



## UMATAC Industrial Processes

# Progress in China – Fushun ATP Project Update

Colorado School of Mines 34<sup>th</sup> Oil Shale Symposium  
October 14, 2014



# Agenda

## Operation Update

- Plant is currently producing oil.
- 40 day run length achieved.
- Oil quality as per design.

## Fushun Project Background

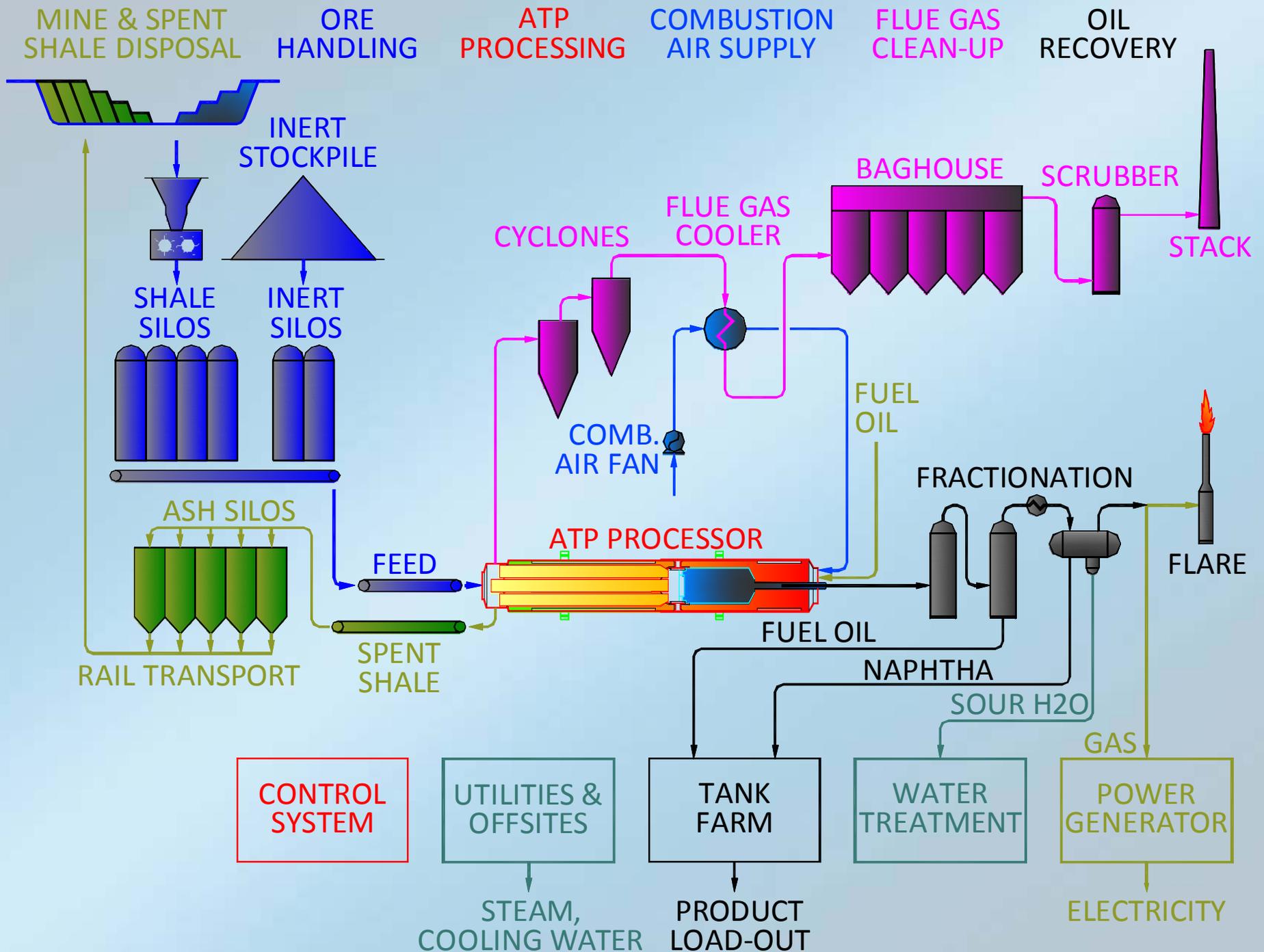
- Mechanical completion in 2010.
- First oil in 2013.
- Continued improvements through 2014.

## Technical Challenges

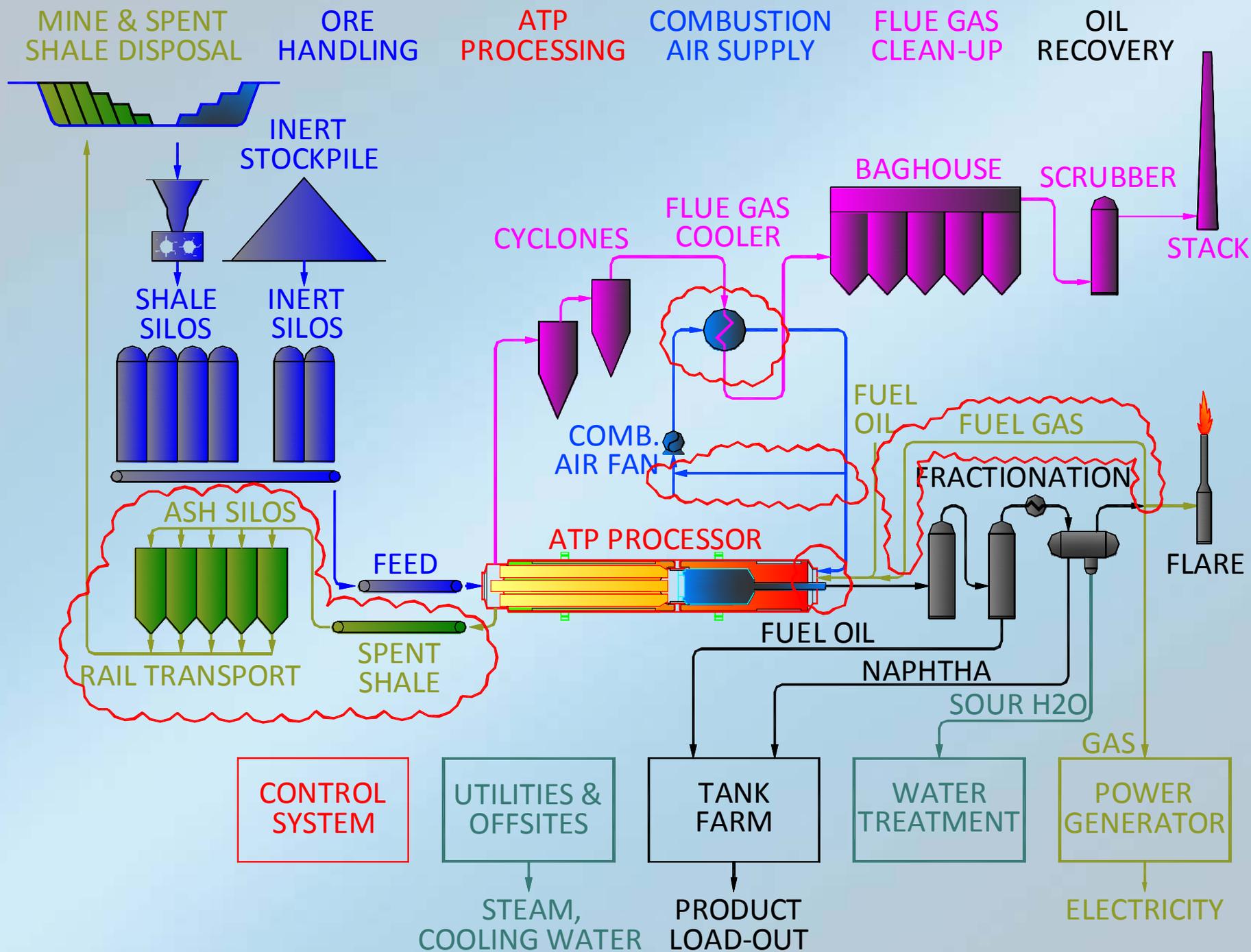
- Burner fouling.
- Flue gas cooler fouling.
- Ash system reliability.
- New East Open Pit mine.



# FMG ATP Plant Flowsheet



# FMG ATP Plant Flowsheet



# ATP Burner Fouling Update

## ATP Burners

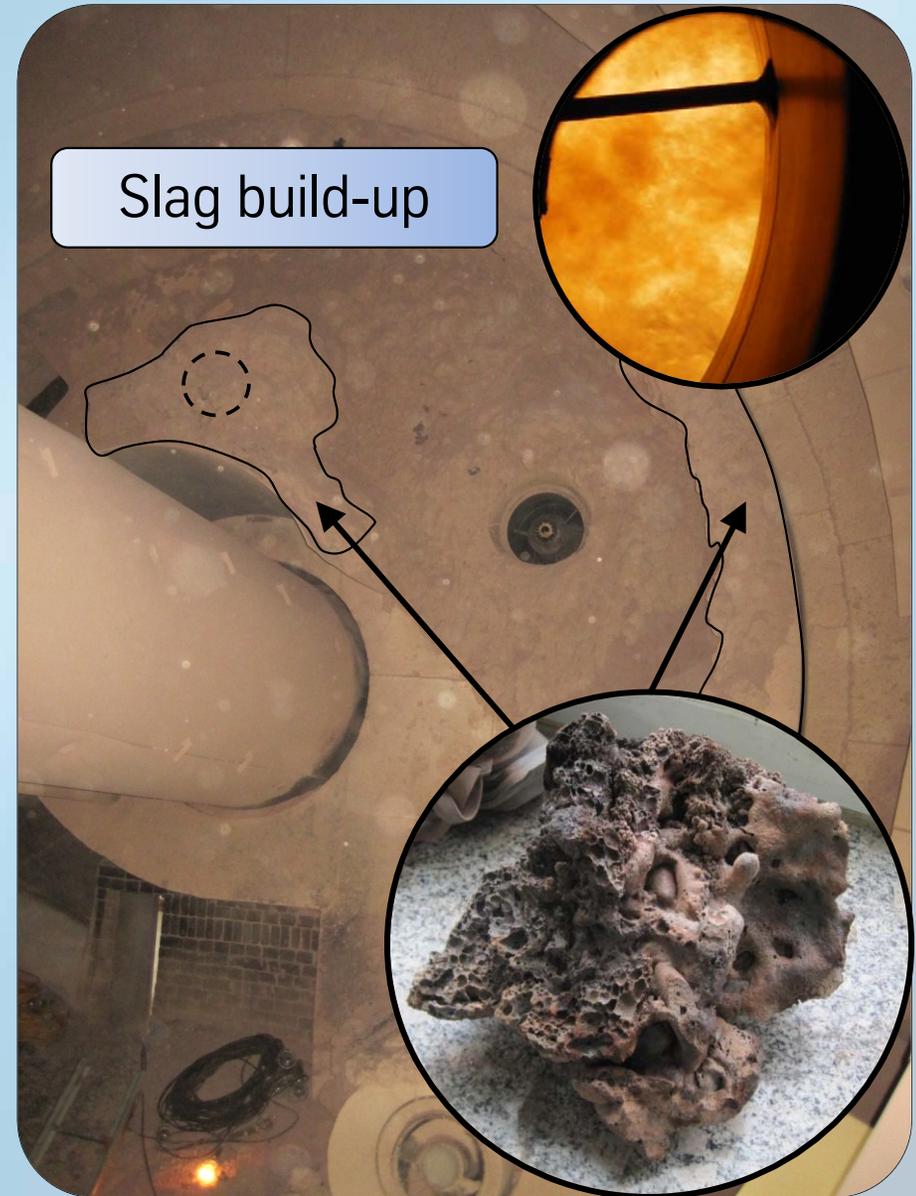
- Used vertical retort derived fuel oil from existing FMG plant.
- Now using low solids, low water content ATP produced heavy oil, increasing fuel system reliability.

## Fouling

- Determined to be due to exposure of clays to high temperature in flame (slagging).
- Proposed solution was to reduce flame intensity.

## Solution

- Automated mechanical cleaning.
- Installed *Big Blasters*<sup>™</sup> (air cannons).
- Successful.



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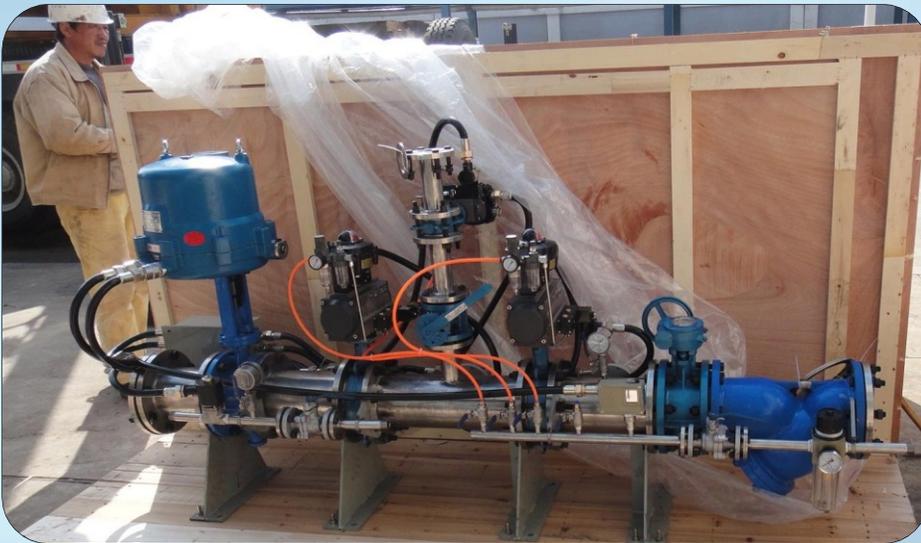
# Retrofit ATP to Utilize Off Gas

## ATP Produced Off Gas

- Design was to generate 15 MWe of electricity by burning off gas in internal combustion engines.
- Generators are not yet commissioned and gas is being flared.

## Temporary Use

- Burn off gas in ATP Processor and displace coke & heavy oil combustion.
- Replaced one of three heavy oil burners with a gas burner.



# Flue Gas Cooler / Combustion Air Preheater

## Flue Gas Cooler

- Cools flue gas & preheats combustion air.
- Ammonia and sulphur dioxide in flue gas.
- Process design exit temperature was 175°C, reduced to 150°C during detail design.

## Equipment configuration issues

- Low tube-wall temperature at cold end.
- Low tube-side gas velocity.
- Gas distribution.

## Fouling

- Condensation of water and ammonia salts.
- Run length initially limited to 7 days, but now exceeding 40 days.

Flue Gas Cooler

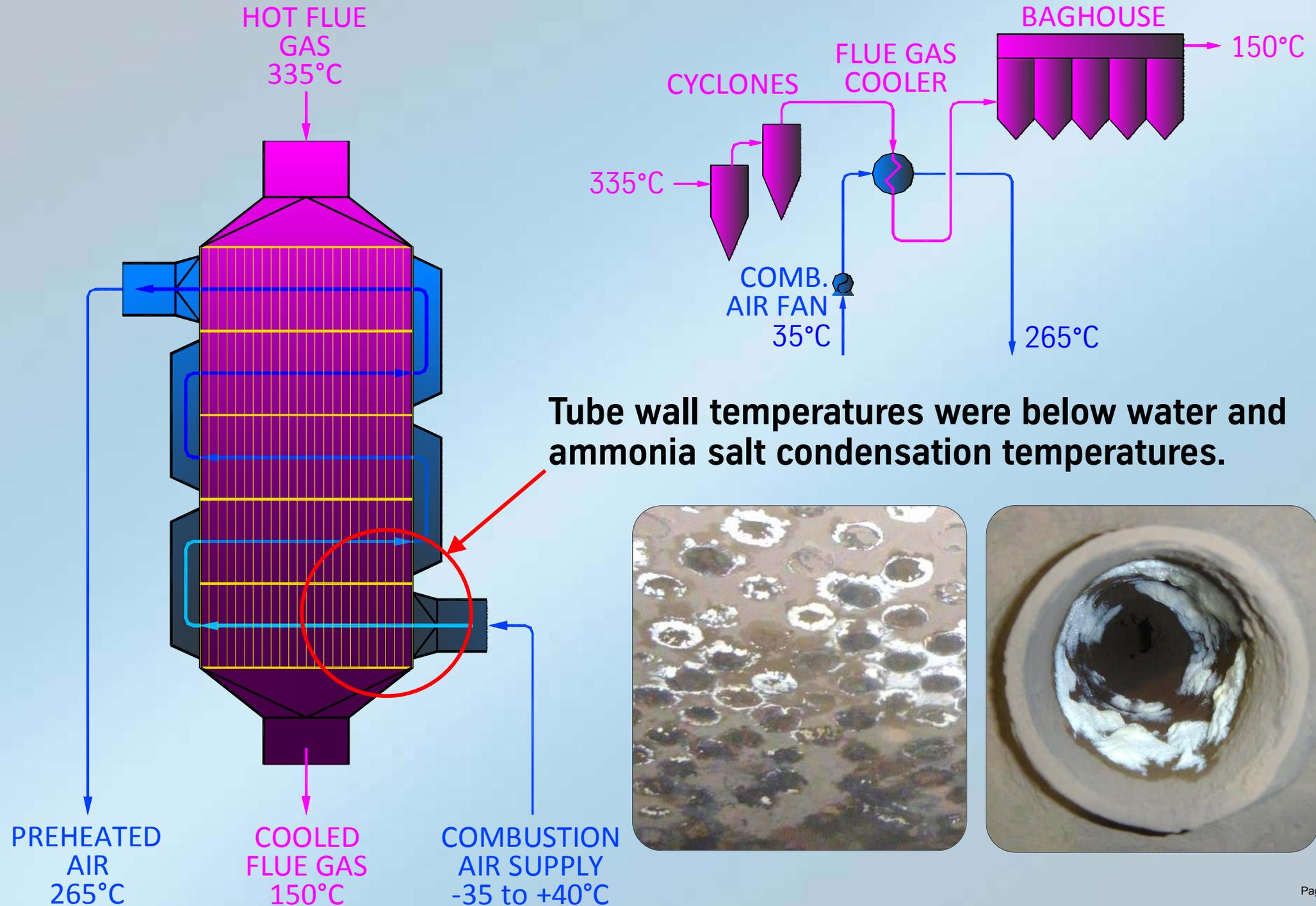
Cyclones



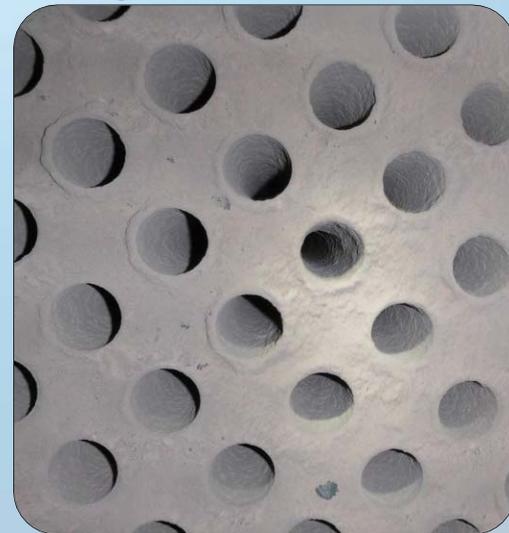
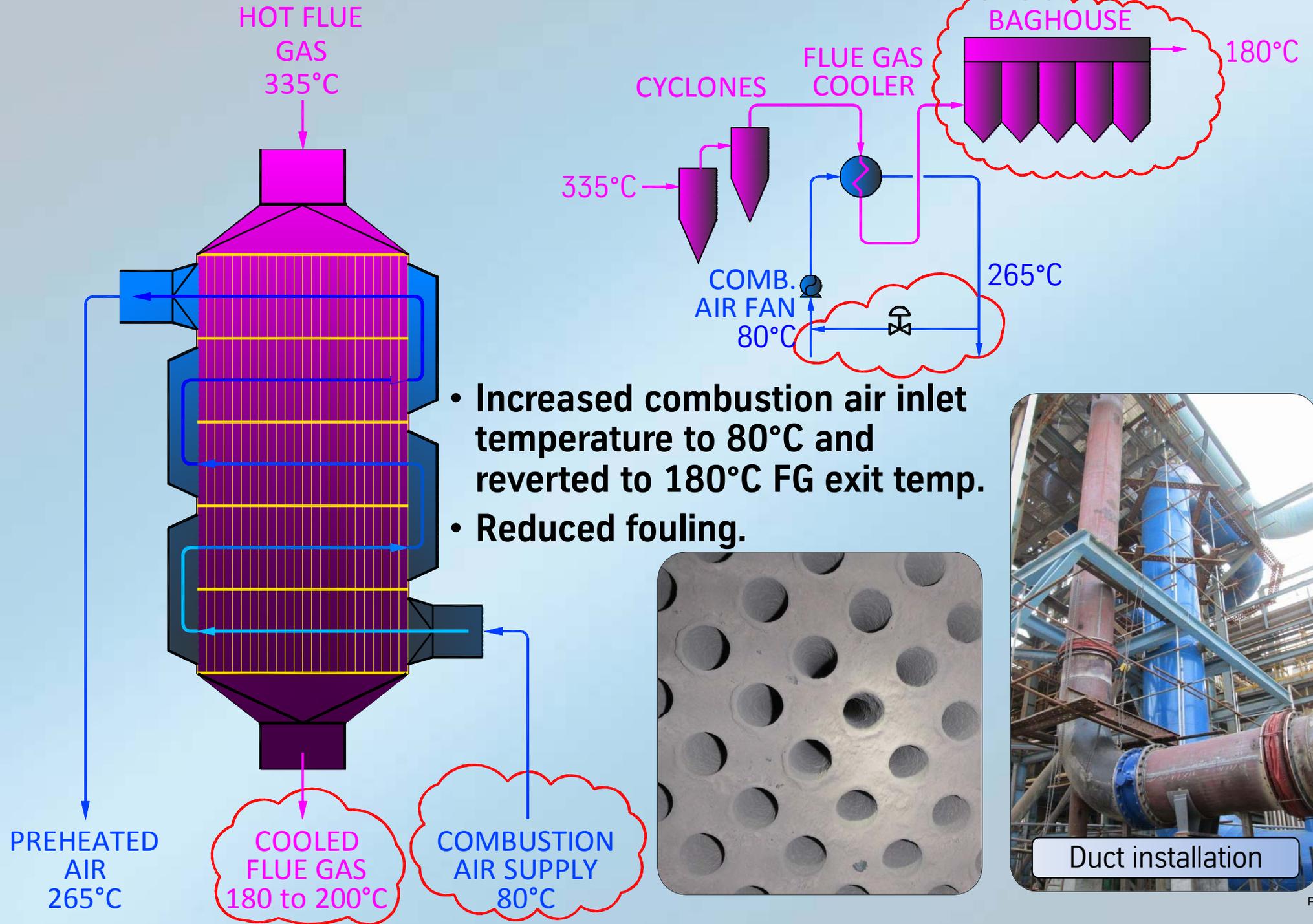
Baghouse

ATP Processor

# Moisture Condensation & Salt Fouling

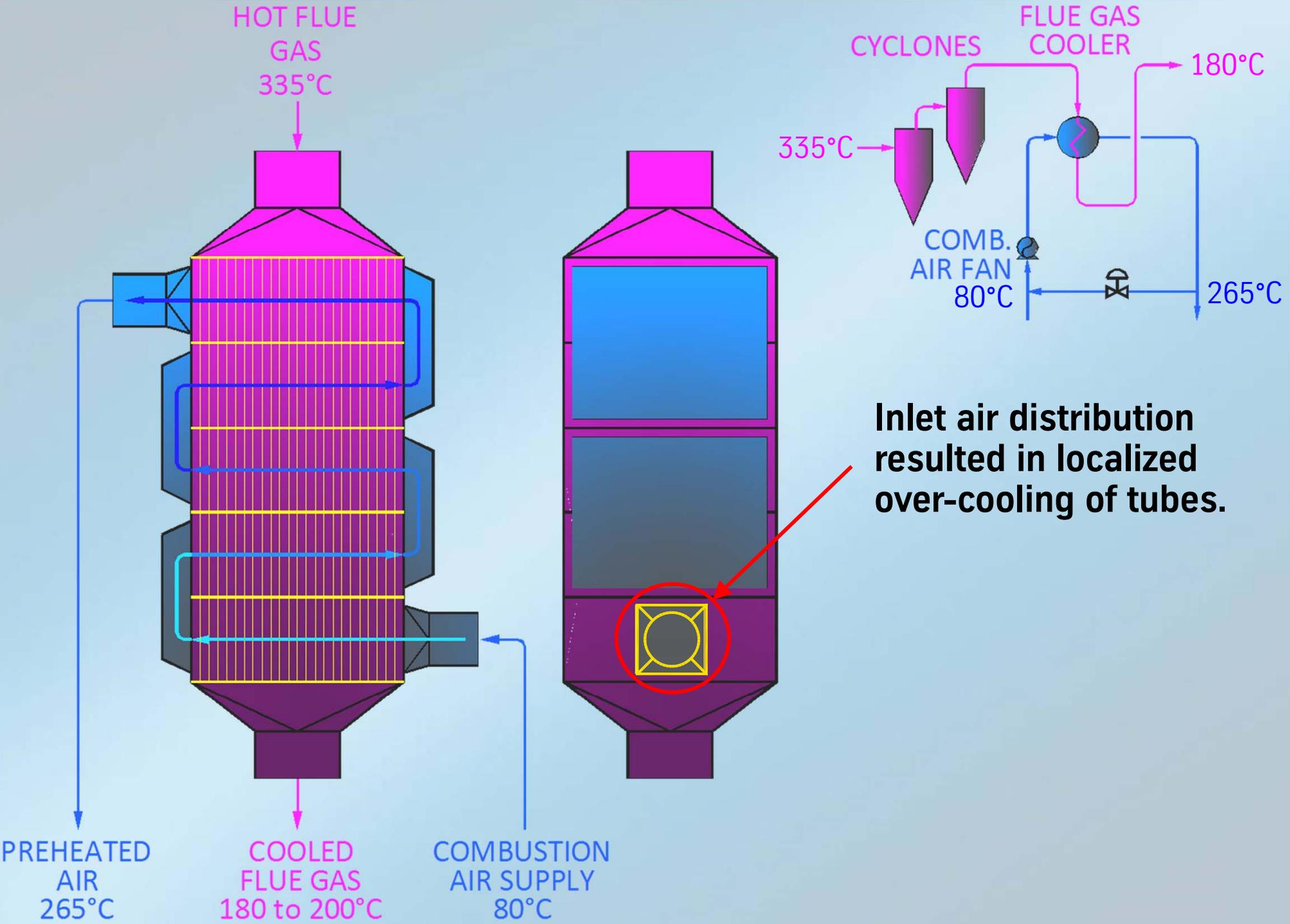


# Increase Tube Inlet Wall Temperature

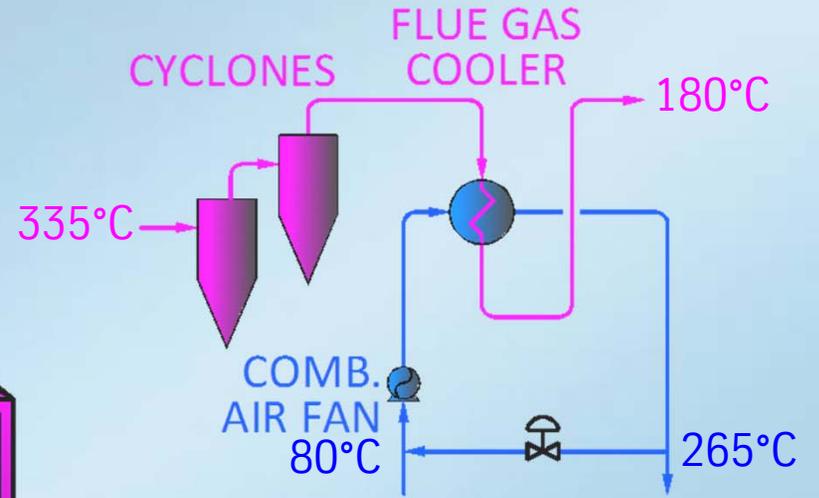
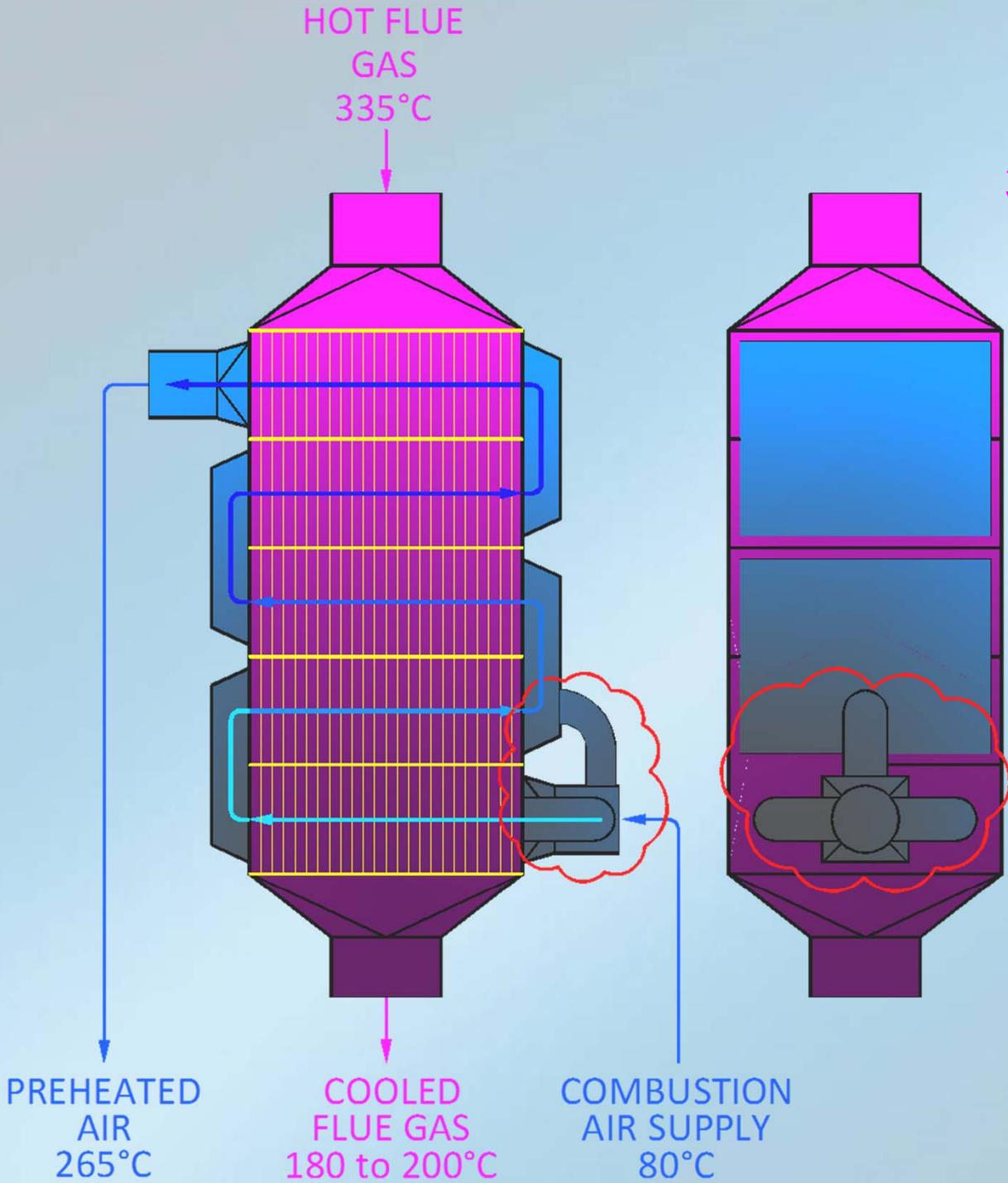


Duct installation

# Inlet Air Distribution



# Improved Inlet Air Distribution



**Fouling was reduced, and run length increased to over 40 days.**

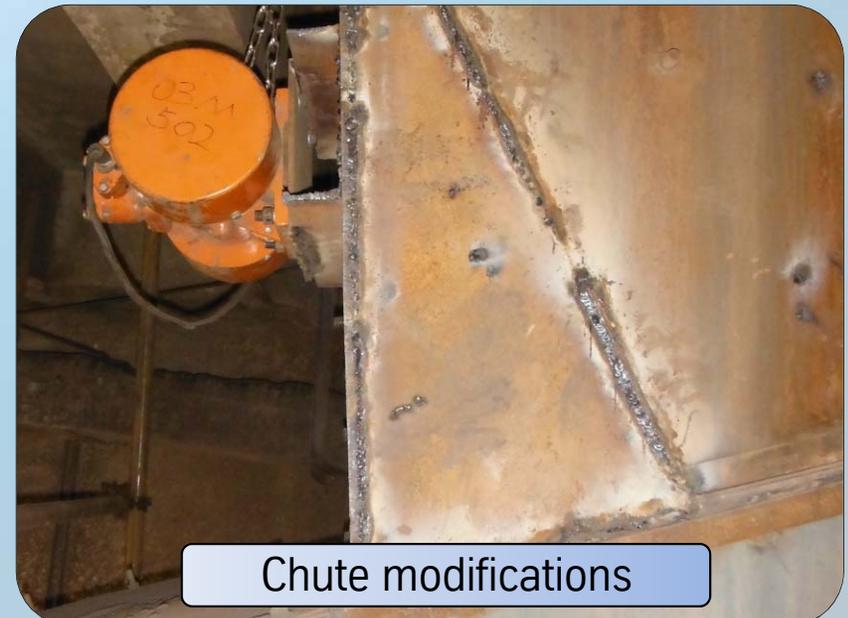


# Ash System Reliability

**Parallel operating/stand-by conveyor belt lines are installed, but both have similar problems.**

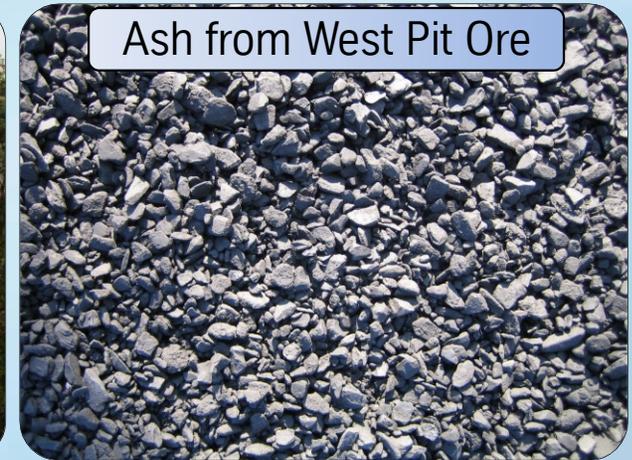
- Complex layout with multiple transfer points.
- Transfer point chutes are long, with compound angles and insufficient slope.
- Oversized water control valves lead to poor control of ash moistening.
- Moistened ash is sticky.
- Belt skirting is insufficient.
- Ash bins bridge and rat-hole.

**Major modification program has started.**



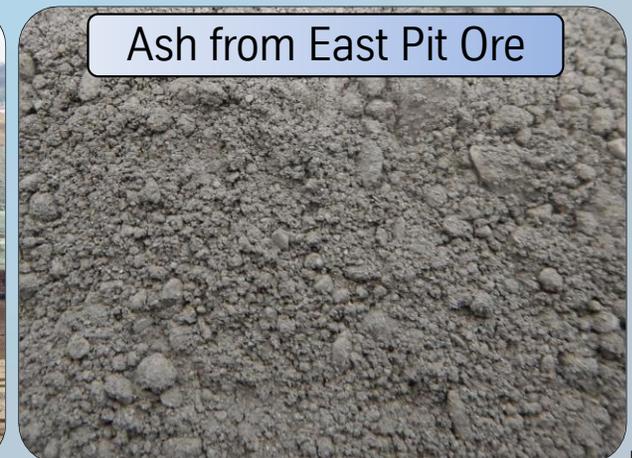
## West Pit Mine is Closing

- Pilot testing and design were done on West Pit ore: **7% oil yield, 5% free water.**
- Excellent particulate physical strength.



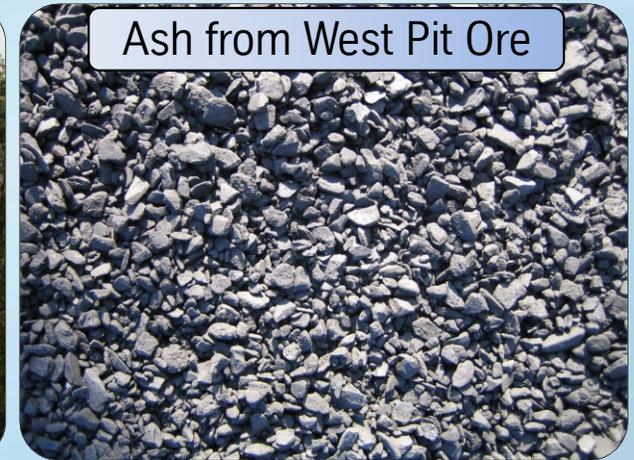
## East Pit Opened – ore grade during early years of mine operation will be low.

- Operations in 2014 mostly used East Pit ore. **4-5% oil, 5-8% water.**
- Much lower particulate physical strength, resulting in higher fines generation.



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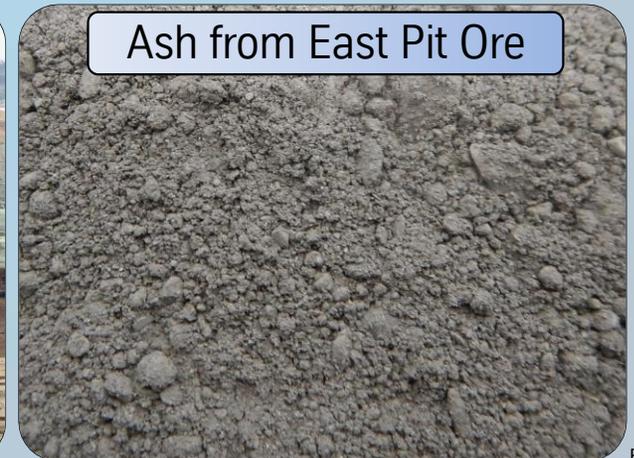
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Ash from West Pit Ore

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Ash from East Pit Ore

# 2014 Operations

FMG is taking a cautious but firm approach to operation in 2014.

This year's targets were to achieve a 30 day run (done) and then a 90 day run.

FMG has added a second 30 day run to test reliability improvements.

Oil shale throughput is 70 to 80% of design.



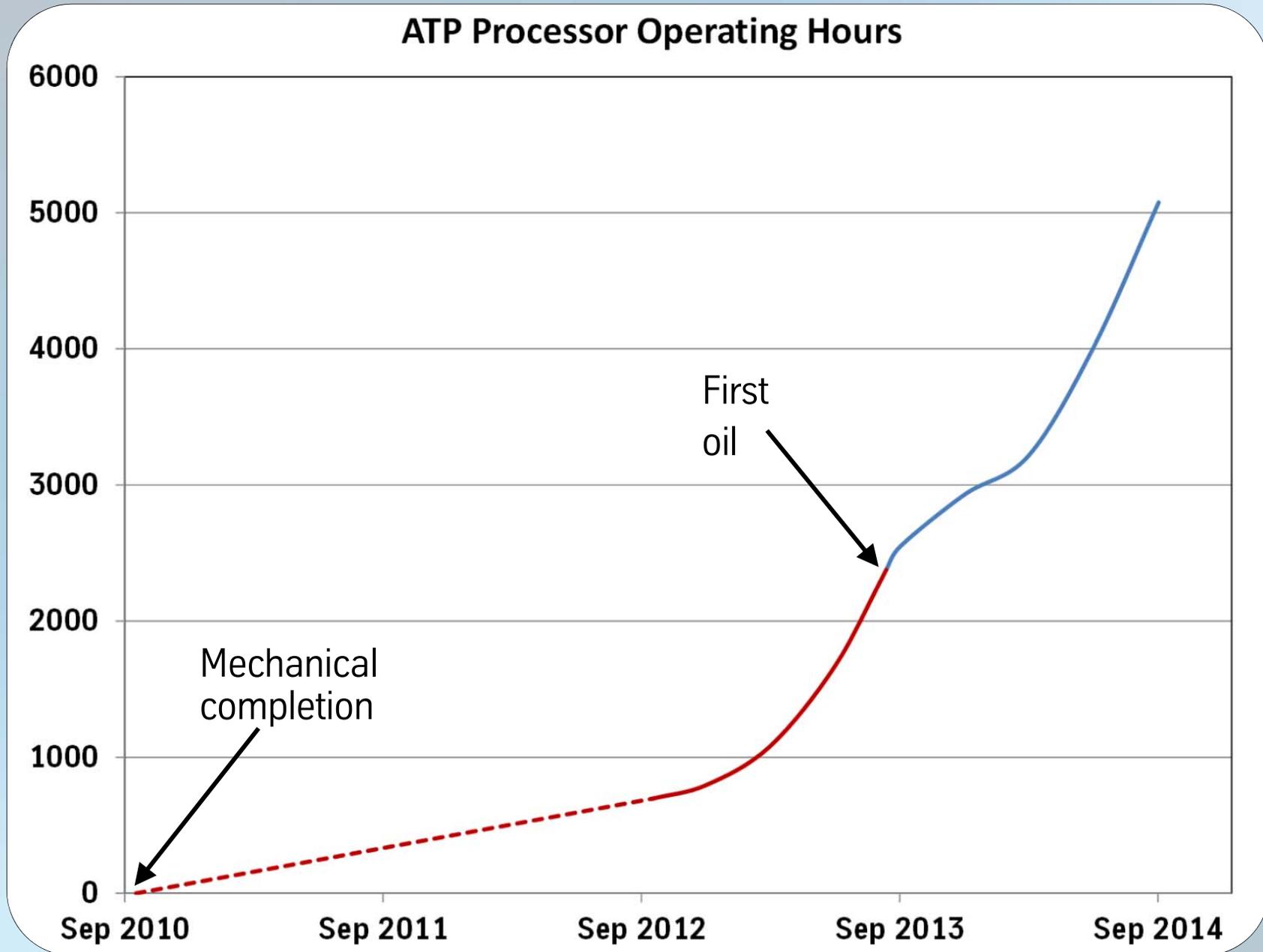
Oil Shale and Ash Trains

# 2014 Operations

Start Date	Run Length (days)	Feed Rate	Notes
Jan. 2014	7	Inert feed	Baghouse bag replacement.
April 2014	15	Inert feed	Check-out run, refractory dry-out.
May 2014	15	Oil Shale 140-170 t/h	FG cooler modifications, ash system improvements, Big Blaster installation.
<b>July 2014</b>	<b>40</b>	<b>Oil Shale 160-180 t/h (70-80% of design)</b>	<b>Successful improvement of plant operability.</b>
Oct. 2014	Currently in Operation	Oil Shale 160-180 t/h	Targeting 30 day run, to be followed by 90 day operation.



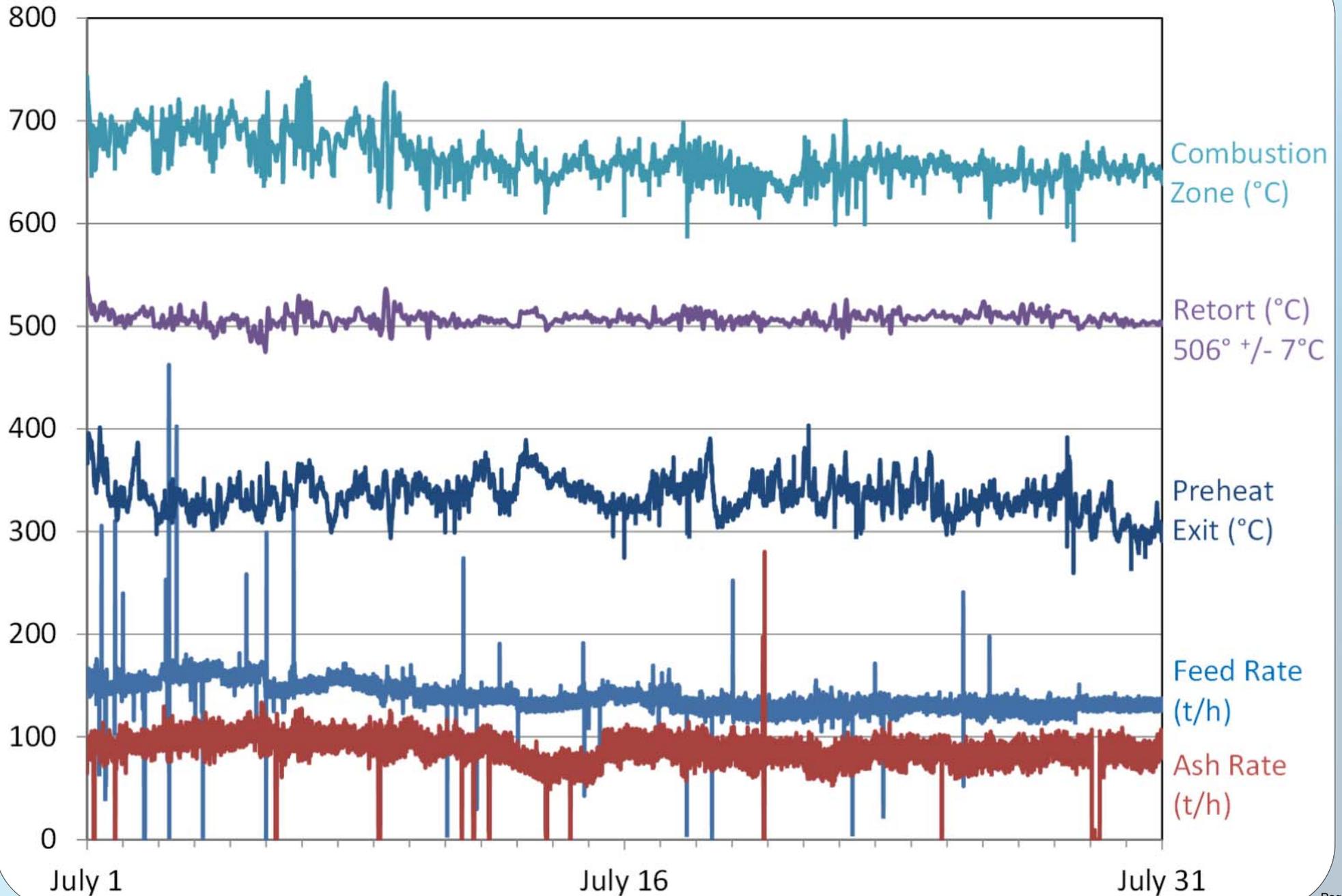
# FMG ATP Processor Operating Hours



~ 200,000 tonnes oil shale processed, 70,000 bbls oil produced to date in 2014.

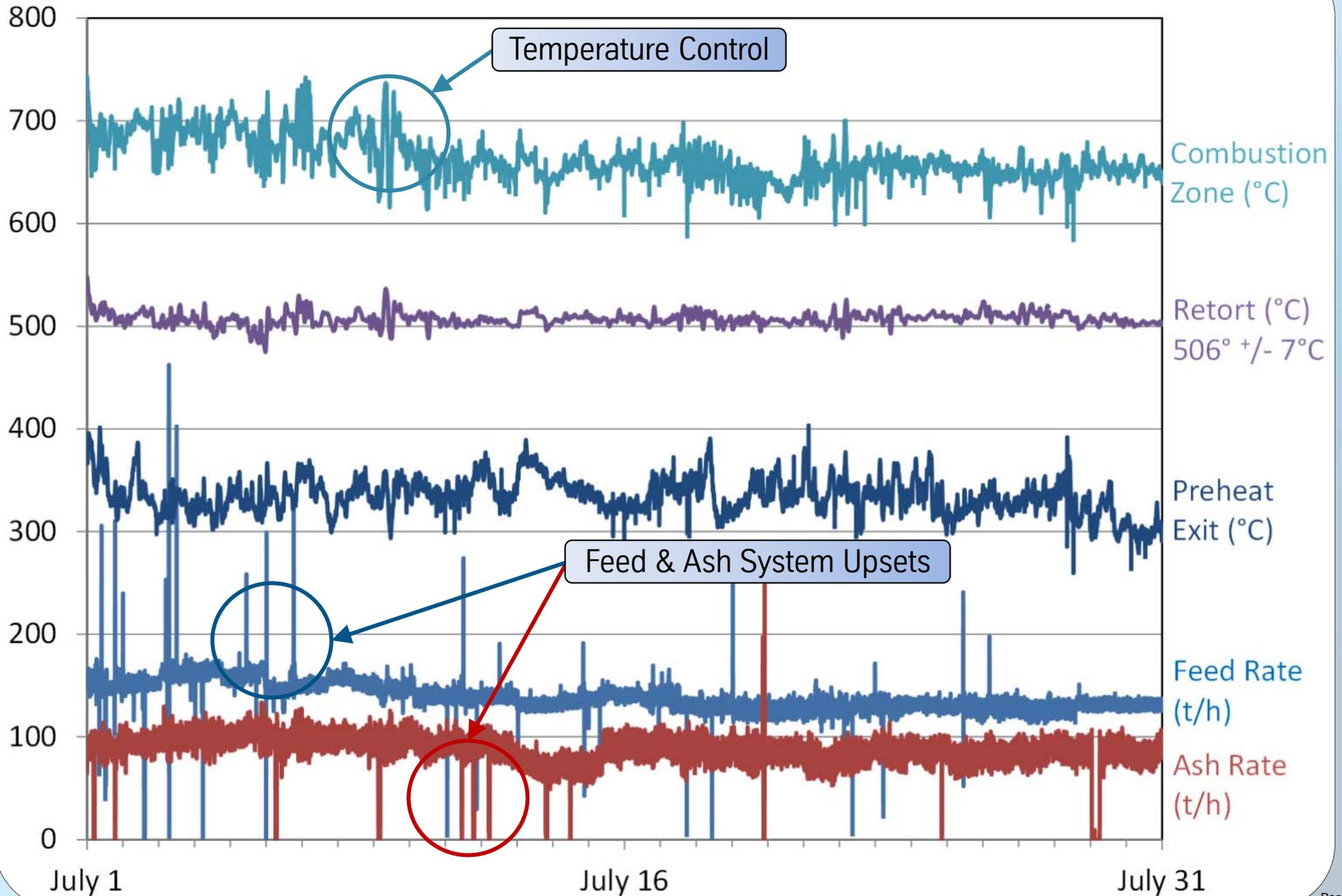
# Oil Shale Operation July 2014

## ATP Processor Operation July 2014 (total 40 day run)



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## ATP Processor Operation July 2014 (total 40 day run)





**2014 Video – ATP Commercial Oil Shale Operations (China)**

View online at [UMATAC Industrial Processes Videos](http://youtu.be/XxNLUK6DLuE)

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# Summary

**In 2014, FMG has focused on operating the plant and improving plant reliability.**

**UMATAC and TKIS continue to support FMG's operating and engineering teams.**

**Reliability improvements are working. Production run length > 40 days achieved.**

**Oil recovery system is working very well. Oil & gas quality meet design expectations.**

**ATP Processor is working well & handling ore much different than design.**



Product oil load-out and future upgrader

# Questions?



谢谢 Thank You شكرا



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