BLENDING OF IMPORTED/ HIGH GRADE AND DOMESTIC COALS

I .K. Rajdeva, GM (Operation Services)
NTPC Ltd.

BLENDING

- Uniform mixing of different grades of coal in predetermined proportion to achieve desired GCV/ properties
- Different grades of coal lifted from different locations and need to be mixed during transportation inside plant.

WHY BLENDING?

- The Gap between Coal Demand and Domestic Coal Supply is widening
- Annual coal demand was **572 MMT** at the end of financial year 2013 and domestic coal availability was only **436.30 MMT** for Power Sector.
- As per CEA, Coal requirement and domestic availability projections for the year 2016-17 for power sector will be respectively **842 Mt & 550 Mt**.

Why Blending ?

Year	Total Coal Requirement for Power	Coal Availability for power	Net Balance
2012-13	515	416	99
2013-14	572	436	136
2014-15	650	471	179
2015-16	737	521	216
2016-17	842	550	292

Figures in MMT(Million Metric Tonnes)

WHY BLENDING?

- The CEA Guideline has recommended that all new coal based projects shall be designed for a blend of domestic and imported coal upto a blending ratio of 30 %.
- Coal is imported in India from varied sources such as Indonesia, South Africa, Australia and their characteristics vary with the source.

WHY BLENDING?

Coal Imported for Power Generation :

2012-13 = 63 MMT

2013-14 = 80 MMT

2014-15 = 94 MMT (Target)

Central Electricity Authority
Office of Secretary (CEA)
2nd Floor, North Wing Sewa Bhawan
Ram Krishna Puram New Delhi-110066

No. CEA/TE&TD-TT/2011/F-9 **Dated:** 19th April, 2011

To

All State Power secretaries, Thermal Power Generating Cos./Project developers and Manufacturers of large power boilers As per list

Sub: Blending of imported/high GCV coal with low grade indigenous coal – Design of new boilers for Blend Ratio of 30:70 imported/high GCV coal: indigenous coal– reg.

Dear Sir,

As you may be aware, there exists large gap between projected demand and supply of indigenous coal to keep pace with the large generation capacity addition programme in the 12th Plan and beyond. Imported coal is being used by several utilities and may continue, so as to bridge the shortfall in indigenous coal supplies to the coal based power stations.

ADVANTAGES OF BLENDING

- GCV of coal can be enhanced
- Reduced ash content/increased ash pond life
- Controlling Sulphur
- Soot blowing frequency can be decreased
- Maintenance cost can be decreased

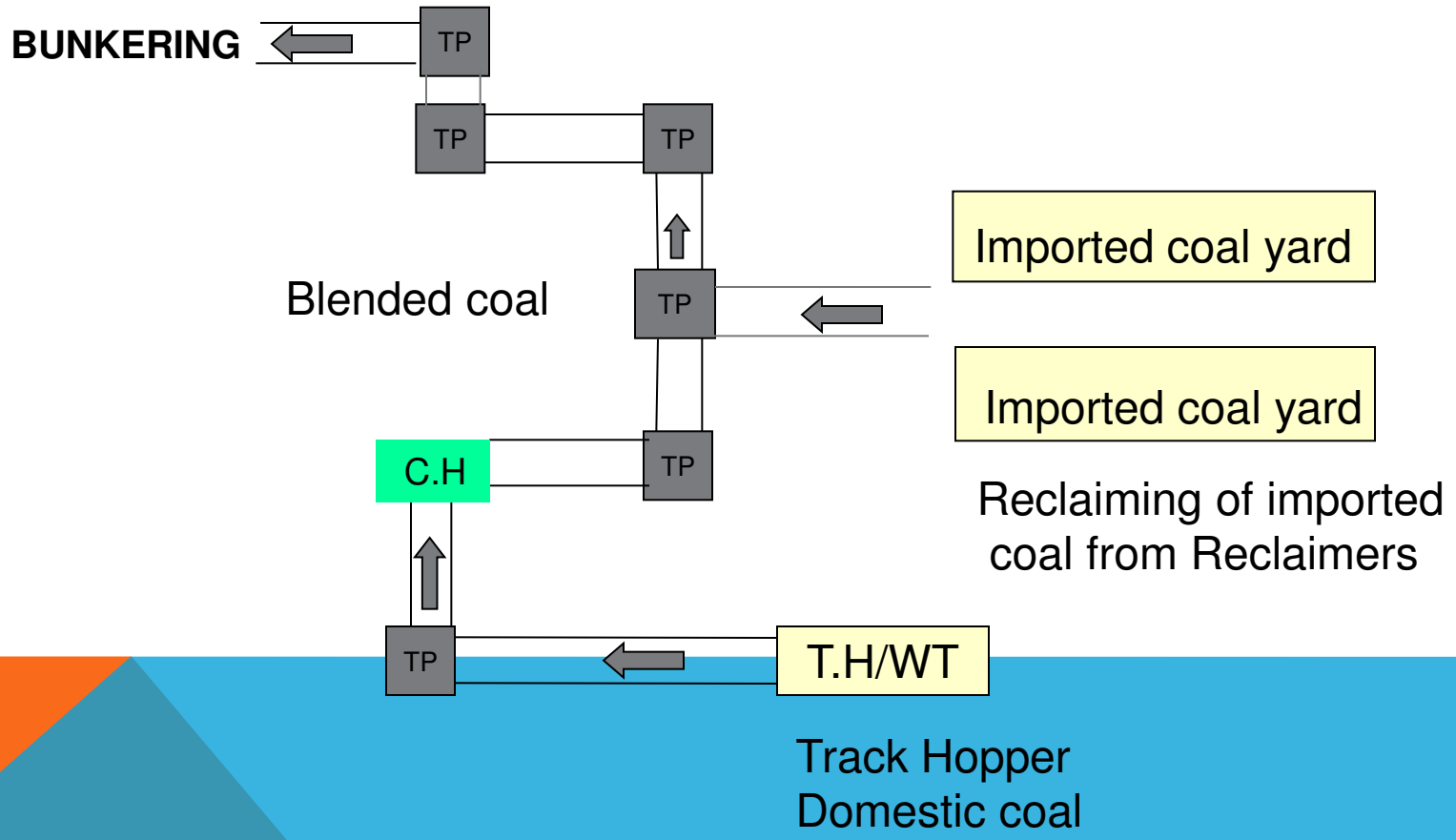
VARIOUS METHODS OF BLENDING

1. Blending by mixing two streams of coal on conveyor belt
   a) Imported coal reclaimed from Reclaimers and domestic coal from track hopper/ Wagon Tipplers
   b) Both coals reclaimed by Reclaimers
2. Blending by Ground Hopper
3. Blending in Stockyard
4. Blending on conveyor by Silos
5. Blending of Imported Coal by Installing additional low capacity Reclaimer on existing stock yard

Blending by mixing two streams of coal on conveyor belt

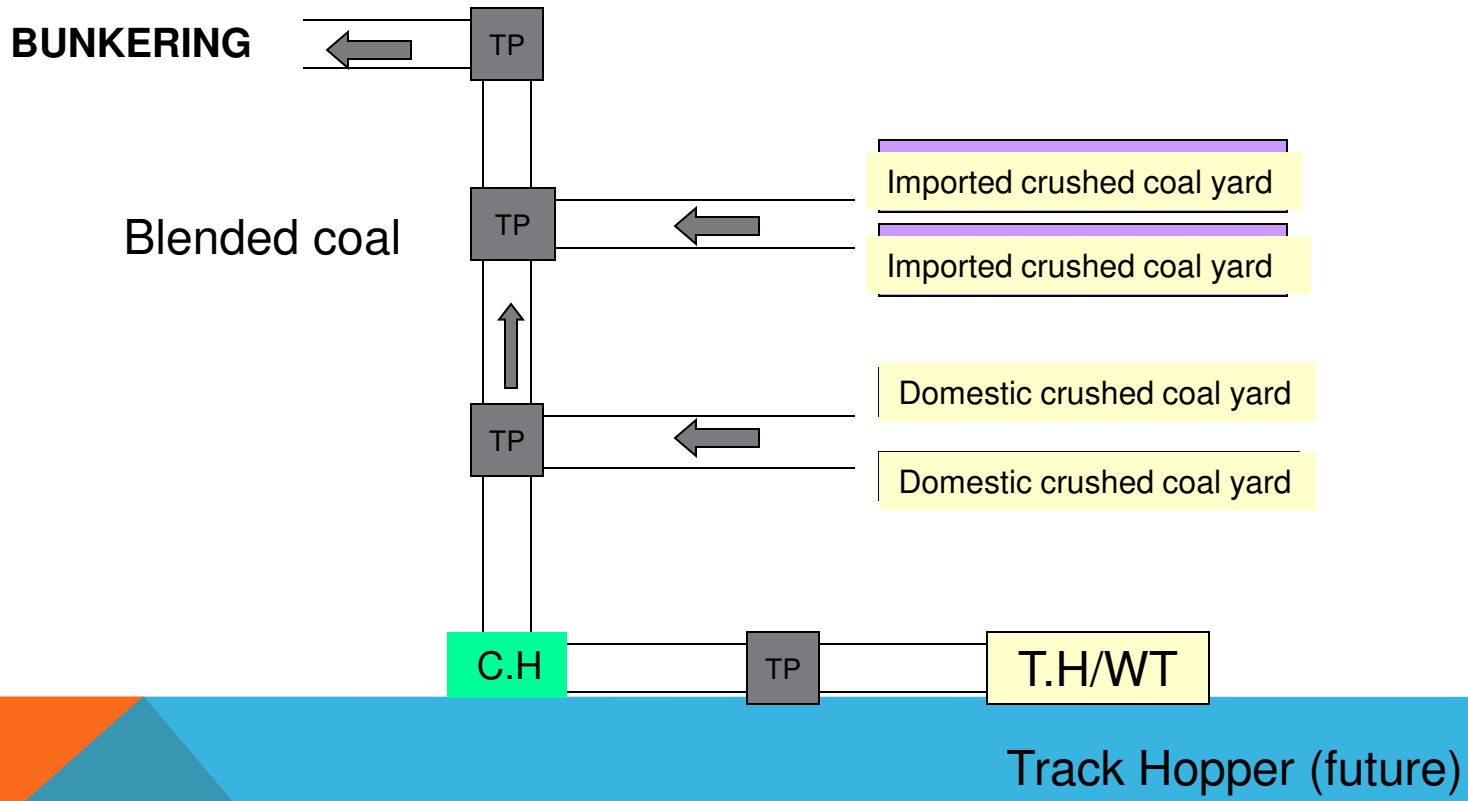
1(a) IMPORTED COAL RECLAIMED FROM RECLAIMERS AND DOMESTIC COAL FROM TRACK HOPPER/WAGON TIPPLERS

Exhibit - D



1(b) BOTH COALS RECLAIMED BY RECLAIMERS STOCKYARDS

Exhibit - C



1. Blending by mixing two streams of coal on conveyor belt

1(a) Imported coal reclaimed from Reclaimers and domestic coal from track hopper
1(b) Both coals reclaimed by Reclaimers in stockyards

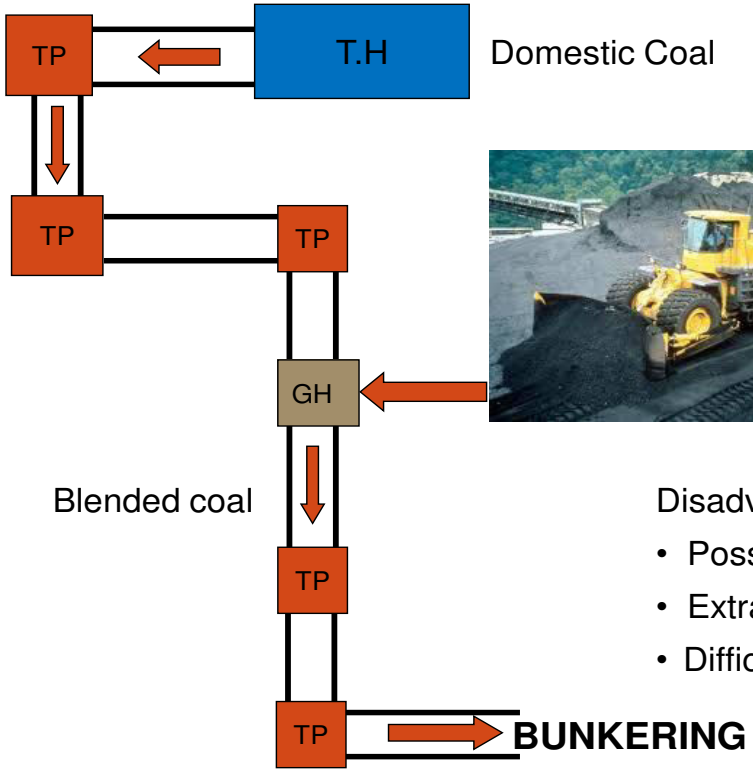
Sr. No.	Blending Method	Brief Description	Point/place of Blending	Advantages	Disadvantages	
1	Blending by mixing two streams of coal on conveyor belt					
a	Imported coal reclaimed from reclaimers and domestic coal from track hopper	Imported coal is reclaimed from yard. Domestic coal is fed directly from Track Hopper/Wagon Tippler	-At common transfer point - Homogenisation in transfer points	-Blending ratio can be changed at any time -Only imported coal need to be stacked.	Not very accurate method	
b	Both coals reclaimed by reclaimers	Two types of coals are stacked in yards of different stacker reclaimers	-At common transfer point - Homogenisation in transfer points	Blending ratio can be changed at any time	-Entire coal to be stacked first & more APC. -More running hours of CHP - Higher aux. power consumption	

2. BLENDING OF IMPORTED COAL THROUGH UNDERGROUND RECLAIM HOPPERS

- Imported coal can be stacked in the yard and dozed through Underground Reclaim Hoppers, which get mixed with indigenous coal received from track hopper / wagon tippler path while passing through transfer points. By suitable adjustments in unloading rate and reclaim rate, the blending ratio can be achieved.

2. BLENDING OF IMPORTED COAL THROUGH UNDERGROUND RECLAIM HOPPERS

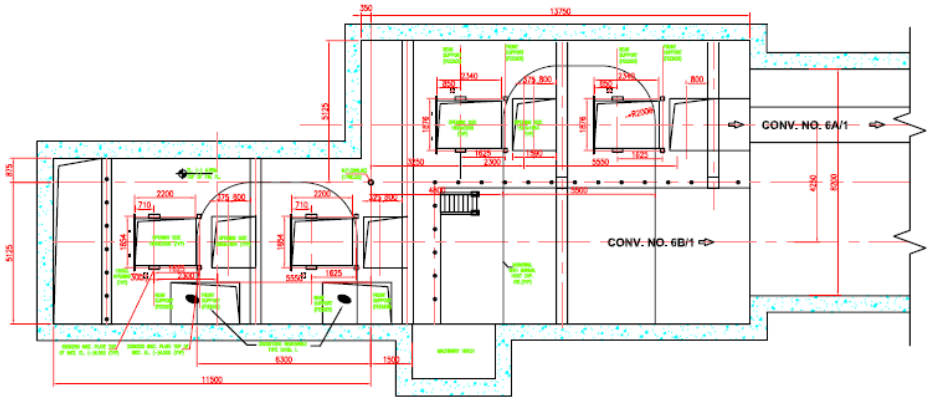
Blending by Ground Hopper

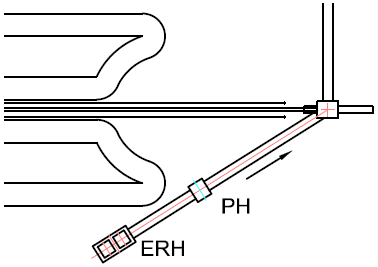


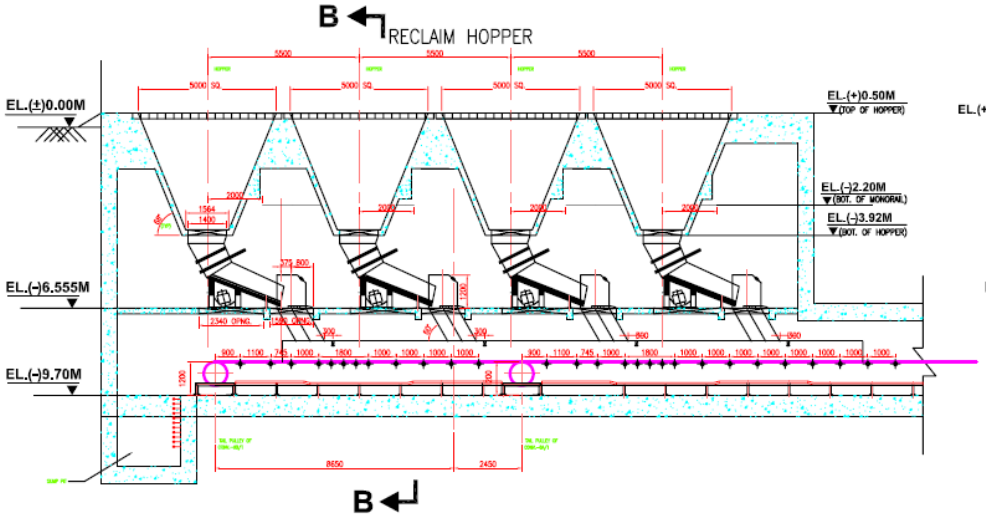
Disadvantage:

- Possible in plants with GH
- Extra cost of dozing
- Difficult to control blending ratio

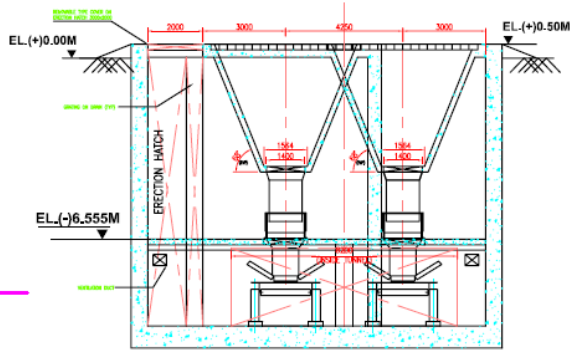
2. BLENDING OF IMPORTED COAL THROUGH UNDERGROUND RECLAIM HOPPERS







SECTION A-A



SECTION B-B

2. BLENDING OF IMPORTED COAL THROUGH UNDERGROUND RECLAIM HOPPERS

➢ Disadvantage

- Possible in plants with Ground Hoppers
- For High Capacity CHP, It is not possible to doze continuously
- Extra cost of dozing
- Difficult to control blending ratio
- Time consuming

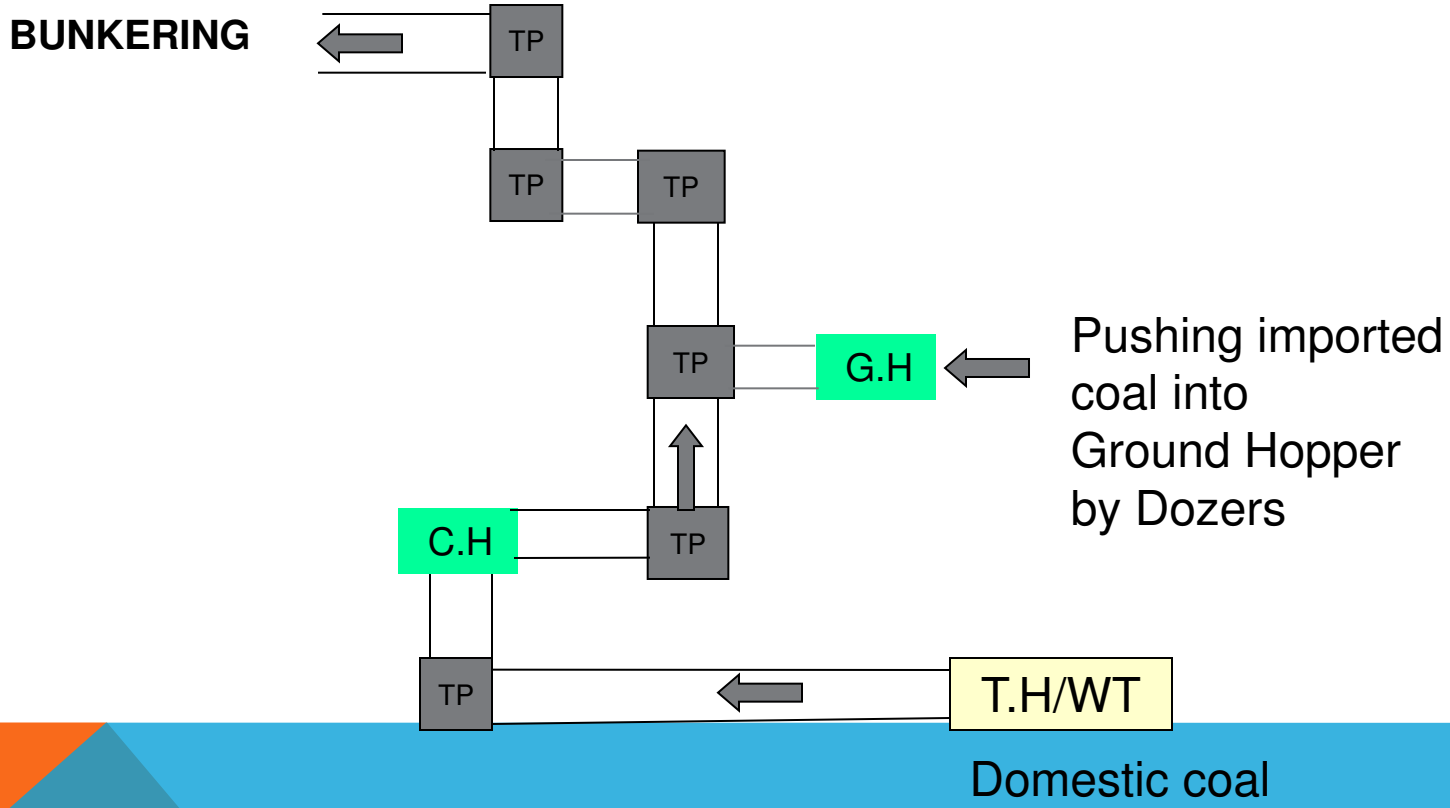
2. BLENDING OF IMPORTED COAL THROUGH UNDERGROUND FACILITY

The vibratory draw down hopper is located at the ground level below the stockpile and its function is to provide the initial flow stimulation.

Once product movement is established the flow rate is regulated by flow control gate.

Overall control is achieved by linking a downstream belt weigher to the flow control gate operation.

2. IMPORTED COAL RECLAIMED FROM GROUND HOPPERS AND DOMESTIC COAL FROM TRACK HOPPER/WAGON TIPPLERS



2. Blending by Ground Hopper

Sr. No.	Blending Method (Exhibit No)	Brief Description	Point/place of Blending	Advantages	Disadvantages	
2	Blending by Ground Hopper	Imported coal dozed into Ground Hopper is mixed with domestic coal in merging Transfer Point	- In merging Transfer Point - Homogenisation in transfer points	An alternate reclaiming method	- Fairly Accurate Blending ratio can be achieved with variable speed Belt Feeder/ Vibrating feeder	

3. Blending in Stockyard

Sr. No.	Blending Method (Exhibit No)	Brief Description	Point/place of Blending	Advantages	Disadvantages	
3	Blending in Stockyard	Stacking of two types of coals in yard in layers-one above the above.	-Blending during reclaiming - Homogenisation in transfer points	Only one system to be run for bunkering blended coal	-Entire coal to be stacked first. -More running hours of CHP & more APC -Mixing in yard may lead to fires - Not possible to change blend ratio after bed construction	

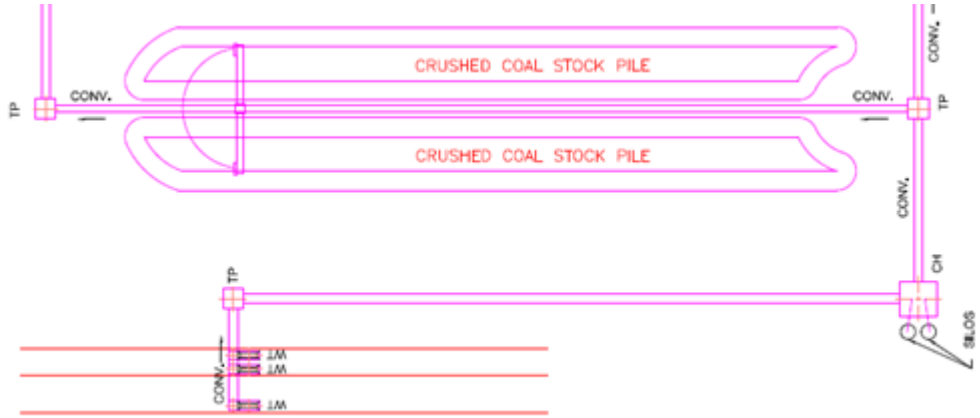
4. BLENDING OF IMPORTED COAL THROUGH STORAGE SILOS

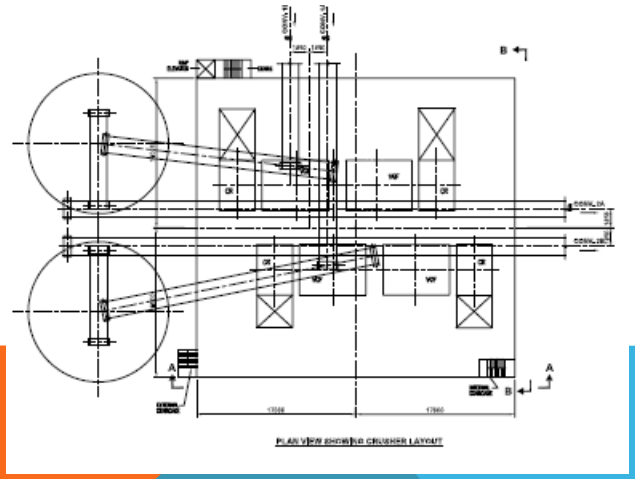
- **Imported coal (-)50mm size without further crushing can be stored in Silos (2 nos.) located near crusher house**

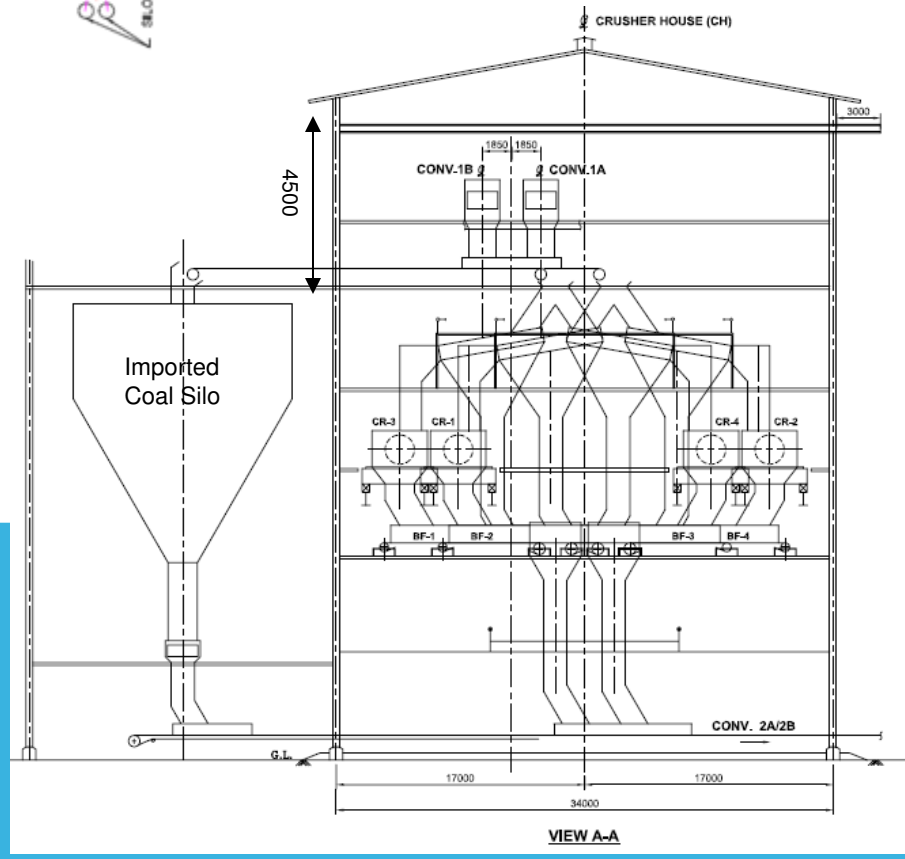
Or

- **Imported coal can be stocked at stockpile after crushing and followed by reclaiming by reclaimer**

BLENDING OF IMPORTED COAL THROUGH STORAGE SILOS





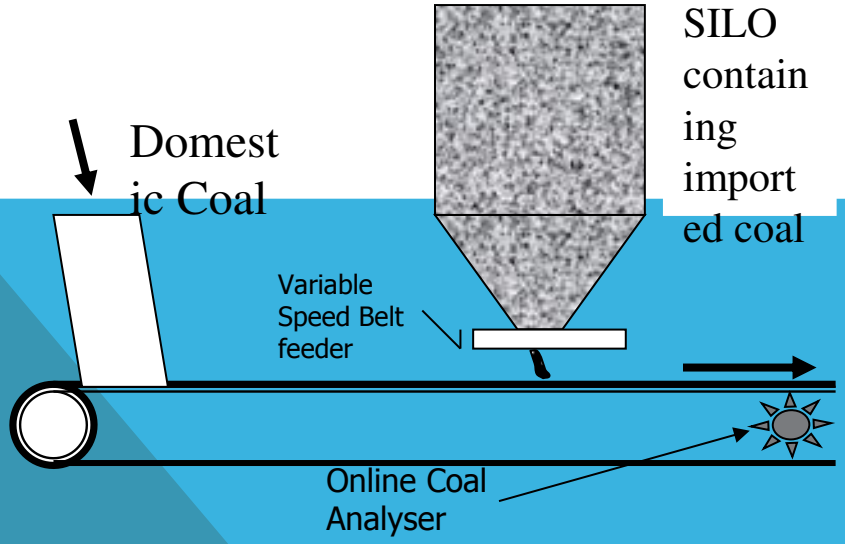


4. BLENDING OF IMPORTED COAL THROUGH STORAGE SILOS

- Advantage
  - Provision of direct feeding of Imported coal to boiler bunker after bypassing crushers.
- Disadvantage
  - Uncrushed Imported coal of (-)50mm size to be fed to Boiler bunker for direct feeding of Imported coal.
  - Increase of Crusher House height by approx 4.5 meter to accommodate Reversible Belt feeders for feeding to silo

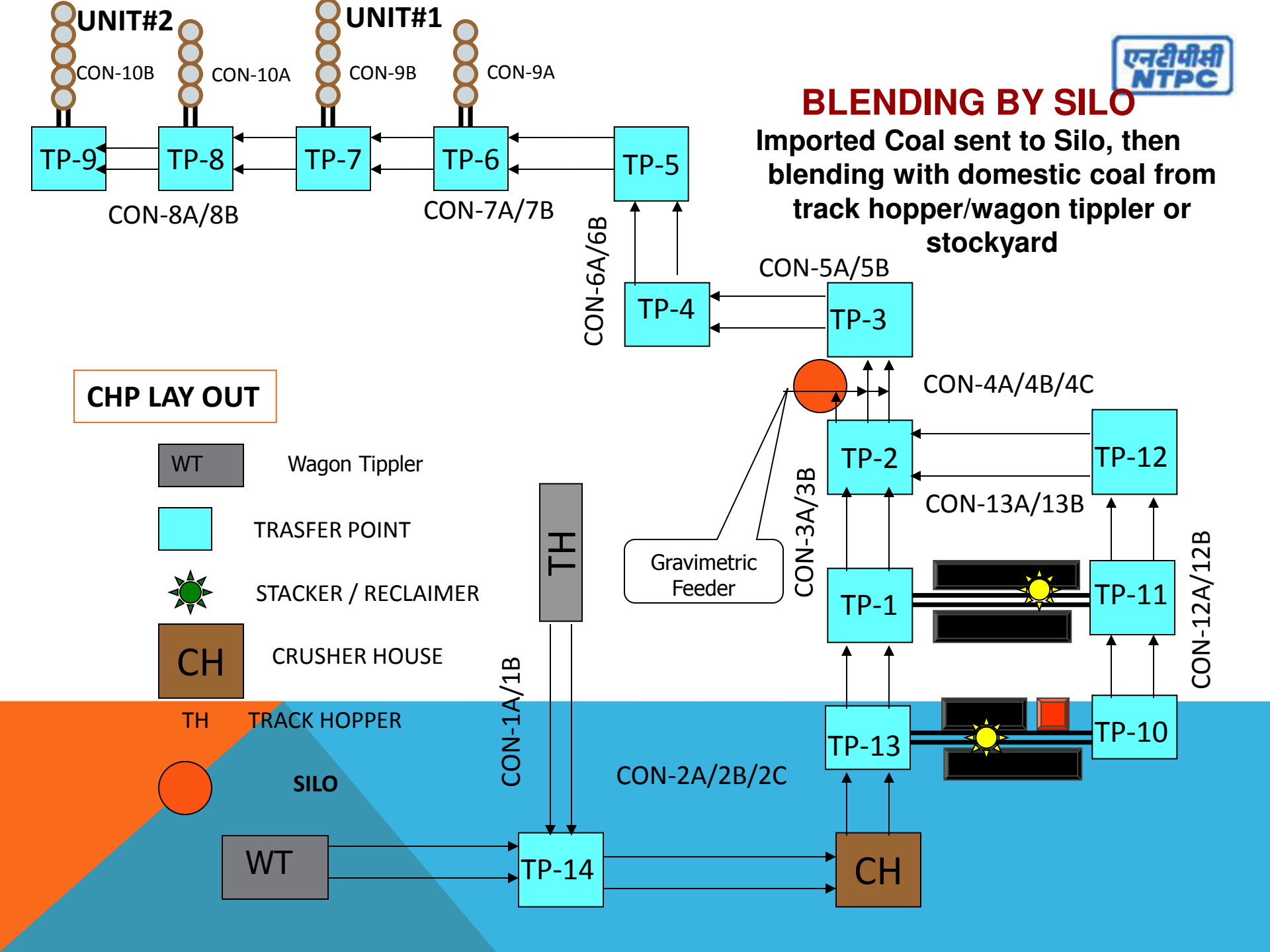
4. Blending of coal through Silos

Sr. No.	Blending Method (Exhibit No)	Brief Description	Point/place of Blending	Advantages	Disadvantages	
2	Blending by Silo	Imported coal carried from silo by variable speed belt feeder is mixed with domestic coal	-Blending on conveyor below silo -Homogenisation in transfer points	-Very accurate blending ratio can be achieved. -Blending ratio can be varied any time -Online coal analyser can be used for consistent uniform quality	High capital cost	



BLENDING BY SILO

Imported Coal sent to Silo, then blending with domestic coal from track hopper/wagon tippler or stockyard

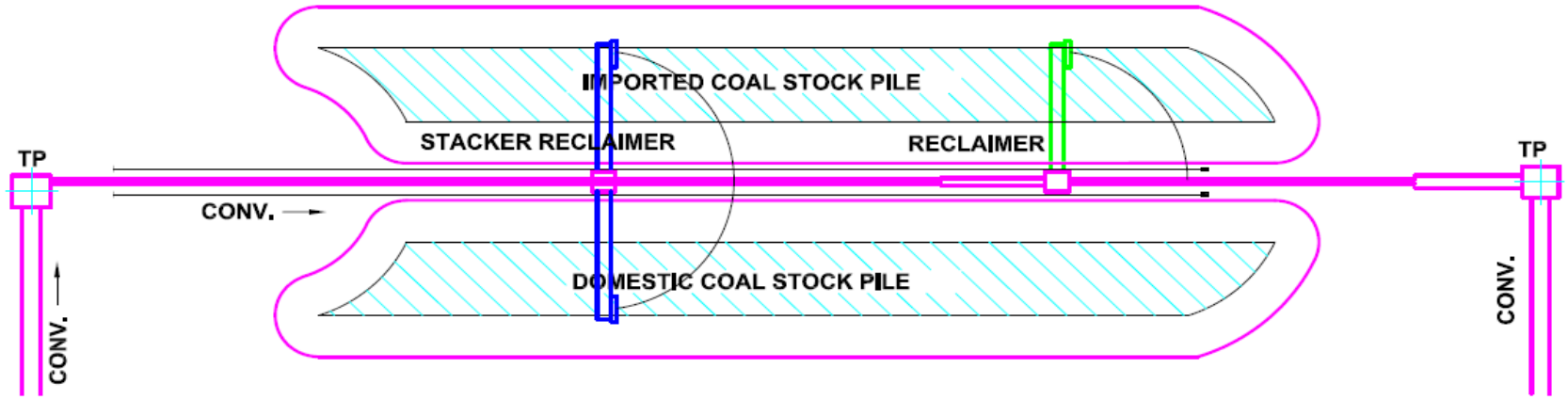


5. BLENDING OF IMPORTED COAL BY INSTALLING ADDITIONAL LOW CAPACITY RECLAIMER ON EXISTING STOCK YARD

- **In the conventional stacker reclaimer stockpile, one pile to be dedicated for stacking imported coal and balance piles can be used for domestic coal.**
- **One number low capacity reclaimer (30 % of CHP capacity) shall be dedicated to reclaim imported coal from Imported stockpile. Before reclaiming the stockpile shall be compacted in such a way to have a uniform pile height.**
- **Balance amount of coal can be received from either stacker reclaimer or wagon tipplers**

5. BLENDING OF IMPORTED COAL BY INSTALLING ADDITIONAL LOW CAPACITY RECLAIMER ON EXISTING STOCK YARD

Method-1: On Existing Rail



RECLAIMER CAPACITY 30% OF CHP CAPACITY

STACKER RECLAIMER CAPACITY 100% OF CHP CAPACITY

BLENDING OF COAL THRU STACKER RECLAIMER COMBINATION

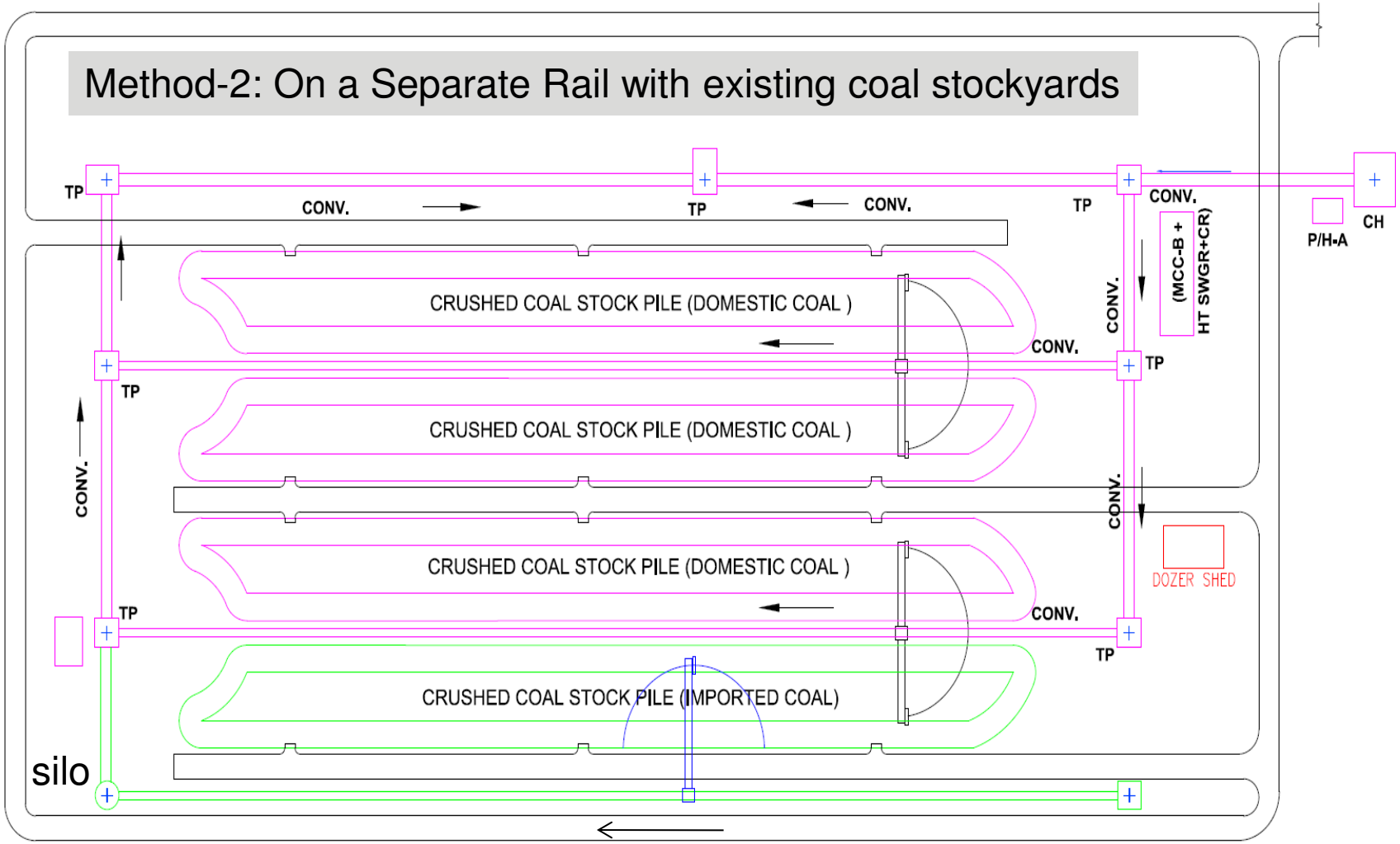
➢**Advantage**

- No modification to system required, No additional facilities required
- Continuous mechanized Blending can be achieved

➢**Disadvantage**

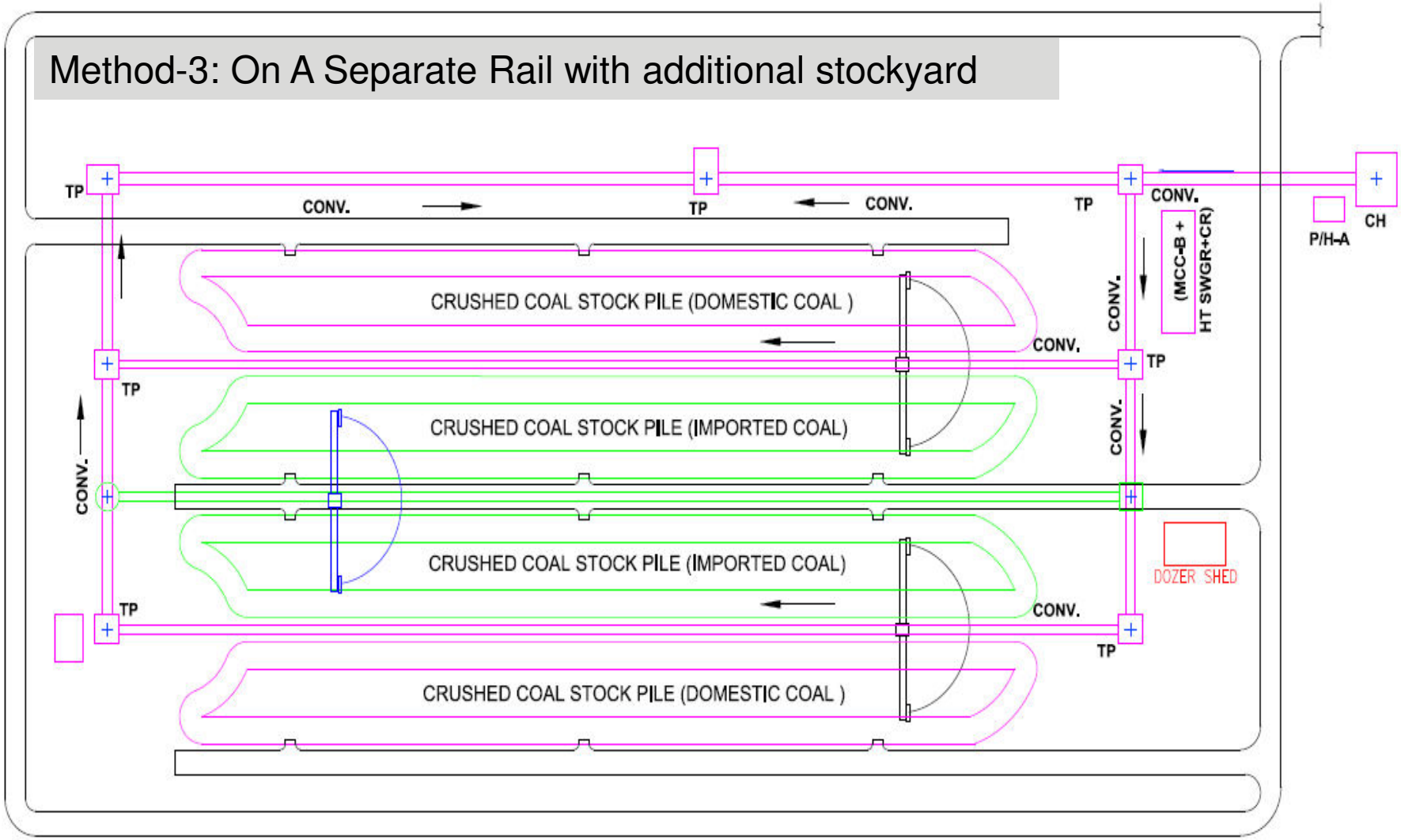
- Stockpile length will be reduced by approx 50 – 60 meter i.e. 8 percent of total coal storage capacity of stockyard

Method-2: On a Separate Rail with existing coal stockyards



BLENDING

Method-3: On A Separate Rail with additional stockyard

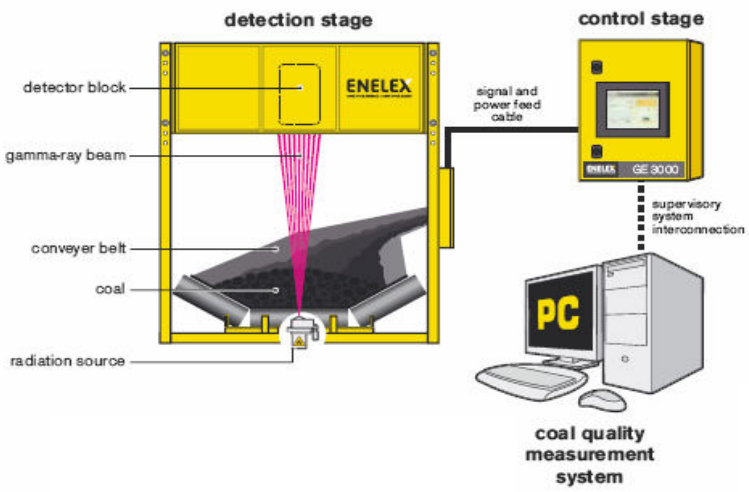


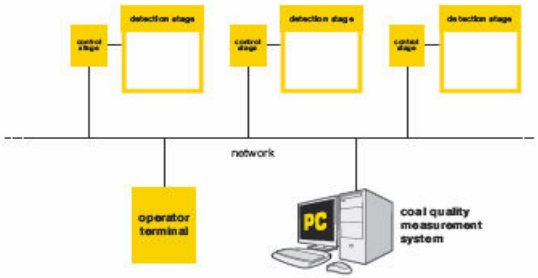
Advantage:
Continuous mechanized Blending can be achieved.

BLENDING

Disadvantage:
Additional cost shall be imparted to the system.

ONLINE COAL ANALYSER





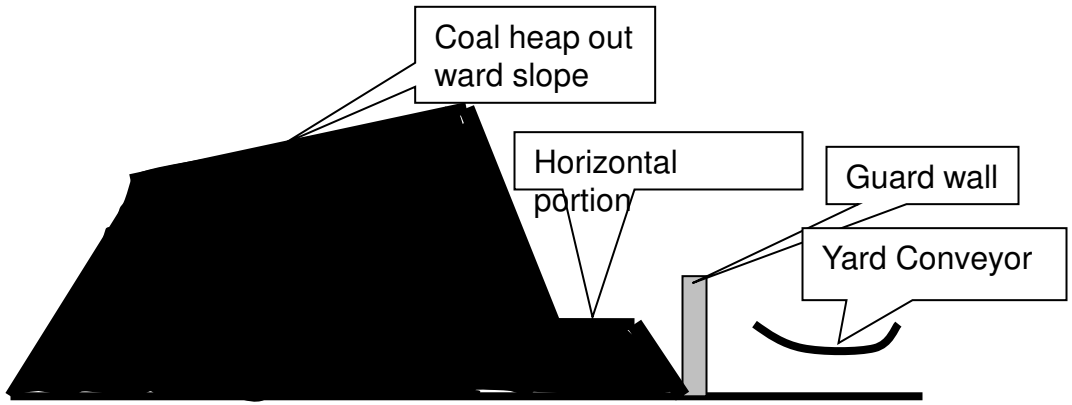
Precautions in the use of Imported Coal:

- Indian boilers are designed for Indian coals
- Imported coals are from different origin have different characteristics compared to Indian coals.
- Blending of imported coal is to be done before the coal is fed to coal bunkers and it should be uniform in all the bunkers.
- Filling of imported coal in a few bunkers and domestic coal in others is not be done.
- Larger blending ratios of imported coal and non-uniform blending can result in
  - slagging and fouling in the furnace
  - Higher temperatures near coal burners resulting in boiler tube leakages etc

Precautions in the use of Imported Coal:

- Imported coal to be stocked in layers of 1.0 m to 1.5 m and compaction of each such layer with dozer to be done in order to avoid auto ignition of stacked coal
- Loose uncompacted coal on sides of yard to be be removed partially and compaction to be done again to avoid sliding on the tracks of stacker reclaimer
- Coal stockyard to be covered with polythene sheets during rainy season

Coal Yard Preparation & Covering



COAL STOCKYARD COVERING

COAL STOCKYARD COVERING

Conclusions:

- Blending of coals is to be done uniformly in all the coal bunkers. Use of domestic coals in a few selected bunkers and domestic coals in others is not to be adopted to avod damages to the boiler tubes.
- For existing stations blending of domestic coal with imported/high grade coal can be done in a fairly accurate method
- For new stations one of methodoloies of blending can be adopted for accurate blending

Thank you