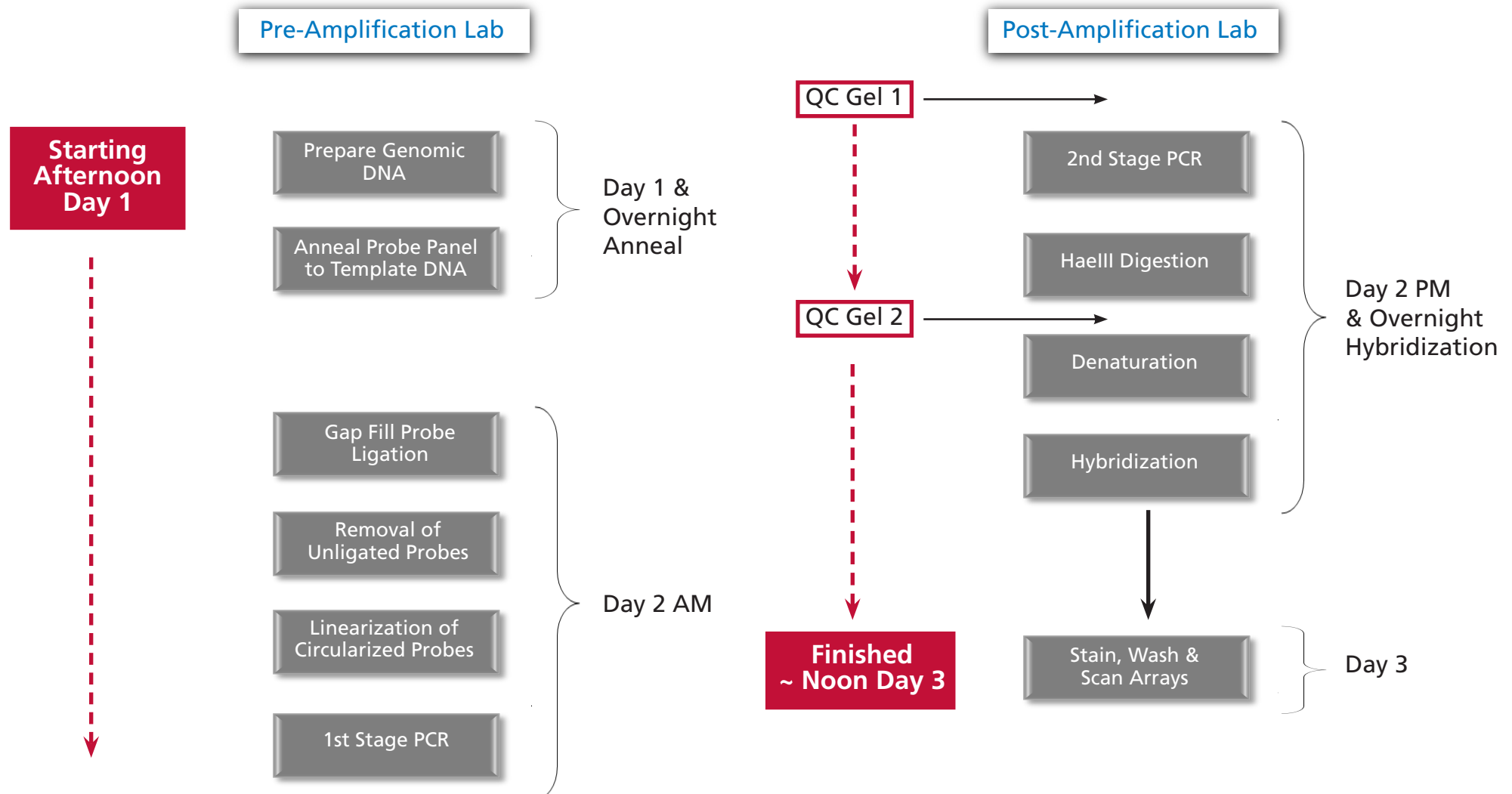


Quick Reference Card

OncoScan™ FFPE Assay Kit – 9 Samples

Workflow Overview

The Affymetrix® OncoScan™ FFPE Assay Kit protocol is optimized for processing 1 to 23 samples at a time to obtain whole genome copy number and Somatic Mutation information from FFPE samples using Affymetrix® OncoScan™ Tag Arrays. The OncoScan™ FFPE Assay Kit QRCs support processing of as few as 7 samples, two of which are a positive and negative control. This QRC is for 9 samples (including 7 FFPEs, 1 pos ctrl, 1 neg ctrl). This protocol is intended for research use only and is not intended for diagnostic purposes.

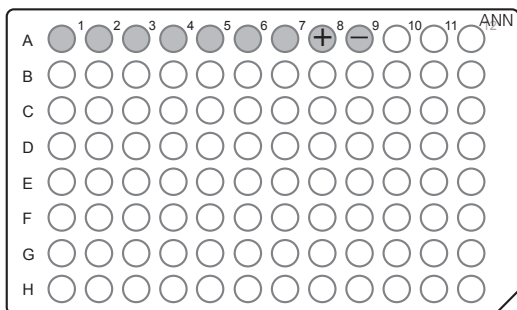


General Procedures

- Vortex plate after reagent addition: Always vortex plates at max speed for 5 seconds using 5-point plate vortexing.
- Spin down plate after reagent addition: Always spin at 2400 rpm for 1 min.
- Spin down plate after 1 min chill step: Always spin at 2400 rpm for 30 sec. Vortex enzymes: Always vortex for 1 second at max speed.
- Spin down enzymes: Quick spin down.
- Vortex Master Mix tubes: Vortex at max speed for 3 seconds.
- Spin down Master Mixes: Quick spin down.
- Plate handling before reagent addition: Reagents are always added to chilled plates. Chill the plate on a cold block for 1 min, then spin down at 2400 rpm for 60 sec.
- When pipetting, always pipette up and down 3 times to rinse the tips.
- When removing enzymes from the $-20\text{ }^{\circ}\text{C}$ freezer, use a cooler to transfer the tube to and from the bench.
- Always remove plate seals slowly and carefully as to not introduce any cross contamination from well-to-well.
- Ensure both plates are at the correct orientation (well A1 at the top left position) during plate-to-plate transfers.
- Program all of the thermal cyclers programs in “9700 Max mode” setting.

Sample Plate (Pre-Amp)

1. Add 6.6 μL FFPE gDNA at 12 ng/ μL to wells marked 1 through 7 in the plate diagram.
2. Add 6.6 μL of the positive control from the OncoScan FFPE Assay Kit to well marked 8.
3. Add 6.6 μL of TE (negative control) to the well marked 9 in the plate diagram.
4. Seal, vortex and spin the plate. Place plate on cold block if continuing assay. Otherwise freeze at $-20\text{ }^{\circ}\text{C}$.

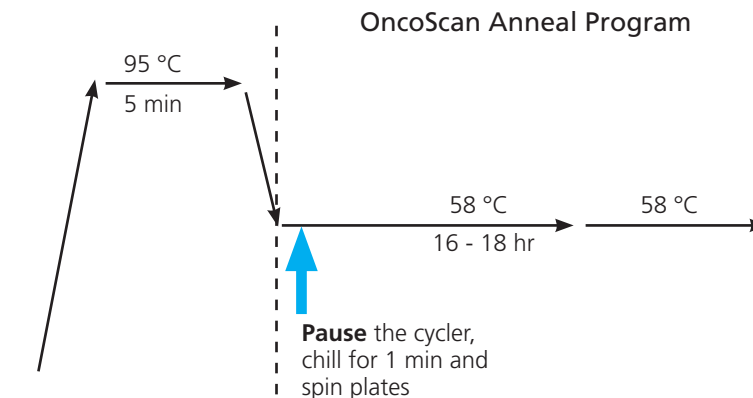


Stage 1 – Anneal (Pre-Amp)

1. Turn on thermal cycler.
2. Thaw reagents listed in the table at room temperature.
3. Once thawed, vortex, spin down and place on ice.
4. Label a 1.5 mL Eppendorf tube as *Ann* and place on ice.
5. Place 9-tube strip in cold block.
6. To the *Ann* tube, add the reagents listed in the table below.

Reagent	1 Reaction	9 Reactions (~60% overage)
Buffer A	1.53 μL	22.0 μL
Copy Number Probe Mix 1.0	1.37 μL	19.7 μL
Somatic Mutation Mix 1.0	0.5 μL	7.2 μL
Total Volume	3.40 μL	49.0 μL
Volume per Tube for Tube Strip		5.0 μL 9-Tube Strip

7. Vortex and spin down *ANN* Master Mix.
8. Aliquot 5.0 μL of *ANN* Master Mix to each strip tube.
9. Transfer 3.4 μL of *ANN* Master Mix from the strip tube to wells 1-9. Pipet up and down 3X.
10. Seal, vortex, and spin plate.
11. Place the plate on the thermal cycler and start the *OncoScan Anneal* program.
12. After 6 minutes, **Pause** the program at $58\text{ }^{\circ}\text{C}$.
13. Remove the plate and place on a chilled cold block for 1 minute.
14. Spin down the plate. Place plate back on the thermal cycler and **Resume** the protocol.



Blue arrows indicate reagent addition steps.

Stage 2 — Gap Fill Through 1st PCR (Pre-Amp)

Thaw Buffer A, dNTPs (AT and GC) Cleavage Buffer, Water and PCR Buffer at room temperature. Vortex, Spin down and keep on ice.

Prepare the AT Mix and GC Mix: Always Make 24-Reaction Master Mix

1. Label two 1.5 mL Eppendorf tubes, one **AT** in **blue** and the other **GC** in **red**. Place on ice.
2. Place two 9-tube strips in a cold block, label one **AT** in **blue**, the other **GC** in **red**.
3. To the AT tube, add the reagents listed in the table below. Pipet 3X. Vortex, spin, place on ice.

Reagent	1 Reaction	9 Reactions (~20% overage)
Water	3.93 µL	113 µL
dNTPs (AT)	0.07 µL	2.1 µL
Total Volume	4.0 µL	115 µL
Volume per Tube for Tube Strip		9.6 µL 9-Tube Strip

4. Aliquot 9.6 µL of the AT Mix to each tube in the strip.
5. Spin down the strip and keep in cold block.
6. Change gloves.
7. Repeat steps 3-5 above for the GC dNTPs.

Reagent	1 Reaction	9 Reactions (~20% overage)
Water	3.93 µL	113 µL
dNTPs (G/C)	0.07 µL	2.1 µL
Total Volume	4.0 µL	115 µL
Volume per Tube for Tube Strip		9.6 µL 9-Tube Strip

8. Change gloves again after completing the GC Master Mix.

Prepare the GAP Fill Mix

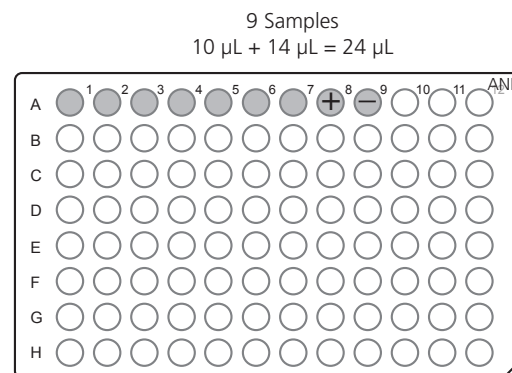
1. Label a 1.5 mL Eppendorf tube and one strip of 9 PCR tubes with the letter **G**.
2. Place tube on ice and strip tubes in cold block.
3. To the **G** tube, add the reagents in the table below. Pipet up and down 3X.

Reagent	1 Reaction	9 Reactions (~20% overage)
Water	10.58 µL	114 µL
Buffer A	1.18 µL	12.7 µL
SAP, Recombinant (1U/µL)	0.84 µL	9.1 µL
Gap Fill Enzyme	1.40 µL	15.1 µL
Total Volume	14.0 µL	151.2 µL
Volume per Tube for Tube Strip		16.0 µL 9-Tube Strip

4. Vortex, spin down, and place on ice.
5. Aliquot 16 µL of the G Master Mix to each tube in the strip.
6. Spin down and place on a chilled cold block.

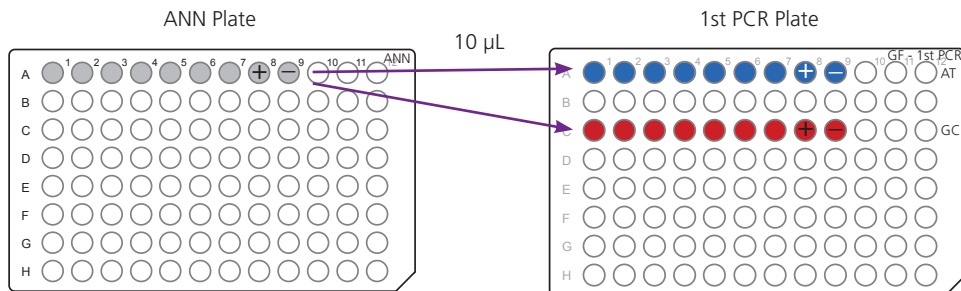
Addition of Gap Fill Mix

1. Remove the **ANNEAL** Plate from the thermal cycler, place in a cold block on ice for 1 min.
2. Stop the *OncoScan Anneal* program
3. Start the *OncoScan Gap Fill*, **Pause** once cycler reaches 58 °C.
4. After the 1 min incubation, spin the **ANNEAL** Plate and return to cold block.
5. Add 14.0 µL Gap Fill (**G**) Mix to each well. Pipet up and down 3X.
6. Seal the plate, vortex and spin.
7. Keep the **ANNEAL** Plate on the cold block.

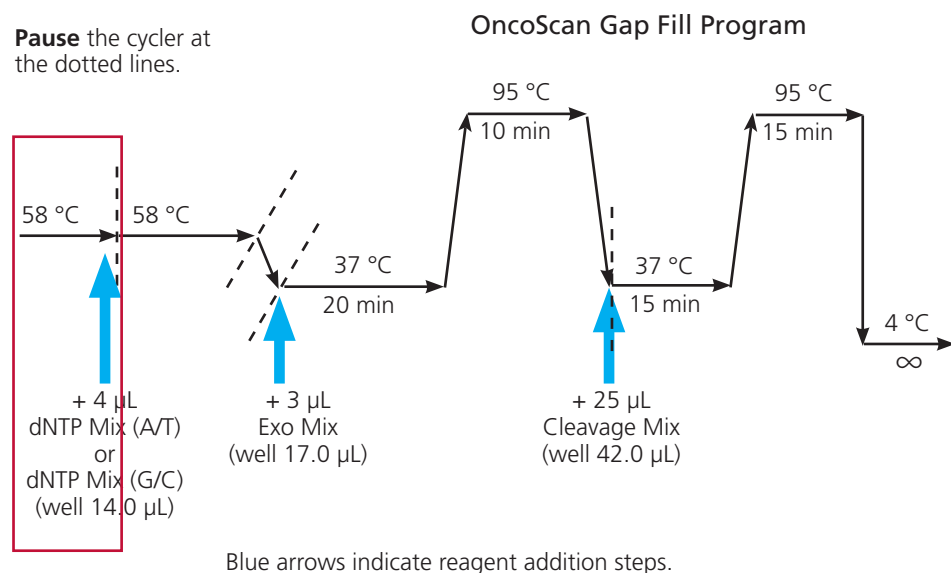


Channel Split

1. Label a new 96-well half-skirt PCR plate as *1st PCR*.
2. Clearly mark the **AT (blue)** and **GC (red)** rows (see Figure below).
3. Transfer 10.0 μL each well from the *ANN* Plate to the *1st PCR* Plate, as shown.

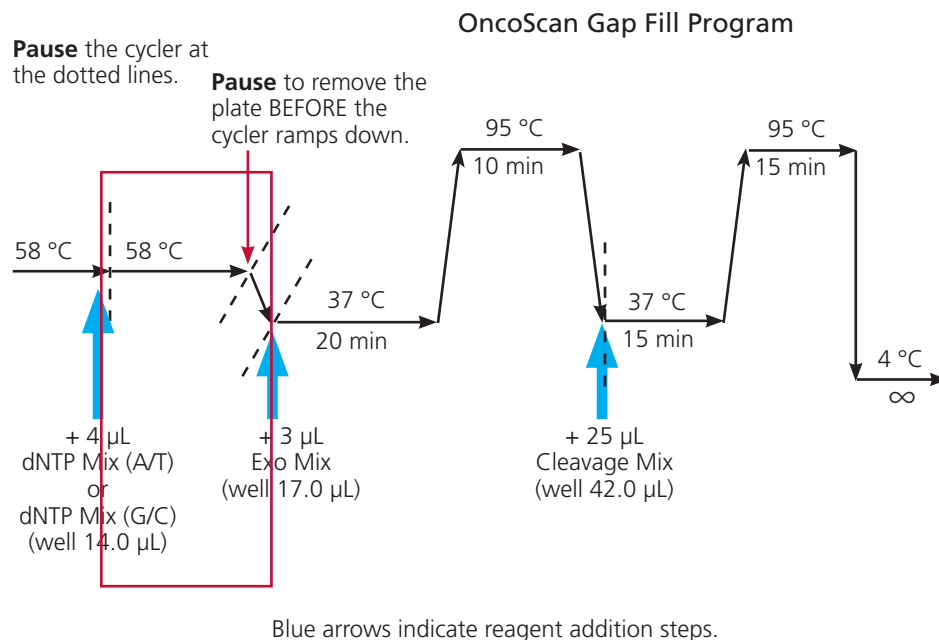
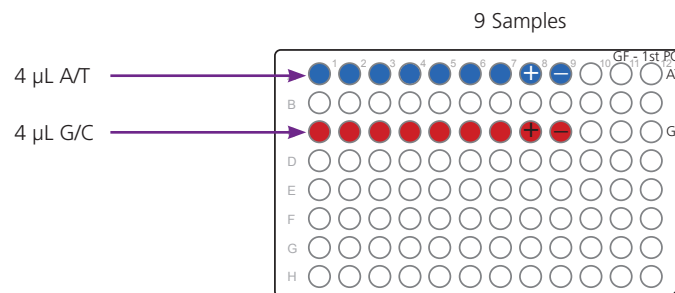


4. Seal and spin down the *1st PCR* Plate.
5. Load the plate on the thermal cycler, close the lid, and **Resume** the *OncoScan Gap Fill* program.
6. After 11 min at 58 °C, press **Pause**.
7. Remove the *1st PCR* Plate and place on a cold block for 1 min.
8. Spin down and return the *1st PCR* Plate to a cold block.
9. Move directly to the next section: **Addition of dNTPs**.



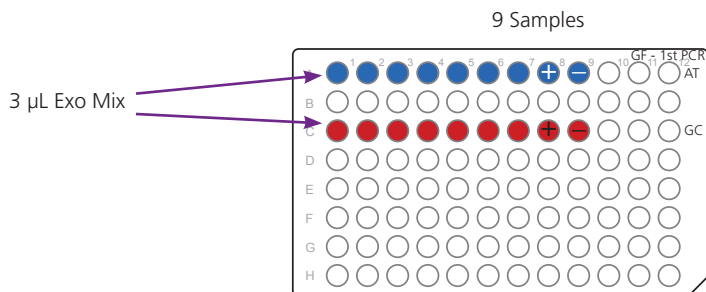
Addition of dNTPs

1. Add 4 μL of AT Mix to the samples in row A on the *1st PCR* Plate. Pipet up and down 3X.
2. Add 4 μL of GC Mix to row C on the *1st PCR* Plate. Pipet up and down 3X.
3. Seal, vortex, and spin the plate.
4. Place the *1st PCR* Plate back on the thermal cycler, press **Resume**.
5. Set a timer for 10 min to be back to **Pause** the program at the end of the 58 °C.
6. During this 11 min incubation, prepare the Exo Mix described in the next section: **Aliquot and Add the Exo Mix**.



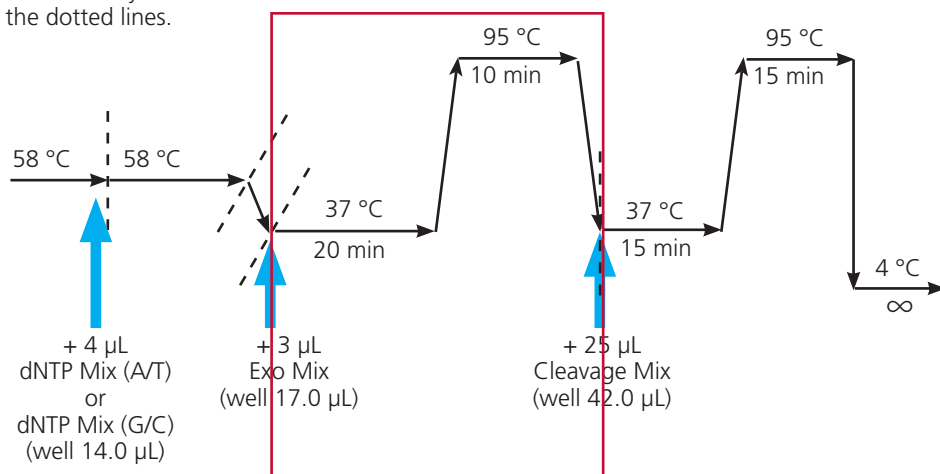
Aliquot and Add the Exo Mix

1. Remove Exo Mix from $-20\text{ }^{\circ}\text{C}$ (keep cold). Vortex Exo Mix and keep on ice.
2. Label one strip of 9 tubes with the letter *E*. Aliquot $7.5\text{ }\mu\text{L}$ of the Exo Mix directly into each strip tube. Spin to remove bubbles.
3. At the end of the $58\text{ }^{\circ}\text{C}$ incubation, press **Pause** and place the *1st PCR Plate* in a cold block for 1 min.
4. **Resume** the program (no plate) and **Pause** thermal cycler once it has ramped down to $37\text{ }^{\circ}\text{C}$.
5. After the 1 min on ice, spin down *1st PCR Plate*, return to cold block.
6. Add $3\text{ }\mu\text{L}$ Exo Mix to each reaction. Pipet up and down 3X.
7. Seal, vortex, and spin the *1st PCR Plate*.
8. Place the *1st PCR Plate* back on the thermal cycler.
9. Press **Resume**.
10. Set a timer for 25 min to be back in order to prepare the Cleavage Mix as described in the next section: **Prepare and Add the Cleavage Master Mix**.



Pause the cycler at the dotted lines.

OncoScan Gap Fill Program



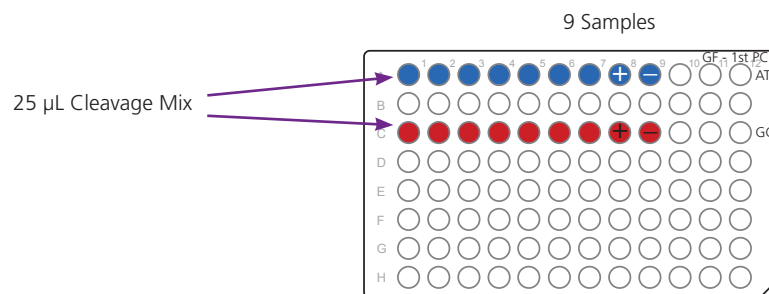
Blue arrows indicate reagent addition steps.

Prepare and Add the Cleavage Master Mix

1. Place 9-tube strip in a cold block and a 1.5 mL Eppendorf tube labeled *CM* on ice.
2. Remove Cleavage Mix from $-20\text{ }^{\circ}\text{C}$ (keep cold). Vortex, spin and keep on ice.
3. Vortex and spin down the thawed Cleavage Buffer, return to ice.
4. Add the Cleavage Buffer and Cleavage Enzyme to the *CM* tube. See table below.

Reagent	1 Reaction	18 Reactions (~25% overage)
Cleavage Buffer	25.0 μL	563 μL
Cleavage Enzyme	0.2 μL	4.5 μL
Total	25.2 μL	567.0 μL
Volume per Tube for Tube Strip		60 μL 9-Tube Strip

5. Pipet up and down 3X.
6. Vortex and spin down the *CM* tube briefly. Keep on ice.
7. Aliquot $60\text{ }\mu\text{L}$ Cleavage Master Mix from *CM* tube to 9 tubes of the strip tube.
8. Spin down strip tubes. Place on a cold block.
9. Press **Pause** when cycler reaches $37\text{ }^{\circ}\text{C}$, remove the *1st PCR Plate* and place a cold block on ice for 1 min.
10. Spin plate and return plate to cold block.
11. Add $25\text{ }\mu\text{L}$ *CM* Mix to each reaction. Pipet up and down 3X.
12. Seal, vortex, and spin down.
13. Place *1st PCR Plate* back on thermal cycler, press **Resume**.
14. Set a timer for 25 min to make the PCR mix described in the next section: **Prepare and Add the 1st PCR Master Mix**.

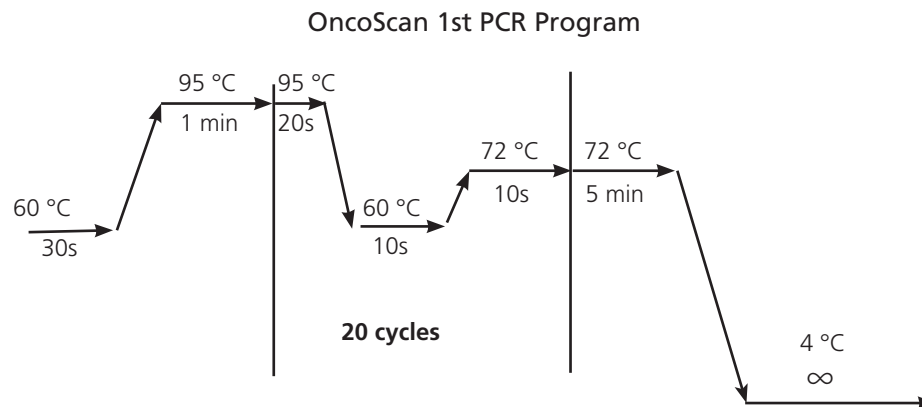
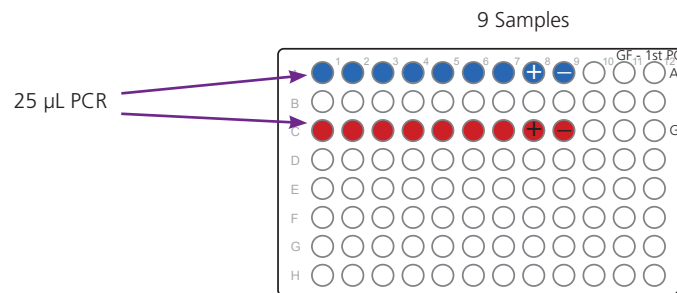


Prepare and Add the 1st PCR Master Mix

1. Label a 9-strip tube, place in a cold block.
2. Label a 1.5 mL Eppendorf tube with the letters *PCR* and place on ice.
3. Remove the Taq from the –20 °C (keep cold). Vortex, spin and return to ice.
4. Vortex, spin down the thawed PCR Mix. Return to ice.
5. Add reagents according to the table below to the *PCR* tube.
Pipet up and down 3X.

Reagent	1 Reaction	18 Reactions (~25% overage)
PCR Mix	24.4 µL	550 µL
Taq Polymerase	0.56 µL	12.6 µL
Total	25.0 µL	562 µL
Volume per Tube for Tube Strip		60.0 µL 9-Tube Strip

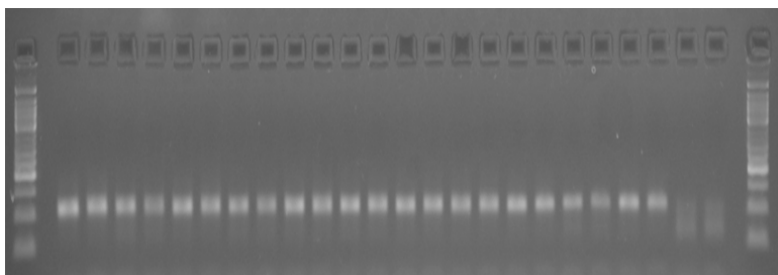
6. Vortex, spin down, and return the *PCR* tube to ice.
7. Aliquot 60 µL of the PCR Master Mix to each of the 9 tubes in the strip.
8. Spin down strip tube. Place strip tube in cold block.
9. When *OncoScan GAP Fill* program ends, remove the *1st PCR Plate*, place on a cold block for 1 min.
10. Vortex, spin down the *1st PCR Plate*.
11. Start the *OncoScan 1st PCR* program, **Pause** program when thermal cycler reaches 60 °C.
12. Add 25 µL PCR Master Mix to each reaction. Pipet up and down 3X.
13. Seal, vortex, and spin the *1st PCR Plate*.
14. Place on thermal cycler, press **Resume**. At the end of *OncoScan 1st PCR* program, take the plate directly to the Post-Amp Lab.



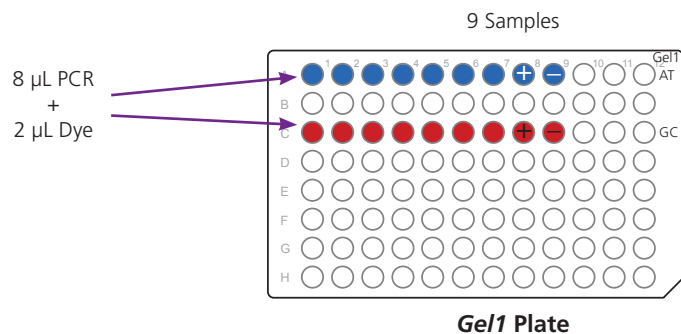
Stage 3 — First QC Gel and 2nd PCR (Post-Amp Lab)

Prepare the QC Gel 1 Plate

1. Label one fresh PCR plate *Gel1*.
2. Prepare diluted gel loading dyes and diluted buffers as instructed on the right.
3. Aliquot 8 μL of *1st PCR* Plate product to wells 1-7.
4. Add 2 μL of 1:10 gel loading dye. Pipet up and down 3X.
5. Seal *1st PCR* Plate and keep in a cold block on ice.
6. Seal, vortex, and spin down.



7. Load 10 μL of each reaction onto a 3% agarose gel.
8. Add 5.0 μL of the diluted 50 bp ladder to the lanes marked as "M".
9. Run the gel at 150 V for 15 min.
10. Examine the gel in a gel imager to ensure PCR products are approximately 120 bp.



Reagents for Gel Loading

1. Glycerol-EDTA Buffer (50% Glycerol + 50 mM EDTA).

Reagent	Initial Concentration	Final Concentration	Volume
100% Glycerol	100%	50%	1000.0 μL
0.5 M EDTA	500 mM	50 mM	200.0 μL
Nuclease-Free Water	N/A	N/A	800.0 μL
Total Volume			2000.0 μL

2. 1:10 Dilution of 6X Gel Loading Dye (store at 4 °C for long-term storage).

Reagent	Volume
Glycerol-EDTA Buffer (50% Glycerol + 50 mM EDTA)	900.0 μL
NEB 6X Loading Dye	100.0 μL
Total Volume	1000.0 μL

3. Dilution of the 50 bp ladder (1 mL of the diluted ladder can be used in ~200 lanes, Store at -20 °C for long-term storage).

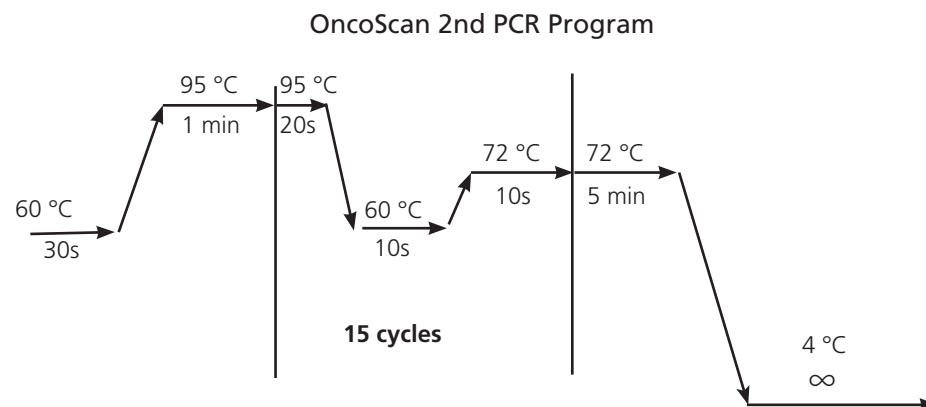
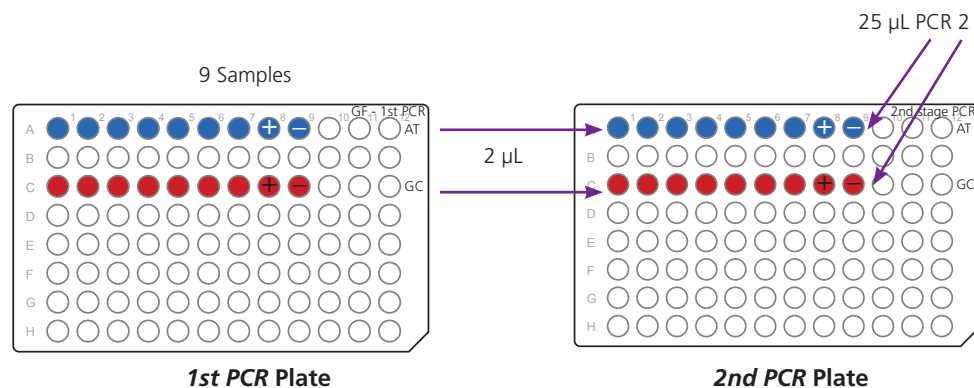
Reagent	Volume
Glycerol-EDTA Buffer (50 % Glycerol + 50 mM EDTA)	830.0 μL
NEB 6X Loading Dye	100.0 μL
NEB 50 bp Ladder	70.0 μL
Total Volume	1000.0 μL

Prepare and Add the 2nd PCR Master Mix

1. Start the *OncoScan 2nd PCR* program and **Pause** when the cyclers reaches 60 °C.
2. Thaw the PCR Mix at room temperature.
3. Label a new 96-well half-skirt PCR plate as *2nd PCR* and keep on cold block.
4. Label row A as "**AT**" in **BLUE** and row C as "**GC**" in **RED**.
5. Label a 9-tube strip and a 1.5 mL Eppendorf tube as *PCR 2*.
6. Place strip tube in a cold block and the *PCR 2* tube on ice.
7. Remove the Taq from the -20 °C (keep cold).
8. Vortex and spin the Taq. Return to ice. Vortex and spin down the thawed PCR Mix and return to ice.
9. Add the PCR Mix and Taq Enzyme according to the table below to the *PCR 2* tube. Pipet up and down 3X.

Reagent	1 Reaction	18 Reactions (~25% overage)
PCR Mix	24.4 µL	550 µL
Taq Polymerase	0.56 µL	12.6 µL
Total	25.0 µL	562 µL
Volume per Tube for Tube Strip		60.0 µL 9-Tube Strip

10. Vortex and spin down the *PCR 2* tube. Keep on ice.
11. Aliquot 60 µL of the PCR Master Mix to each of the 9 tubes in the strip.
12. Spin down strip and return to cold block.
13. Add 25 µL PCR 2 Master Mix to the wells in the new *2nd PCR* Plate.
14. Add 2 µL from each well of the *1st PCR* Plate to the wells in the *2nd PCR* Plate. Pipet mix 3X.
15. Vortex, spin, and place the *2nd PCR* Plate on the thermal cycler.
16. Run the *OncoScan 2nd PCR* program.



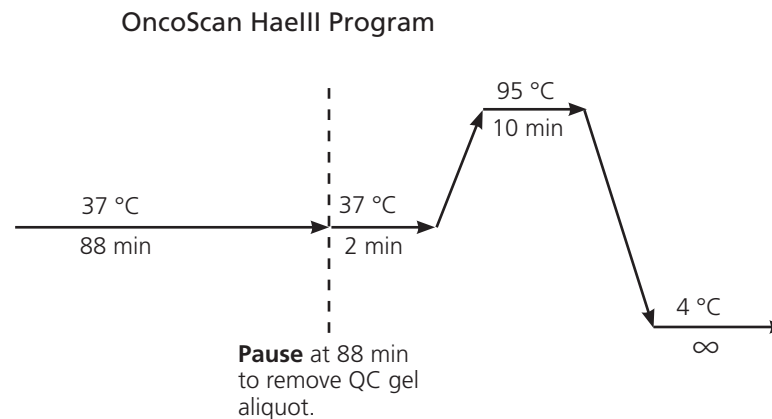
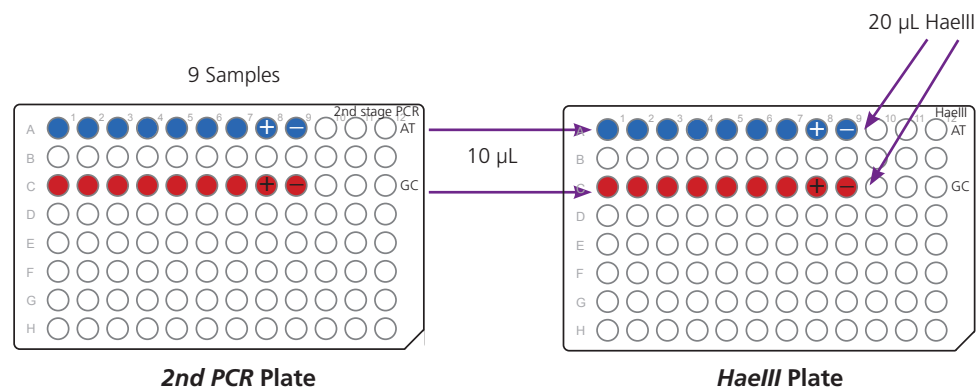
Stage 4 — HaeIII Digest and Second QC Gel (Post-Amp Lab)

Prepare and Add the Hae III Digest

1. Thaw Buffer B at room temperature. Once thawed, vortex, spin and place on ice.
2. Label one fresh 96-well half-skirt PCR plate HaeIII, label row A as "AT" in Blue and row C as "GC" in Red.
3. Place *HaeIII* Plate in a cold block.
4. Upon completion of *OncoScan 2nd PCR* program, place the *2nd PCR* Plate on a cold block for 1 min. Vortex, spin down, and return to cold block.
5. Label a 9-tube strip and a 1.5 mL Eppendorf tube with *HaeIII* and place on cold block or ice.
6. Remove the Hae III and Exo enzymes from the $-20\text{ }^{\circ}\text{C}$. Vortex and spin down. Place on ice.
7. Add the reagents according to the table to the *HaeIII* tube. Pipet up and down 3X.

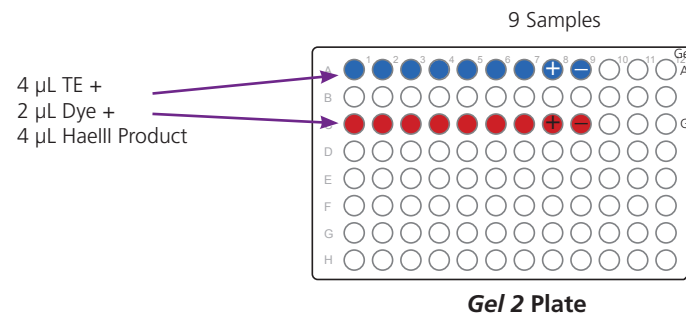
Reagent	1 Reaction	18 Reactions (~20% coverage)
Buffer B	19.10 μL	413 μL
HAE III Enzyme	0.40 μL	8.6 μL
Exo Enzyme	0.50 μL	10.8 μL
Total	20.0 μL	432 μL
Volume per Tube for Tube Strip		45.0 μL 9-Tube Strip

8. Vortex and spin the *HaeIII* tube. Keep on ice.
9. Aliquot 45 μL of the HaeIII Master Mix to a 9-tube strip. Spin down and place on a cold block.
10. Add 20 μL of HaeIII Master Mix to each well of the *HaeIII* Plate.
11. Add 10 μL of *2nd PCR* Plate wells to the *HaeIII* Plate. Pipet up and down 3X.
12. Seal, vortex, and spin down the *HaeIII* Plate.
13. Place the plate on a thermal cycler and run *OncoScan HaeIII* program.
14. Set timer for 85 min for Hae III QC Gel.

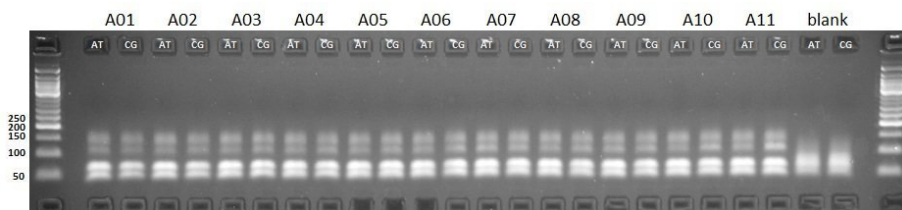
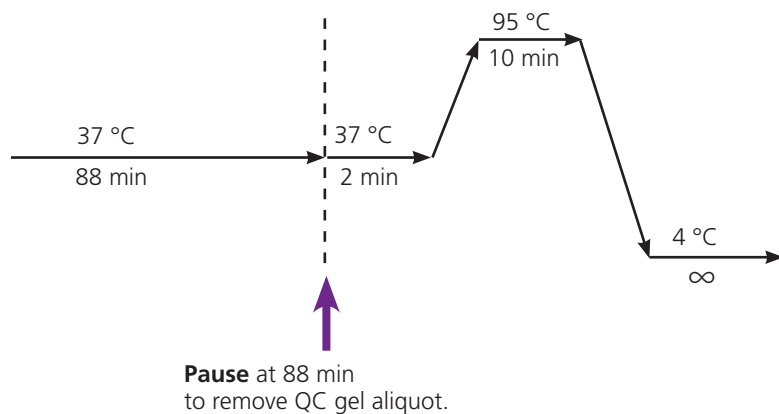


Prepare and Run the Second Quality Control Gel

1. Label a 96-well PCR plate *Gel2*.
2. Add 4 μ L of 1X TE to the gel plate.
3. Add 2 μ L of 1/10th diluted Gel Loading Dye to each reaction. Pipet up and down 3X.
4. At 88 min at 37 °C during the *OncoScan Haelll* program, **Pause** the cyclor.
5. Remove the *Haelll* Plate, and place it on a cold block for 1 minute.
6. Vortex, spin down, and place on cold block.
7. Remove 4 μ L of *Haelll* digest sample and add it to the *Haelll* QC Gel plate.
8. Seal the *Haelll* Plate and place it back on the thermal cyclor. **Resume** the *OncoScan Haelll* program.
9. Seal the *Gel2* plate. Vortex and spin down.
10. Load 10 μ L of each reaction and 3.5 μ L of the diluted 50 bp ladder onto a 3% agarose gel.
11. Run the gel at 150 V for 15 min.
12. Examine the gel in a gel imager to ensure that you see a double band.



OncoScan Haelll Program

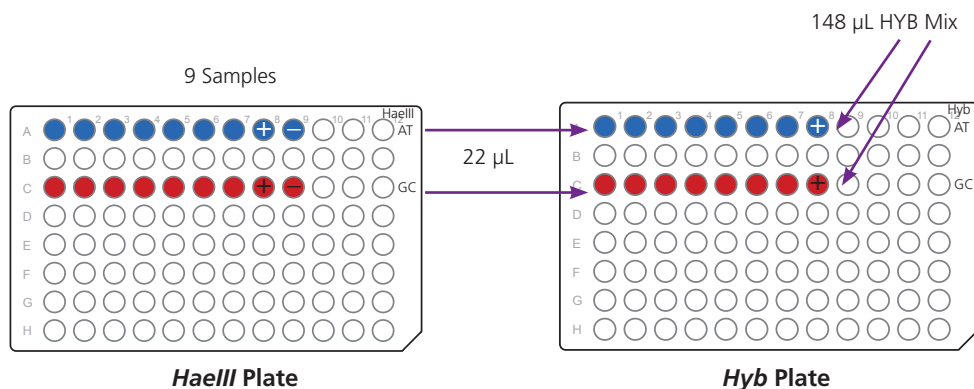


Stage 5 — Hybridization (Post-Amp Lab)

1. Unpack the arrays and equilibrate to room temperature.
2. Preheat the hybridization oven for an 1 hr at 49 °C with rotation.
3. Create a Batch Registration file (AGCC) or Test Requests (AMDS).
4. Prepare the Hybridization Master Mix in a 15 mL conical tube on ice.

Reagent	For 1 Array	16 Arrays
Water	30.0 µL	0.648 mL
Hybridization Mix	118.0 µL	2.5488 mL
Total	148.0 µL	3.1968 mL

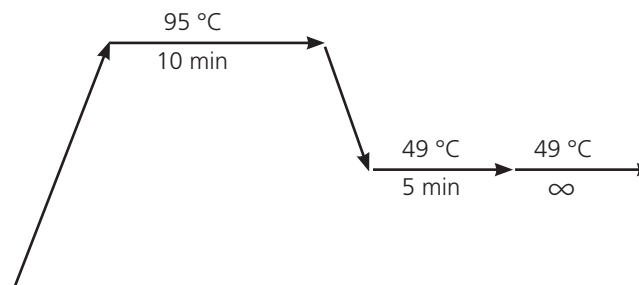
5. Vortex, spin down briefly, and place it on ice.
6. Once *OncoScan Haelll* program is complete, remove the *Haelll* Plate. Vortex, spin down, place on ice.
7. Label a fresh 96-well plate as *Hyb*. Label row A “AT” in **Blue** and row C “GC” in **Red**.
8. Place reagent reservoir on ice and pour Hyb Master Mix into reservoir.
9. Aliquot 148 µL of Hybridization Master Mix to the appropriate wells of the *Hyb* Plate.
10. Transfer 22 µL of each reaction from the *Haelll* Plate to the *Hyb* Plate. Pipet up and down 3X.



148 µL HYB Mix +
22 µL Haelll Product =
Total volume each well: 170 µL

11. Seal, vortex, and spin the *Hyb* Plate.
12. Place the *Hyb* Plate on the thermal cycler.
13. Start the *OncoScan Hybridization* program.

OncoScan Hybridization Program



Load Arrays

Allow the samples to incubate at 49 °C for at least 5 min before loading.

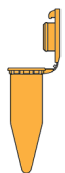
1. Leave the samples on the thermal cycler, load 160 µL of sample onto each array using a single-channel P200 pipette. Only hybridize up to 8 arrays at a time.



2. Clean any excess fluid from around the septa.
3. Apply Tough-Spots® to the septa and press firmly.
4. Immediately load the arrays into the hybridization oven, four at a time.
5. Hybridize the arrays 16 to 18 hrs at 49 °C and 60 rpm.
6. After 16 to 18 hrs of hybridization, move on to the Wash, Stain, and Scan portion of the assay.

Wash, Stain and Scan

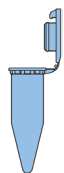
1. Aliquot the following reagents into separate 1.5 mL microfuge tubes for each array:
 - 500 µL Stain Buffer 1 into amber tubes
 - 500 µL Stain Buffer 2 into clear tubes
 - 1000 µL Array Holding Buffer 1 into blue tubes



500 µL
Stain Buffer 1



500 µL
Stain Buffer 2



1000 µL
Array Holding Buffer

2. Prime the Fluidics Station with the Wash buffers. Load the stain solutions and select the appropriate Fluidics Protocol: **OncoScan_450**
3. Start the Fluidics Protocol and leave the cartridge lever down in the **Eject** position.
4. Remove the Tough-Spots® from each array.
5. Load the arrays onto the Fluidics Station.

Before Scanning

1. Ensure no bubbles are visible through the window.
2. Cover the septa with Tough-Spots®, then load onto the scanner.
3. Scan the arrays as described in the *OncoScan™ FFPE Assay Kit User Manual* (P/N 703175).

Important Points

- Aliquot Stain 1 Buffer into amber tubes.
- Aliquot Array Holding Buffer into blue tubes.
- Stain Buffer 1 and Array Holding Buffer are light sensitive.
- If there is a delay after aliquoting into the tubes, store the tubes at 4 °C, protected from light.
- Remove the bubbles from the arrays on the Fluidics Station (see the *Affymetrix® GeneChip® Fluidics Station 450/250 User's Guide*, P/N 08-0092) or remove the bubbles manually.

For Research Use Only

Not for use in Diagnostic Procedures.

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