Use of National Emissions Inventory Data for Development of Regulatory Reporting Requirements in Canada

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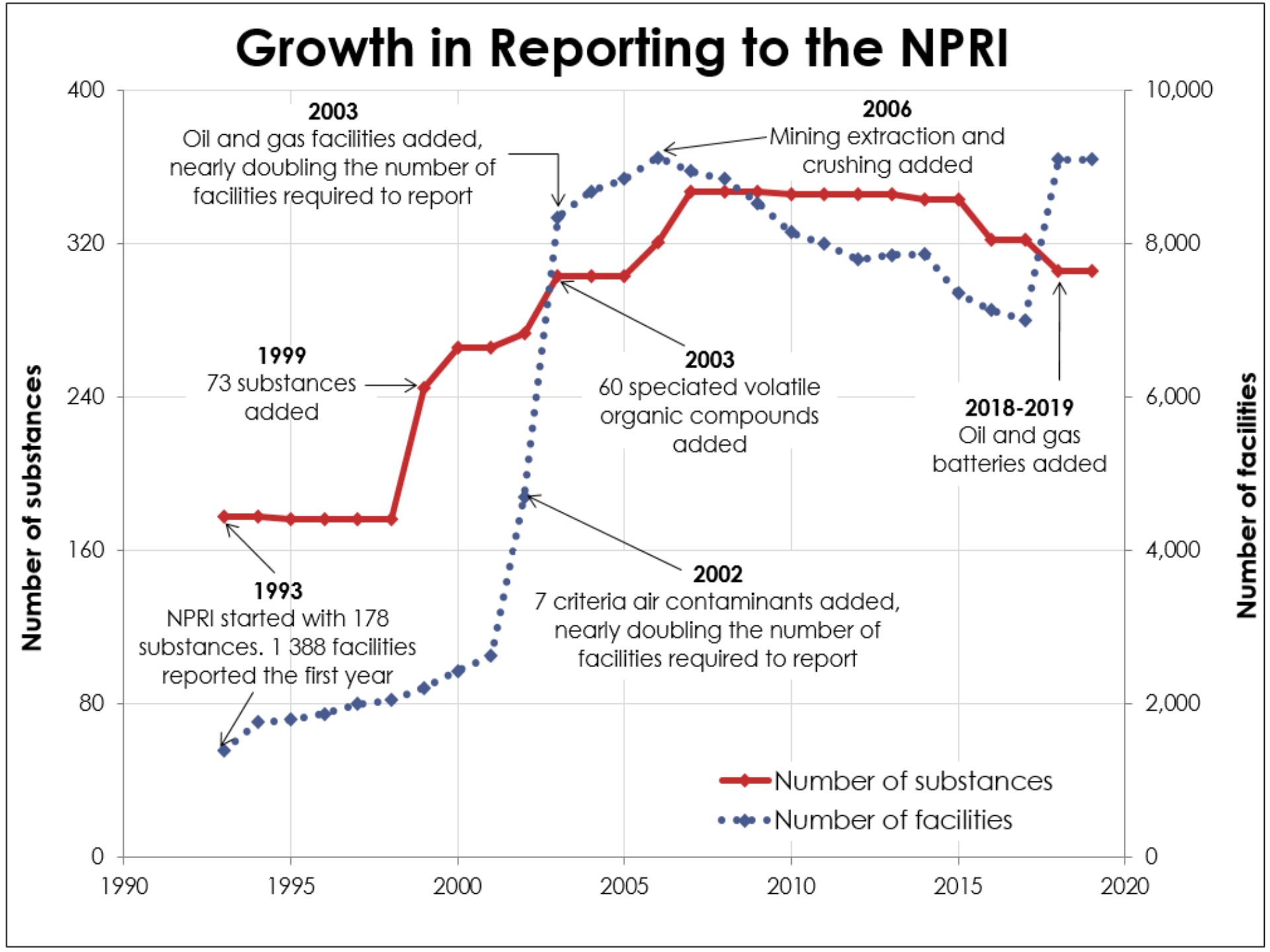
The National Pollutant Release Inventory

- The National Pollutant Release Inventory (NPRI) collects information from Canadian industrial, commercial and institutional facilities on their releases (to air, water and land), disposals, and transfers
- Over 300 pollutants and other substances of concern including
  - 7 criteria air contaminants (CACs)
  - 170+ volatile organic compounds

Changes to NPRI Reporting Requirements

- Requirements are published every two years
- Any party in Canada (person, government or organization), may submit proposals to change NPRI reporting requirements
- Proposed changes are considered using a public consultation process, informed by analysis of existing datasets where possible


Growth in Reporting to the NPRI
Number of substances
Number of facilities
400
320
240
160
80
0
10,000
8,000
6,000
4,000
2,000
0
1990
1995
2000
2005
2010
2015
2020
2003
Oil and gas facilities added, nearly doubling the number of facilities required to report
2006
Mining extraction and crushing added
1999
73 substances added
2003
60 speciated volatile organic compounds added
2018-2019
Oil and gas batteries added
1993
NPRI started with 178 substances. 1 388 facilities reported the first year
2002
7 criteria air contaminants added, nearly doubling the number of facilities required to report
Number of substances
Number of facilities

Reporting Requirements for CACs

- CACs must be reported if the facility meets the threshold for quantities released to air
- Emissions from individual stacks that are 50 metres or more in height above grade must be reported if the stack air release threshold is met

Reporting Thresholds for CACs

CAC	Facility-wide air release threshold (tonnes)	Stack air release threshold (tonnes)
NO_2	20	5
SO_2	20	5
$PM_{2.5}$	0.3	0.15
PM_{10}	0.5	0.25
CO	20	5
Total VOCs	10	5

Reporting Requirements for Individual VOCs

- Individual VOCs must be reported if 10 tonnes or more of total VOCs are released by the facility and if the VOC is released to air in a quantity of 1 tonne or more
- Emissions from individual stacks that are 50 metres or more in height above grade must be reported if the stack releases 5 tonnes or more of total VOCs

Proposed Changes to Reporting Requirements for CACs

- Data users requested that more information be collected on CAC releases from individual stacks
- Since Canada does not have a nation-wide, process-level inventory of air emissions from facilities, US NEI data are often used to evaluate potential changes to Canadian reporting criteria
- Analyses of 2014 NEI data are currently being used to propose new NPRI reporting requirements for CACs

Data Sources

- In order to determine the best type of criteria for stack reporting, two stack databases were analysed:
  - 2008 Alberta Industrial Air Emissions Survey
  - 2014 US National Emissions Inventory (ptegu, pt_oilgas and ptnonipm)
- NOx, SO_2, CO, total VOCs, and filterable $PM_{2.5}$ and PM_{10}

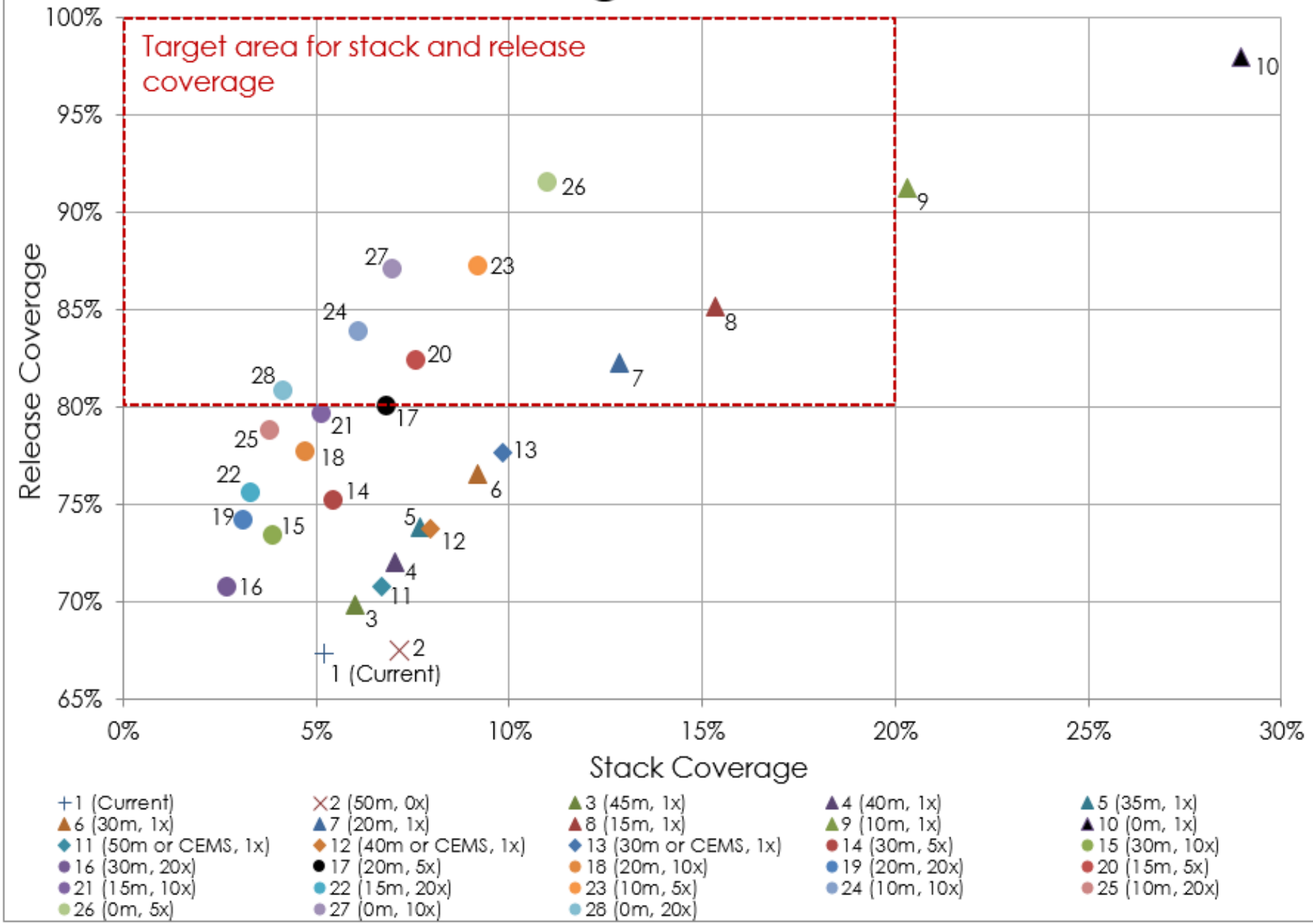
Criteria to Evaluate Thresholds

- In order to provide additional data for data users while minimizing additional reporting burden on facilities, the objective for individual stack reporting is to:
  1. Maximize the reporting of release quantities, as indicated by “release coverage” (the quantity of releases reported by individual stacks as a percentage of all stack releases) and
  2. Minimize the number of stacks required to report, as indicated by “stack coverage” (the number of stacks required to report for a CAC as a percentage of all stacks releasing that CAC)

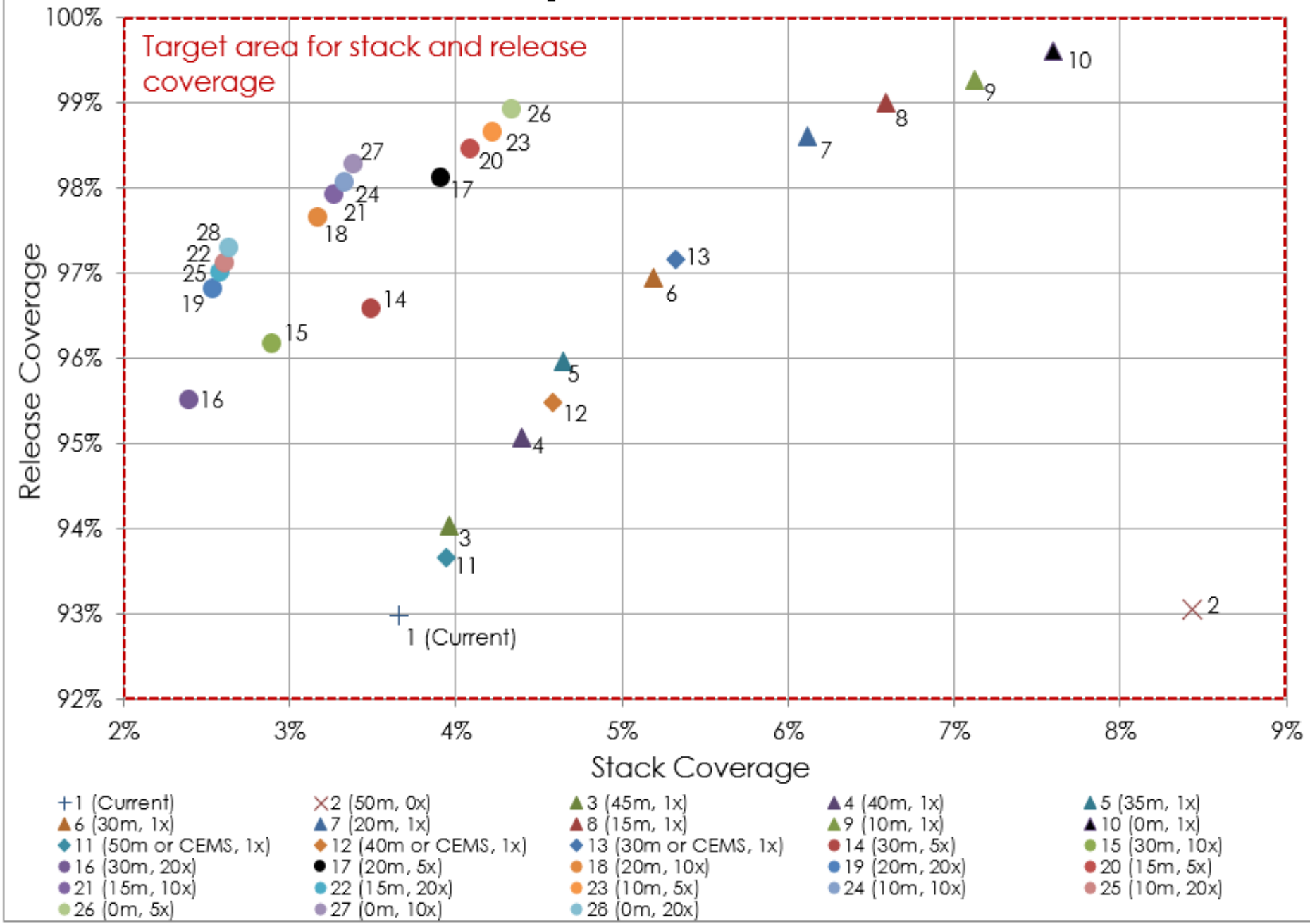
Scenarios to Evaluate Thresholds

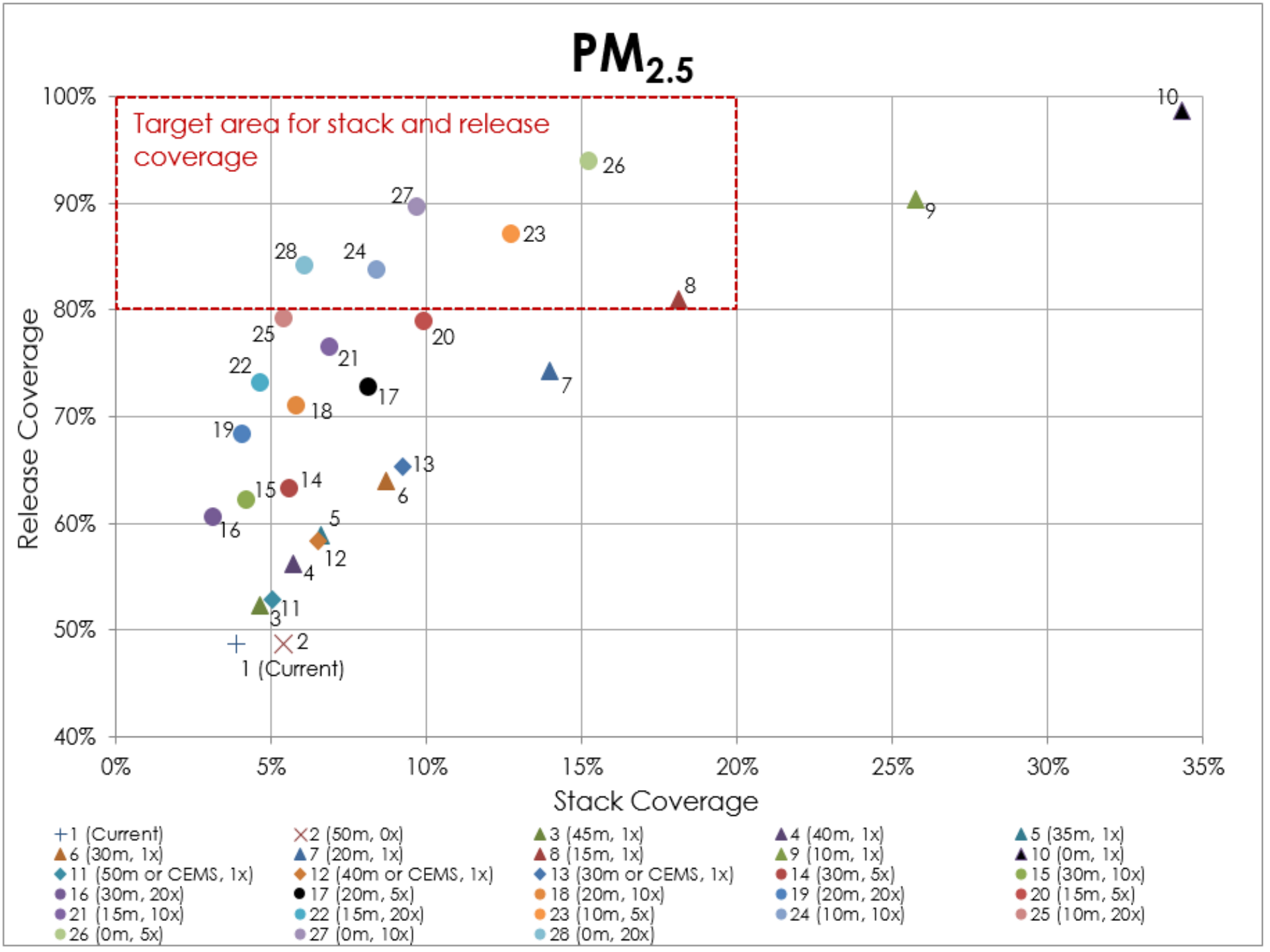
- Current NPRI reporting requirements
- No stack air release thresholds
- 8 scenarios where the only variable that was changed was the stack height threshold
- 3 scenarios where the requirement to report for stacks with CEMS installed was added
- 15 scenarios where the stack height threshold was reduced and the stack air release thresholds were increased
- 12 “trigger one, report all” scenarios

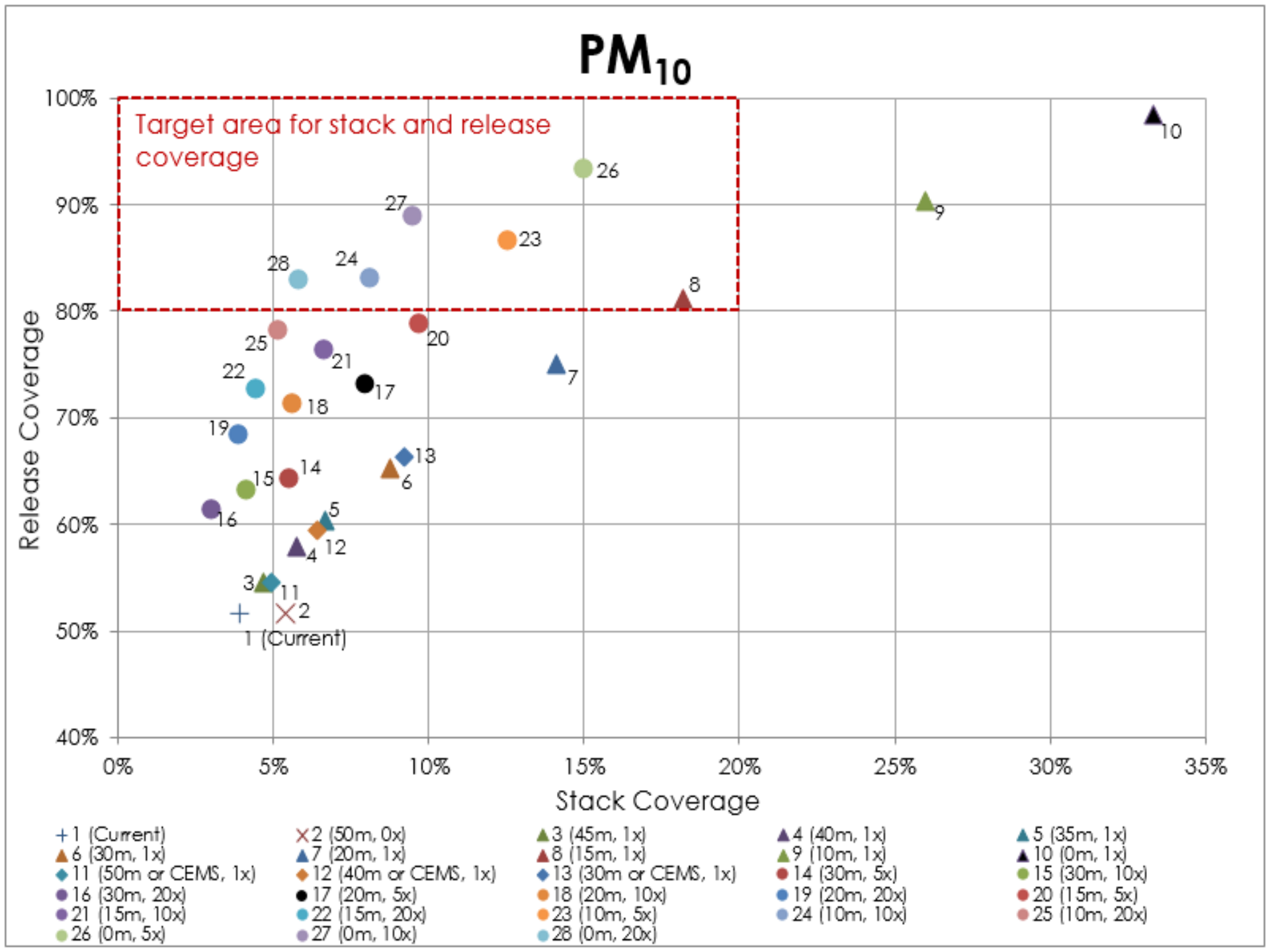
Nitrogen oxides



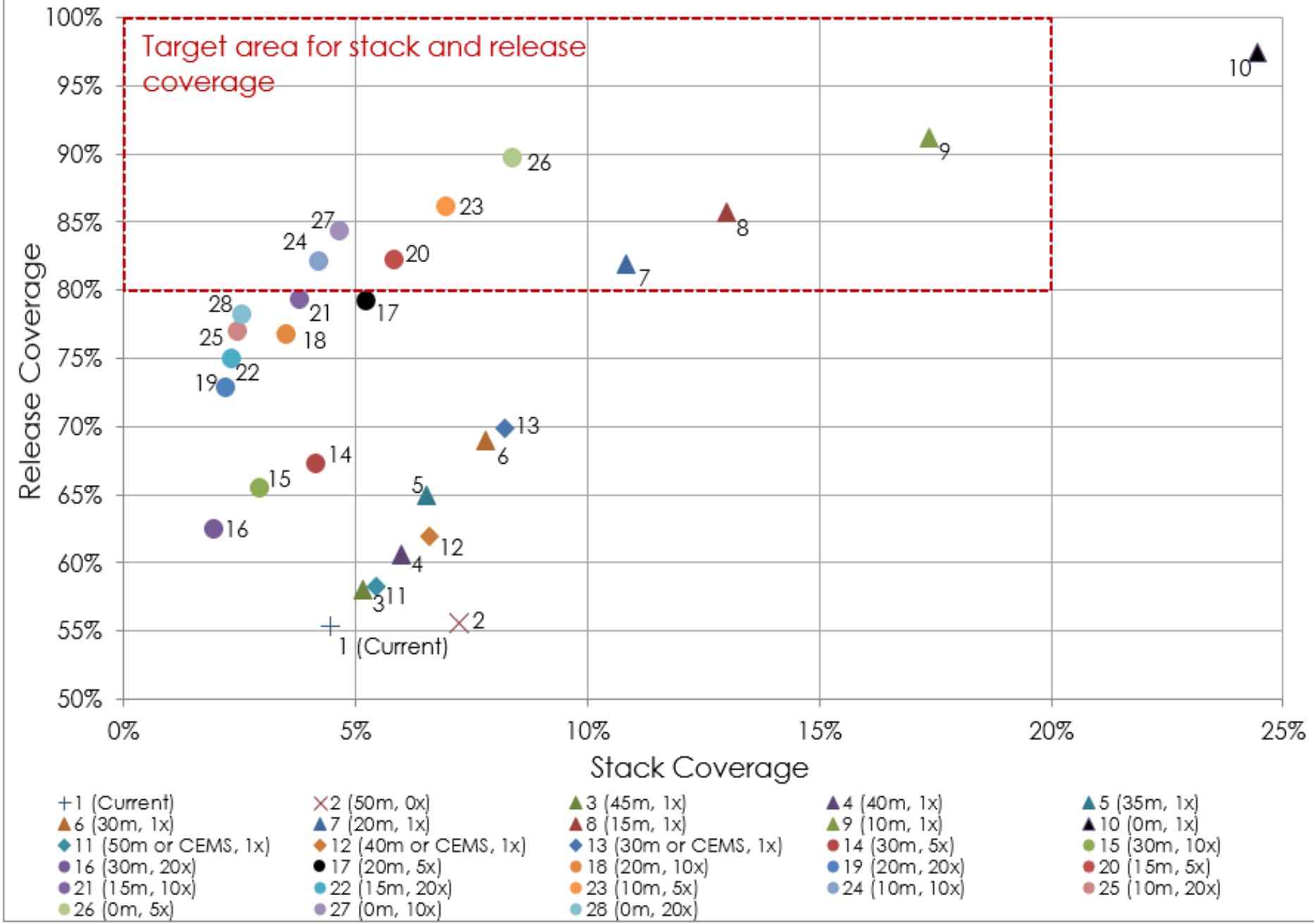
Sulphur dioxide




PM2.5
Target area for stack and release coverage
Release Coverage
Stack Coverage
100%
90%
80%
70%
60%
50%
40%
0%
5%
10%
15%
20%
25%
30%
35%
1 (Current)
2 (50m, 0x)
3 (45m, 1x)
4 (40m, 1x)
5 (35m, 1x)
6 (30m, 1x)
7 (20m, 1x)
8 (15m, 1x)
9 (10m, 1x)
10 (0m, 1x)
11 (50m or CEMS, 1x)
12 (40m or CEMS, 1x)
13 (30m or CEMS, 1x)
14 (30m, 5x)
15 (30m, 10x)
16 (30m, 20x)
17 (20m, 5x)
18 (20m, 10x)
19 (20m, 20x)
20 (15m, 5x)
21 (15m, 10x)
22 (15m, 20x)
23 (10m, 5x)
24 (10m, 10x)
25 (10m, 20x)
26 (0m, 5x)
27 (0m, 10x)
28 (0m, 20x)

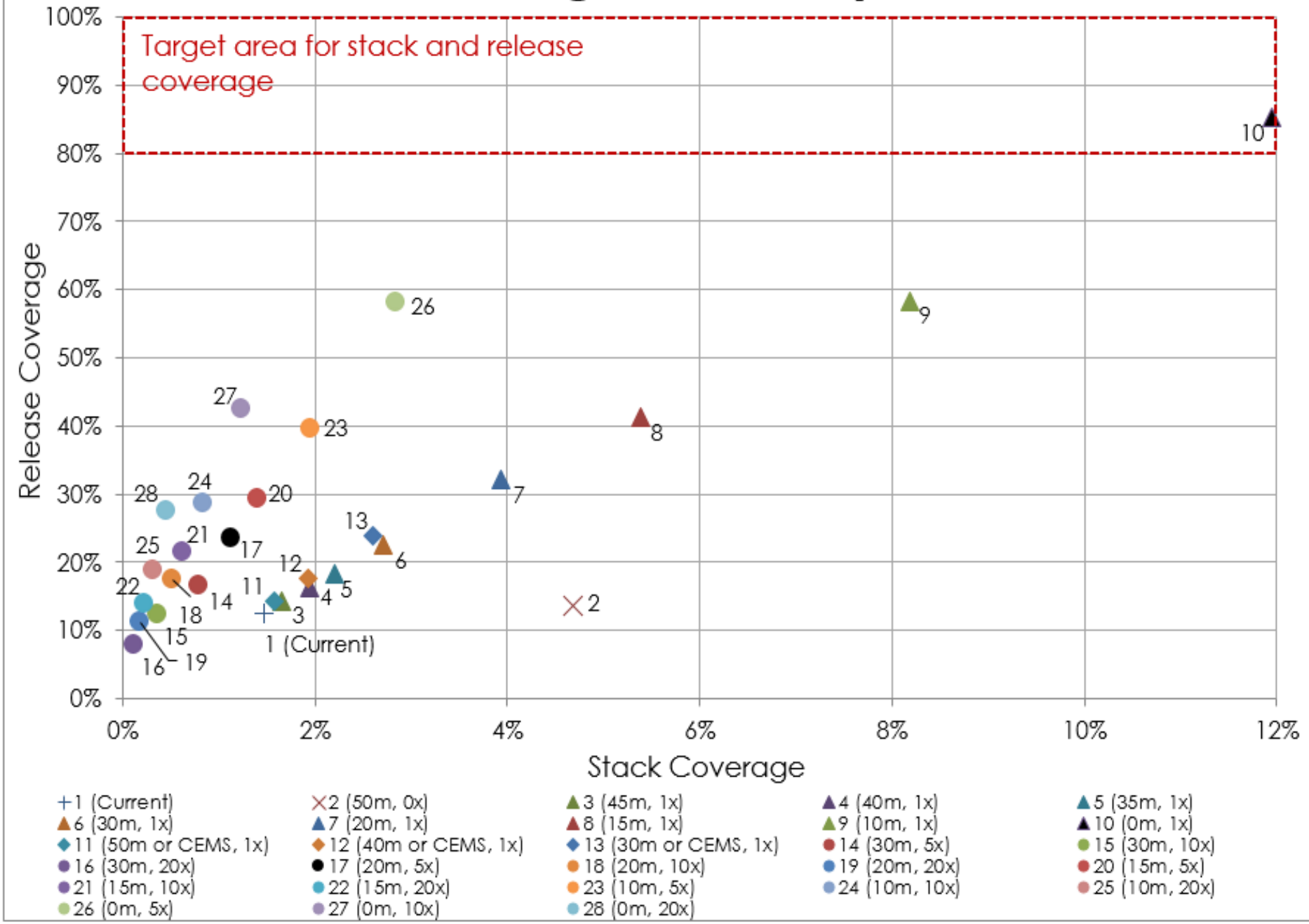

PM10
Target area for stack and release coverage
Release Coverage
Stack Coverage
100%
90%
80%
70%
60%
50%
40%
0%
5%
10%
15%
20%
25%
30%
35%
1 (Current)
2 (50m, 0x)
3 (45m, 1x)
4 (40m, 1x)
5 (35m, 1x)
6 (30m, 1x)
7 (20m, 1x)
8 (15m, 1x)
9 (10m, 1x)
10 (0m, 1x)
11 (50m or CEMS, 1x)
12 (40m or CEMS, 1x)
13 (30m or CEMS, 1x)
14 (30m, 5x)
15 (30m, 10x)
16 (30m, 20x)
17 (20m, 5x)
18 (20m, 10x)
19 (20m, 20x)
20 (15m, 5x)
21 (15m, 10x)
22 (15m, 20x)
23 (10m, 5x)
24 (10m, 10x)
25 (10m, 20x)
26 (0m, 5x)
27 (0m, 10x)
28 (0m, 20x)

Carbon monoxide



+1 (Current) ×2 (50m, 0x) ▲3 (45m, 1x) ▲4 (40m, 1x) ▲5 (35m, 1x)
▲6 (30m, 1x) ▲7 (20m, 1x) ▲8 (15m, 1x) ▲9 (10m, 1x) ▲10 (0m, 1x)
◆11 (50m or CEMS, 1x) ◆12 (40m or CEMS, 1x) ◆13 (30m or CEMS, 1x) ●14 (30m, 5x) ●15 (30m, 10x)
●16 (30m, 20x) ●17 (20m, 5x) ●18 (20m, 10x) ●19 (20m, 20x) ●20 (15m, 5x)
●21 (15m, 10x) ●22 (15m, 20x) ●23 (10m, 5x) ●24 (10m, 10x) ●25 (10m, 20x)
●26 (0m, 5x) ●27 (0m, 10x) ●28 (0m, 20x)

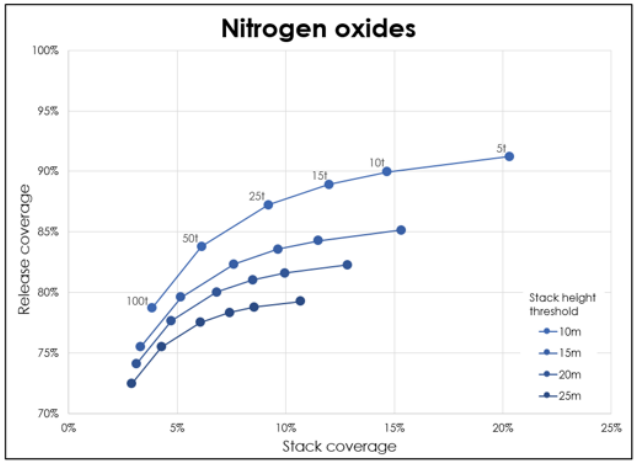
Volatile organic compounds

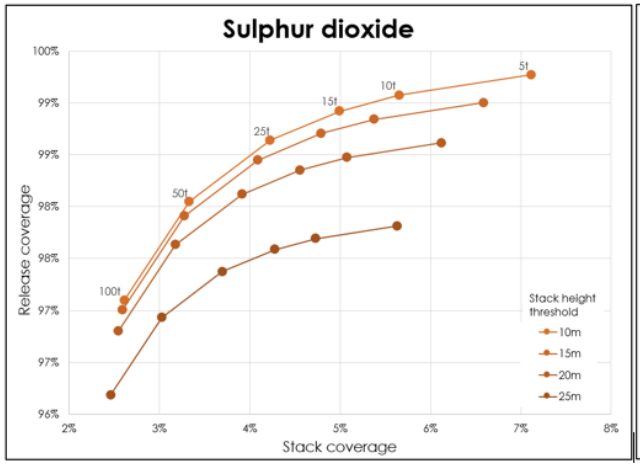


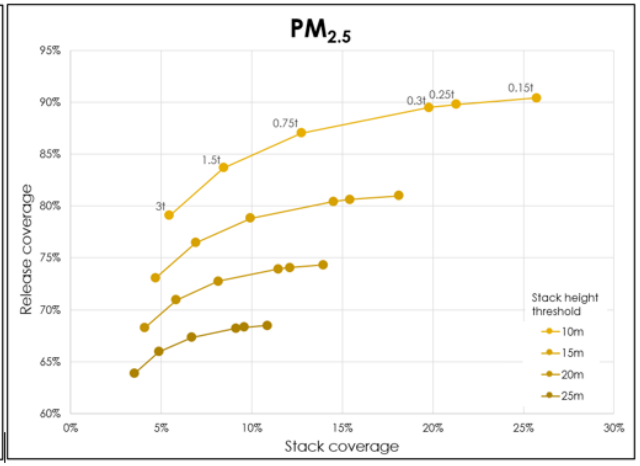
Conclusions

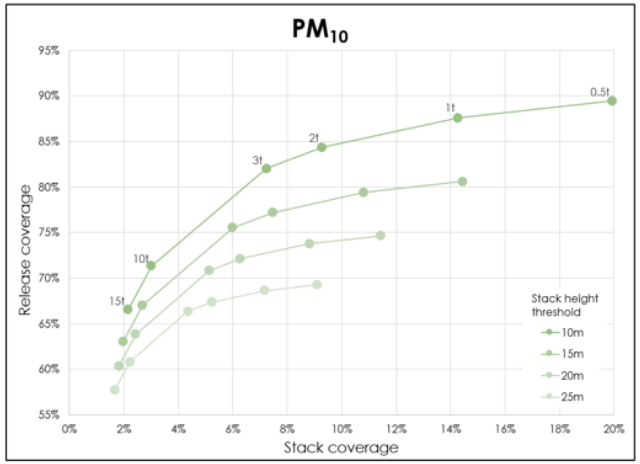
- Of the four types of scenarios evaluated, only the scenarios where the stack height threshold was reduced and the stack air release thresholds were increased met the targets
- Stack and release coverage rates were calculated for
  - 4 stack height thresholds (10m, 15m, 20m, 25m) and
  - 31 stack air release thresholds, ranging from 0.15 to 300 tonnes

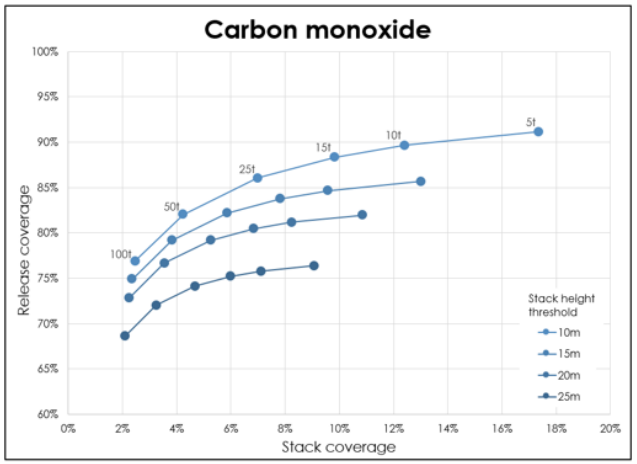
Stack and Release Coverage

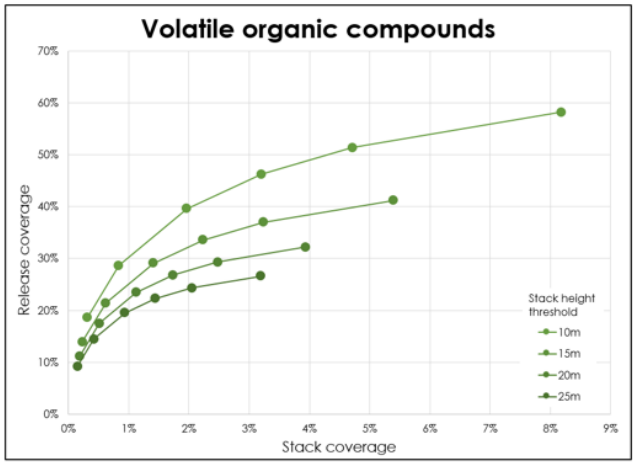












Proposed Changes to NPRI Reporting Requirements for CACs

- ECCC proposed to reduce the stack height threshold to 15m and increase the stack air release thresholds
- Expected to result in the stack and release coverage targets to be met for all CACs except total VOCs

CAC	Proposed stack air release threshold (tonnes)
NO_2	15
SO_2	100
$PM_{2.5}$	0.25
PM_{10}	0.75
CO	15
Total VOCs	25

Final Proposed Changes to NPRI Reporting Requirements for CACs

- ECCC revised the proposal to 25m with these stack air release thresholds

CAC	Current	Proposed	Final proposed
NO_2	5	15	15
SO_2	5	100	50
$PM_{2.5}$	0.15	0.25	1
PM_{10}	0.25	0.75	2
CO	5	15	15
Total VOCs	5	25	10

Next Steps

- Public consultations were completed in June 2019
- NPRI will consider the comments received
- Changes to requirements may be implemented beginning with the 2020 reporting year
- Further analyses of NEI data by source and for individual VOCs

Thank you!

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