REFLECTIONS ON 5 YEARS OF CONVERSION EXPERIENCE

PIONEERS OF CHANGE

GAVIN BALL – GM, NTP RADIOISOTOPES
Mo99 Topical Meeting, Boston, 2015
OUR FIELD OF PLAY

OUR OPERATIONAL SPAN

IRRADIATED
Target Plate
Mo-99
Tc-99m
Dose
Patient

RADIOCHEMICALS & API’S

Mo-99; I-131; Lu-177n.c.a

RADIOACTIVE SOURCES (NDT)

Ir-192; Cs-137; Co-60

RADIOPHARMACEUTICALS

Novatec-P Tc-99m generator;
MIBG; I-131 capsules; FDG;
cold kits

IRRADIATION SERVICES

NTD silicon; target irradiations
AND IT’S ALL ABOUT THE PATIENT
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2007/8</td>
<td>Theoretical feasibility studies &amp; cold experiments</td>
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<tr>
<td>2009</td>
<td>NNR approval received for test stage and first hot runs commence</td>
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<tr>
<td>2010</td>
<td>Hot runs, process validation, regulatory approval</td>
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<tr>
<td>Sep 2010</td>
<td>US FDA approves LEU $^{99}$Mo for a customer in the US</td>
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<td>Dec 2010</td>
<td>First large scale commercial FDA approved batch of LEU $^{99}$Mo</td>
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<td>Jun 2011</td>
<td>produced and shipped to US for patient use</td>
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<tr>
<td>Sep 2011</td>
<td>Routine commercial supply of LEU $^{99}$Mo commenced to some</td>
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<tr>
<td>Jan 2014</td>
<td>customers</td>
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<tr>
<td>Aug 2015</td>
<td>Commencement of investment in plant modifications (due to conversion)</td>
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<td>Hot commissioning of new LEU specific production line</td>
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<tr>
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<td>Cold Commissioning of new uranium residue facility</td>
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PROGRESS WITH MO-99 CONVERSION

% LEU Distribution relative to all LEU runs

- 2009: 0%
- 2010: 3%
- 2011: 10%
- 2012: 15%
- 2013: 35%
- 2014: 40%
% LEU Distribution relative to all LEU runs

PROGRESS WITH I-131 CONVERSION
NEW DISSOLVER CELL PRODUCTION LINE

COMMISSIONED AND OPERATING WELL
NEW URANIUM RESIDUE FACILITY

COLD COMMISSIONED
HOT COMMISSIONING SCHEDULED FOR END 2015
COMPLIANCE LESSONS FROM THE FRONT LINE
- HEU TO LEU -

IT’ ALL ABOUT CONSEQUENCES:
THE GOOD, THE BAD & THE UGLY

- Pioneers in conversion technology
  - A world first
  - Exceed full compliance

- Massive capital investment
  - Higher reactor operational costs and lower fluxes
  - Lower MO-99 production capacity
  - Higher waste

- No noticeable therapeutic benefits to patient
  - The patient pays more
LET’S LEARN FROM THE LESSONS OF THE PAST

Technology and scale-up challenges are to be expected.

Developing non-HEU production methods takes longer than expected.

It costs more than initially budgeted.

It is more a ‘technology push’ than a ‘market pull’ situation.
IT’S TIME FOR WISE action
- no reactions required -

THANK YOU