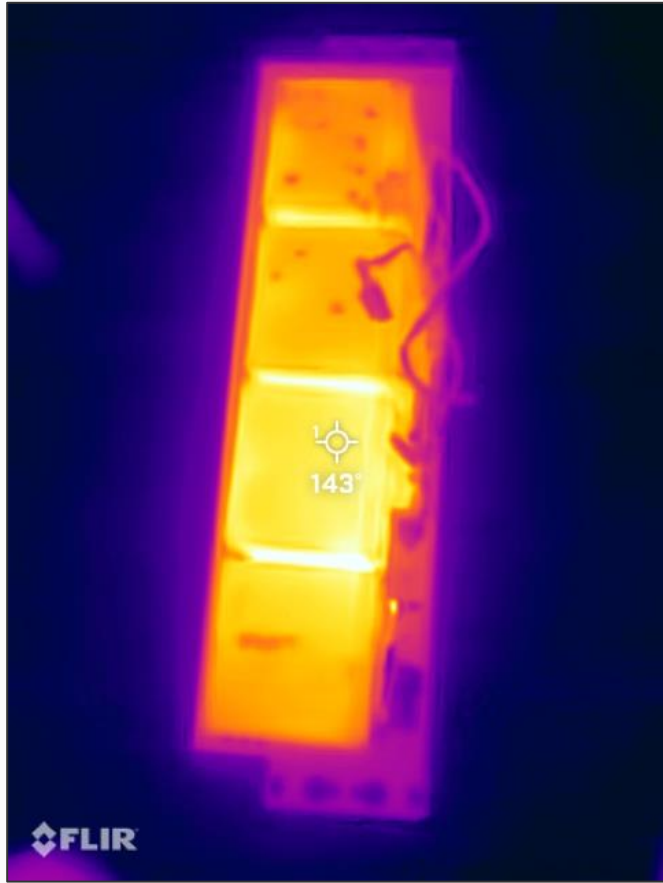
Photo: Spokane Fire

Spokane Central YMCA Battery Failure

- FIRE CALL: Smoke in electrical room coming from alarm panel.
- 1st Engine in observed smoking backup batteries, request HAZMAT respond.
- Engine Co. isolates and removes batteries from building to limit exposures.
- TIC show decrease in temp over time.



Spokane Central YMCA Battery Failure



143°C

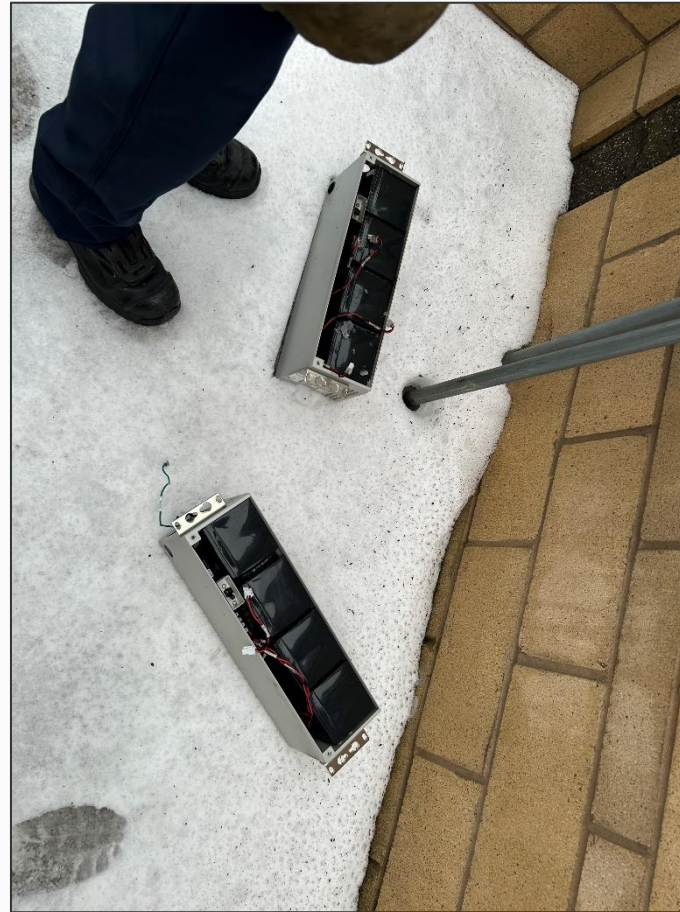


135°C



77°C

Spokane Central YMCA Battery Failure





Post Fire: Cleanup & Disposal

Response Pre-Planning
& Partnerships



Post Fire: Cleanup & Disposal

- Ecology has the legal means to move fire damaged electric vehicles from the scene if: the Ecology SOSOC believes leaving the vehicle could be harmful to the public and/or the environment.
- Once moved to a safe location, Ecology can assist in making sure the waste is secure and to find a disposal outlet.

Post Fire: Cleanup & Disposal

- **WAC 173-303-145**
 - (b)(i) Where immediate removal, temporary storage, or treatment of spilled or discharged dangerous wastes or hazardous substances is necessary to protect human health or the environment, the department may direct persons to:
 - (A) Remove it without a manifest, by transporters who do not have EPA/state identification numbers;
 - (B) Temporarily store it at sites that are protective of human health and the environment and are secure from access by the public; and/or
 - (C) Treat it to reduce or control the hazards, under WAC 173-303-170.
 - (ii) When the department seeks to direct persons who are not responsible for a spill or discharge to carry out actions pursuant to this section, it will obtain their concurrence. It is the intent of the department that persons who provide these services may be deemed "good samaritans" under the provisions of chapter 70.136 RCW.

Post Fire: Cleanup & Disposal

- ***Dangerous Waste Regulations Chapter 173-303***
 - “Ecology can direct the transport and temporary storage of wastes/substances to sites removed from direct threat of exposure to the public or the environment (e.g., stream banks, residential neighborhood), reduced or restricted access by the public, and with the knowledge or control of public officials or cooperative private parties. Secure sites may include “hazo houses”, public works facilities, fire stations, police stations and military bases. “Temporary” is left undefined but is intended to be of sufficient duration to allow Ecology to arrange for pick-up and transport by hazardous waste contractors in a timely and cost-effective manner.”

Post Fire: Cleanup & Disposal

- 1) Ecology's lead responder determines the vehicle is a danger to people or the environment.
- 2) The responder calls support personnel at Ecology's Headquarters and a plan is created to move the waste to a safe location. One of Ecology's contractors may be called to assist. If the waste is moved by governmental entity, no paper work is required (the term required is key). If moved by NGOs, only a BOL is required.
- 3) A permit is not required nor are standard storage regulations.
- 4) Once the waste is moved, Ecology can a) Arrange for pick-up and disposal or assist the RP in doing that. b) arrange for security of the waste or have the waste put in an already secured area (or assist the RP in doing so) c) store until final disposal arrangements are obtained.

THE WASTE WON'T JUST SIT THERE and YOU DO NOT HAVE TO TRANSPORT to YOUR STATION.

Ecology has the legal means to move burnt Electric Vehicles, Batteries or other dangerous waste from the road (or other scenes). That can happen only if the **Ecology** on-scene IC believes leaving it there could be harmful to other people and/or the environment (IC must record that decision in writing). Once moved to a safe location, Ecology can assist in making sure the waste is secure and to find a disposal outlet.





Building Response Partnerships



Spokane Fire
Regional HAZMAT
Response Team



ATF
Fire Science and
Investigation



WSP State Fire
Marshal
Hazmat



Spalding Auto
Recyclers

Ecology Equipment Cache Grant Program

- **Eligible Applicants**
 - Washington counties, cities, and municipalities
 - Other state recognized local governments
 - Federally recognized Tribal governments
- **Eligible Projects**
 - Purchase New Equipment
 - Training and Certifications
 - Maintenance of previous Awarded Equipment
- **Next Cycle Opens: Fall 2025**



Ecology Contact: Laura Hayes
Laura.hayes@ecy.wa.gov
(425) 495-2632



Thank you

Sean M. Thompson, Ph.D.

sean.thompson@ecy.wa.gov

509-824-3332

Mark Furnish

mark.furnish@ecy.wa.gov

360-584-4257