Alternatives to Helium for Air In-leakage Detection in ACCs

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ACCUG 2022
September 13-14, 2022

Leak Detection Options

- Helium tracer gas leak detection is almost always used for AIL into the vacuum created by power plant condensers.
- Tracer gas leak detection can be challenging for use in Air-cooled Condensers:
  - large structure with difficult access to potential leak locations
  - thousands more potential leak locations than with indoor leak testing
  - air currents require that helium be applied close to the point of in-leakage
  - RESULT: time requirements and helium gas use are extensive
- Remote testing may provide an alternative to help with time and material use. Two primary options:
  - Infrared camera
  - Acoustic measurement

Helium AIL detection

- Standard approach for many years
  - excellent equipment specific to the intent of testing
  - extensive experience base in the utility industry
- Highly-experienced contract companies available – efficient, thorough
- Can be done in-house with equipment purchase and some training
- Routine process for applying helium, detecting leaks, interpretation

Infrared camera AIL detection

- Available for a couple of decades with limited application to AIL; current systems provide leak imaging convenience
- Setting temperatures can be adjusted to clearly distinguish cooler areas (where in-leakage is likely)
- Remote imaging readily available
- Potentially relatively rapid coverage of ACC AIL
- May be used as a screening tool to identify possible leaks with helium testing to confirm

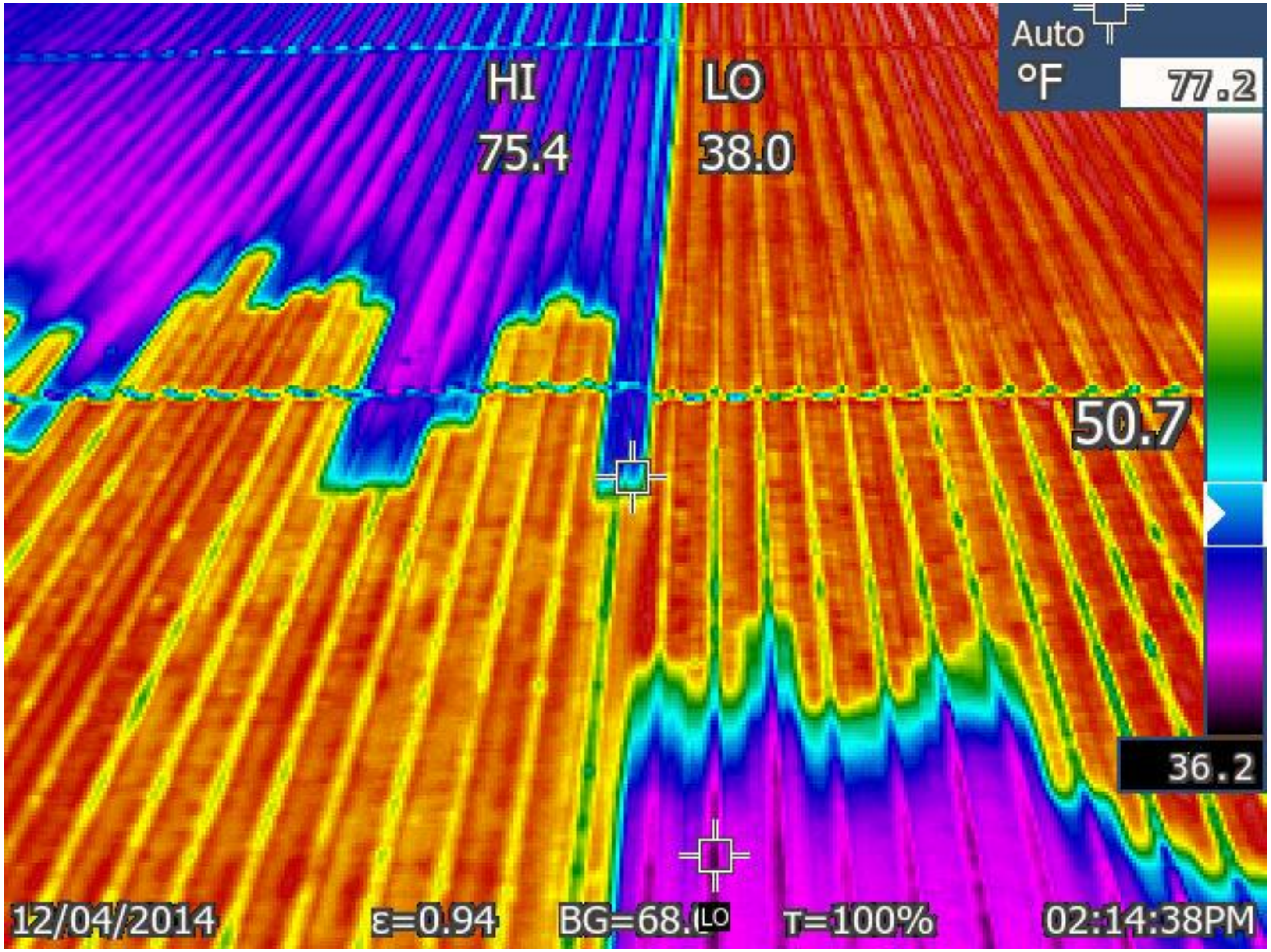
Infrared cameras

Raytek STPro

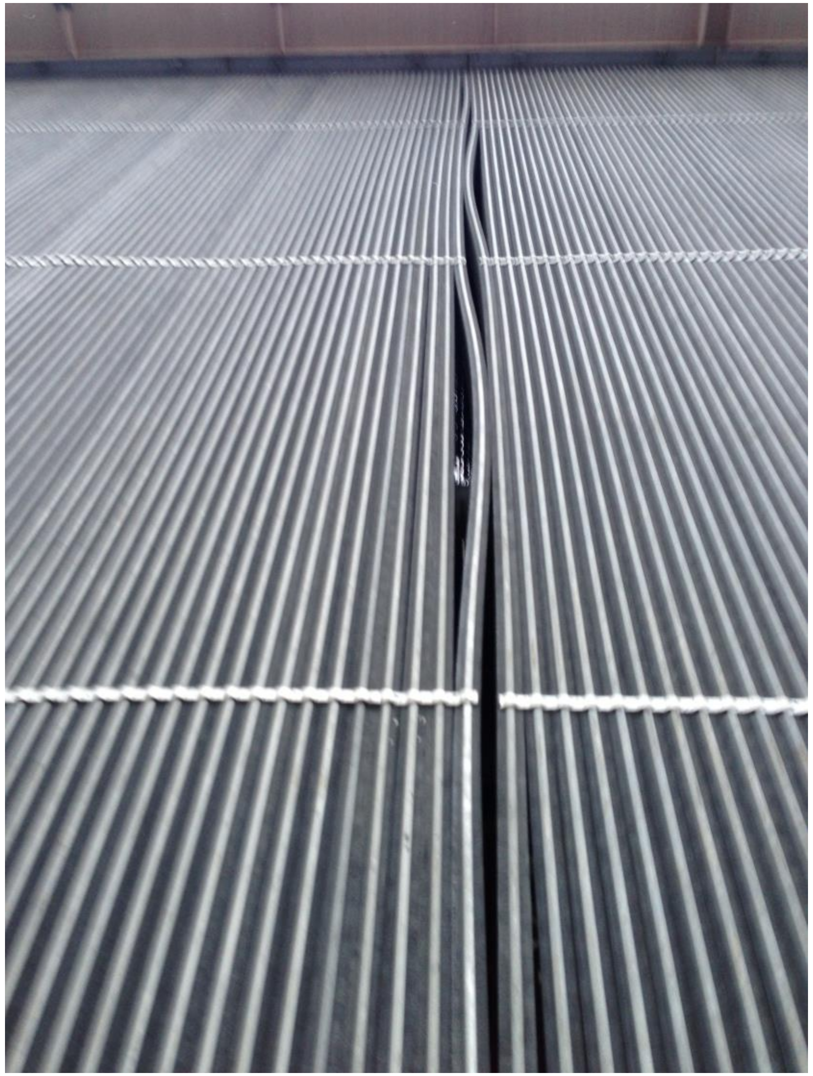
FLIR E6 Infrared Camera

Evidence of Air In-leakage

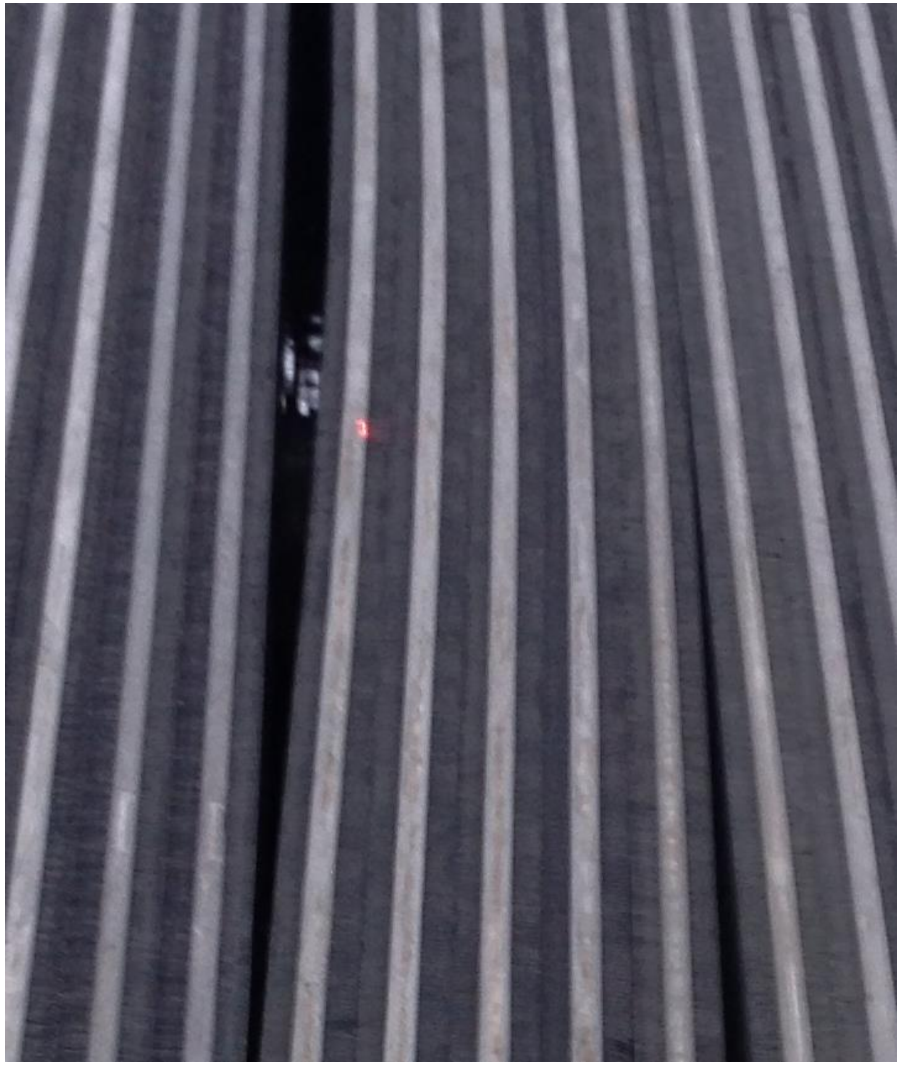
Interface – Secondary (Left) and Primary (Right) Tube Bundles



Infrared camera temperature measurement



Infrared camera temperature measurement



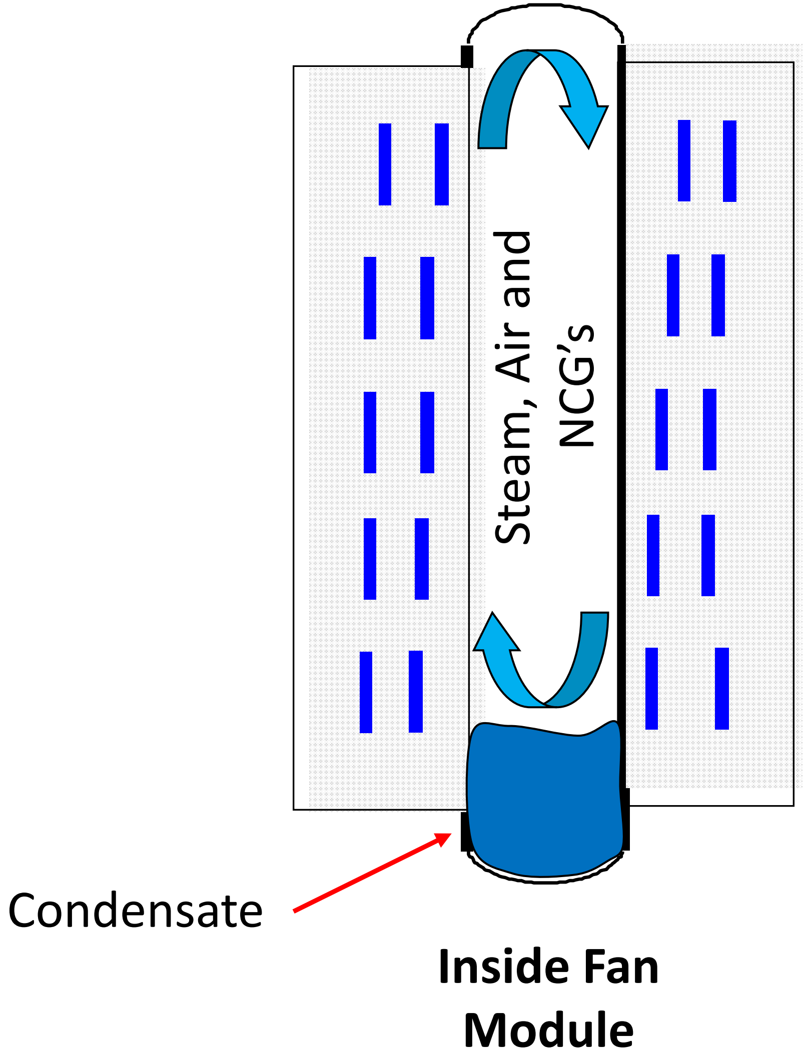
Infrared camera temperature measurement

Infrared camera temperature measurement

www.epri.com

Infrared Survey Tips

- IR images should be recorded on the outside of fan modules:
  - condensate will flow along bottom of tubes.
  - steam, Air and NCG's will flow above the water and along the top of the tube.
  - air cannot be detected from the inside of the fan module as it is shielded by the condensate
- IR testing requires that the ACC be in service
- Easier detection in cold weather (larger temperature differential)



Acoustic sensing AIL detection

- Earlier systems used headphones with human audio-detection; current systems provide imaging based on sound emitted from leak to pinpoint location
- Improvements in background noise cancellation and frequency range to categorize size of leak
- May be used as screening tool with helium testing as confirmation
- Best when unit is offline supporting vacuu

Acoustic sensing AIL detection

Distran Ultra Pro

Acoustic sensing AIL detection

October 19th 2021 22:35:55

Delete

Enter here a report name

Create report

Description

Description

ACC Street 700C

Inside North Centre Bottom.

Sound is apparent whether inside or outside See #005

Acoustic sensing AIL detection

October 19th 2021 22:42:04

Delete

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Create report

Description

Description

ACC Street 700C

Outside North Centre Bottom

Acoustic sensing AIL detection

October 19th 2021 22:56:31

Delete

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Create report

Description

Description

ACC Street 400E

Inside South East Bottom

Acoustic sensing AIL detection

October 19th 2021 23:17:50

Delete

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Description

Description

ACC Street 100E

Inside, South, East Bottom

Acoustic sensing AIL detection

October 19th 2021 23:22:35

Delete

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Description

Description

ACC Street 100E

Outside, South, Centre Bottom

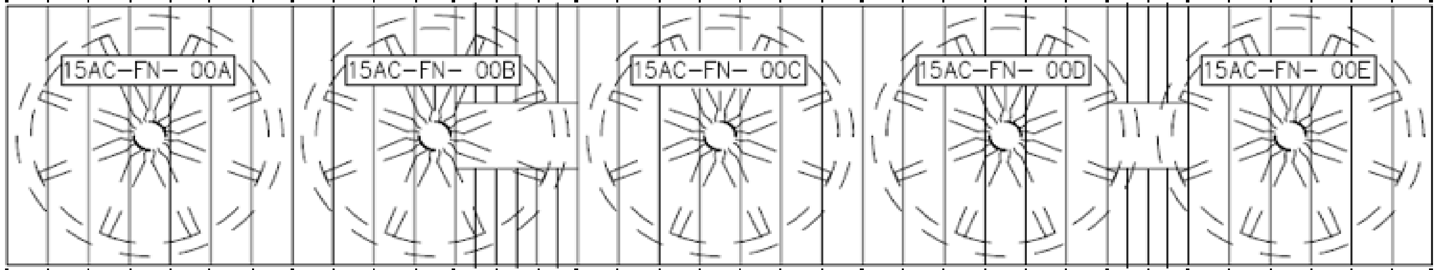
Documentation

STREET # 1

DATE:

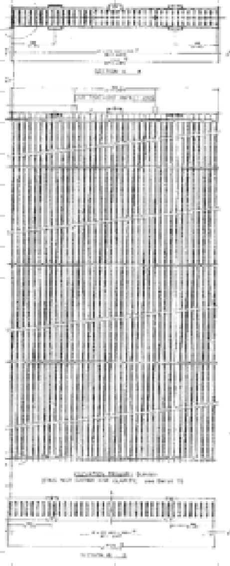
COMMENTS

INSIDE/OUTSIDE																																			
dB																																			
LEAK RATE																																			
TUBE NUMBER(S)																																			
DIRECTION	SOUTH																																		
FAN	A							B							C							D							E						
TUBE TYPE	PRIMARY											SECONDARY			PRIMARY													SEC		PRIMARY					
TUBE BUNDLE #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
LEAK?																																			



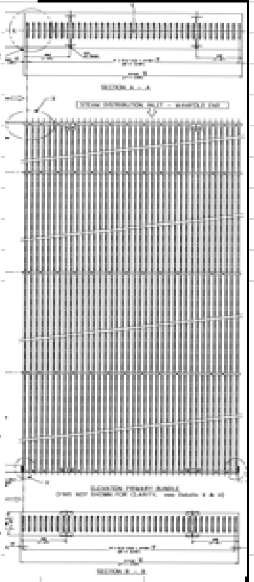
LEAK?																																			
TUBE BUNDLE #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
TUBE TYPE	PRIMARY											SECONDARY			PRIMARY													SEC		PRIMARY					
FAN	A							B							C							D							E						
DIRECTION	NORTH																																		

PRIMARY



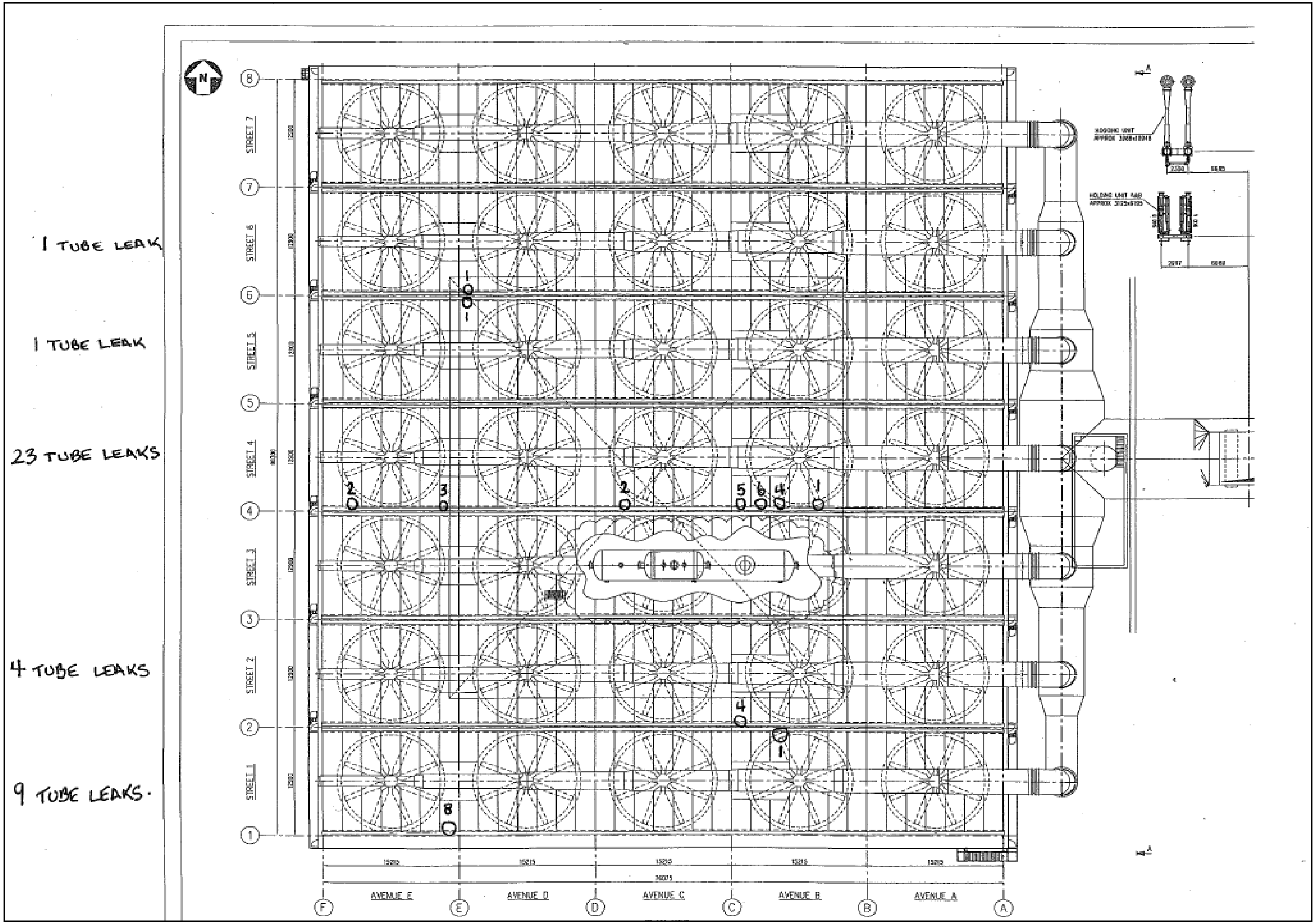
38 TUBES/BUNDLE

SECONDARY



38 TUBES/BUNDLE

Street 1 | Street 2 | Street 3 | Street 4 | Street 5 | Street 6 | Street 7 | Template | ACC Leak May 29, 2015 | ACC Leak Data Feb 9, 2015


1 TUBE LEAK
1 TUBE LEAK
23 TUBE LEAKS
4 TUBE LEAKS
9 TUBE LEAKS.
STREET 7
STREET 6
STREET 5
STREET 4
STREET 3
STREET 2
STREET 1
AVENUE E
AVENUE D
AVENUE C
AVENUE B
AVENUE A

Continuous Monitoring air exhaust flow rate
- recorded on DCS

Discussion


Together…Shaping the Future of Electricity