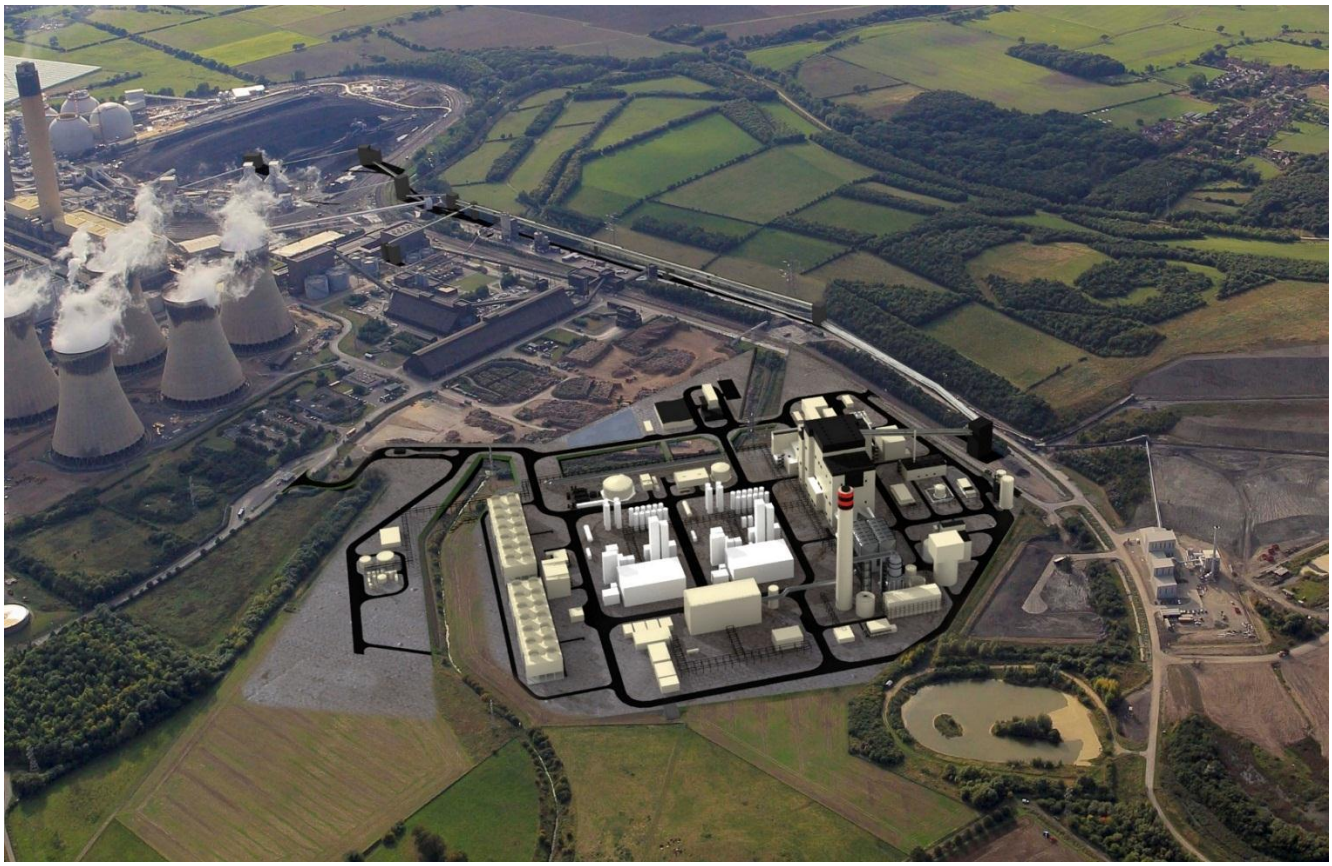
White Rose Carbon Capture and Storage (CCS) Project

Land adjacent to and within the Drax Power Station site, Drax, near Selby, North Yorkshire

Environmental Permit
Chapter XI – Raw Materials



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Glossary	
AOD	Above Ordinance Datum
ASU	Air Separation Unit
BS	British Standard
CCS	Carbon Capture and Storage
CEMP	Construction Environmental Management Plan
CPL	Capture Power Limited
dB	Decibel
EA	Environment Agency
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPC	Engineering, Procurement and Construction
ES	Environmental Statement
FGD	Flue Gas Desulphurisation
FRA	Flood Risk Assessment
GPU	Gas Processing Unit
HGV	Heavy Goods Vehicle
LWS	Local Wildlife Site
MWe	Megawatt
NERC	Natural Environment and Rural Communities (Act 2006)
NSIP	Nationally Significant Infrastructure Project
NYCC	North Yorkshire County Council
PEIR	Preliminary Environmental Information Report
SAC	Special Area of Conservation
SINC	Site of Importance for Nature Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WHO	World Health Organisation
WSI	Written Scheme of Investigation

CONTENTS

1.0 INTRODUCTION

1.1 This chapter provides a description of the raw material inputs used within the White Rose CCS plant and the additional storage requirements for Drax, describing the proposed additions to the inventory of raw materials used, the procedures for the regular review of new developments in raw materials, the implementation of any suitable ones that have less environmental impact, and the quality assurance programme in place.

1.2 There is only one practical source of cooling water which is the River Ouse. The existing Drax power station site was selected to provide a supply of water and changing this supply is neither desirable nor feasible. One of the key reasons for siting the White Rose project on the Drax site is to make use of the water supply.

1.3 A key issue at the REP will be the management of all raw materials delivered to, stored and used on site including the use of water and the reduction and avoidance of wastes being generated. Common wastes will include packaging generated from a wide range of materials delivered to site. Wastes will, wherever possible, be collected in a specific, designated area and recycled if a feasible recycling option is available and can be integrated into the installation's operations, (e.g. ash, scrap metals and office wastes). The volume or mass of the wastes generated will be recorded and used to generate the site's Pollution Inventory data. Raw materials used within the White Rose CCS site fall into five major categories.

- Fuels
- Water Treatment Chemicals
- Reagents for flue gas abatement (limestone, lime, ammonia, and calcium hydroxide).
- Water and water treatment chemicals

1.4 In addition, the plant will use a number of other raw materials in much smaller quantities. Where these are considered to be hazardous in nature, they are noted below. The principal materials proposed to be used within the White Rose plant are summarised in the table below. This table contains details of the following:

- The process in which each raw material is used
- How, and in what quantities, the raw material is stored
- The amount of each raw material used annually and the fate of the material once it has been used.
- The environmental impact of each raw material, why it is used and reason alternative materials are not used.

Table providing main bulk raw materials to be stored onsite for the White Rose CCS plant			
Raw material	**Use/location**	**Volume/tonnage stored**	**Consumption rate**
Fuels			
Fuel (Coal)	Fuel in combustion process, Silo located within White Rose CCS plant	12 hours of storage equates to roughly 2000 tonnes	160 tonnes per hour
Fuel (Biomass)	Fuel in combustion process, Silo located within White Rose CCS plant	12 hours of storage equates to roughly 420 tonnes	35 tonnes per hour
Light Fuel Oil	Fuel storage within White Rose CCS plant	2450 tonnes	Variable depending on operational conditions
Bulk chemicals			
Oxygen (LOX)	Oxygen required for the combustion process	2505 tonnes stored in multiple tanks	Dependant on operational conditions
Limestone	Limestone silo within White Rose CCS plant	700 tonnes	13 tonnes per hour assuming high sulphur coal
Gypsum	By product from FGD	2500 tonnes	22 tonnes per hour but dependant on fuel and sulphur content
Anhydrous ammonia	SCR reagent	100 tonnes	200 kg/h
Water treatment chemicals			
Sulphuric Acid	Waste water treatment and cooling water system	Around 25m^3	
Sodium Hydroxide	Waste water treatment	Around 25m^3	
Sodium Hypochlorite	Cooling water system	Around 15m^3	
Anti-scalant	Cooling water system	Around 15m^3	
Ferric Chloride	Raw water and waste water treatment	Up to 50m^3	

2.0 FUEL MANAGEMENT AND CONVEYANCE

2.1 Fuel will be bought into the existing Drax site via the current rail systems operating onsite, there is also the provision of road unloading facilities for both biomass and coal at the White Rose CCS plant as well as road unloading as part of the current co-firing facility. Conveyors will take coal from the existing coal stock along the main haulage road up to the White Rose CCS site where it will enter a silo. The silo will then feed a number of coal mills which will either be ball mills or roller mills. The biomass will pass through vertical hammer mills.

2.2 Coal for the OPP will be delivered to site by rail and will be unloaded at the existing Drax coal rail unloading facility. This facility has a series of existing coal conveyors that are currently used to convey the coal to the existing Drax coal yard. A new 350m^3 ground level hopper provided for exclusive use by the OPP will receive coal from either the existing emergency stock-out conveyors connected to the Drax coal rail unloading facility, or as a back-up. The new hopper can be loaded from the coal yard by vehicles to and including the size of the coal yard scraper. The existing conveyors will be fitted with pneumatically operated diverter chutes to allow coal to be diverted to the new ground hopper, but will maintain the ability to provide emergency stock-out the Drax the coal yard when required. From the ground hopper, coal is discharged by three vibratory feeders and then, by means of pneumatically operated diverter chutes, will feed one of two new 1000mm width trough belt conveyors (duty and standby). Each conveyor line is capable of carrying 650 t/h of coal to the OPP coal silos. Both conveyor lines will include a belt weighing system immediately before the ferrous separation system. Ferrous separators, over-band magnets at the head end of the conveyors, remove any ferrous material which is then transferred via chutes to ground level skips. In addition, trash screens remove oversize material. Fuel sampling is undertaken at the first transfer tower. The conveyors will follow a route paralleling the existing rail spur, with transfer towers along the route to accommodate changes in the conveyor direction. At each main transfer tower, both coal conveyors will include appropriate chutes and pneumatically operated diverter chutes to enable the coal flow to be diverted to the standby conveyor, to ensure the target availability of 99.5% is achieved. At the final transfer tower, the coal is transferred to one of two tripper conveyors which run to the tippers. These will be mounted on rails above the coal silos and both tripper carriages will be capable of independent movement to allow positioning over the respective discharge chute. To provide further availability of coal supply, a road unloading facility has been provided adjacent to the OPP facility. This facility consists of a covered ground hopper with a capacity of 90m$_3$ which be filled from both tipper trucks and coal yard scraper vehicles. The ground hopper will include two vibratory feeders to discharge the coal to a single conveyor. Similar auxiliary systems to the main coal supply system will be provided including a belt weigher and an over band magnetic separator. These systems are provided at the conveyor head in tower transfer tower. In the transfer tower the coal will be transferred to a conveyor which transfers the coal to the two tripper conveyors which feed the OPP's coal silos.

3.0 RAW WATER MAKE-UP

3.1 Raw water for the White Rose CCS Plant will be taken from Drax's cooling water (CW) make-up distribution tower located on the east side of the Drax site. The raw water make-up required by the existing Drax generating station is abstracted from the River Ouse. The water is fed to four make-up water pumps via two intake screens and supplied to four sedimentation tanks via two pipelines. The treated water from the sedimentation tanks is taken to the distribution tower via two pipelines. To supply water to the White Rose CCS Plant, a connection is to be made on the outlet pipeline which supplies make-up water to the North generation units.

3.2 The make-up water is pumped via two new 100% centrifugal pumps (duty / standby) to the White Rose tie-in point via a single buried glass fibre reinforced plastic (GRP) pipeline. The cooling water distribution tower has two steel outflow pipes (1000mm diameter), one of which feeds the North cooling towers makeup system and the other feeds the South cooling towers make-up system. The tie-in, to feed White Rose, is made onto the steel outflow pipe which supplies make-up water to the generation units located to the North.

3.3 A pump house containing two 100% duty centrifugal cooling water pumps provides 1,600m^3/h of make-up water at the required conditions at OPP's terminal point, located to the south of the White Rose plant.

4.0 LIMESTONE AND GYPSUM ASSOCIATED WITH WET FGD PROCESS

4.1 Limestone gravel is stored into two silos. Each silo is sized for a capacity of approximately 314 m^3. Each silo is sized to provide 24 hours of limestone for the FGD running at 100% load with the performance coal. Two milling systems are provided to wet grind the limestone gravel to the required size. The prepared reagent slurry (suspension of powdered limestone in water) is stored in a tank and from this tank is fed to the FGD absorber to replenish the reagent consumed in the absorption phase. Feeding rate is controlled based on a pH signal from the FGD absorber. The raw limestone can be received from the existing Drax's limestone storage via two dedicated conveyors or by truck. The conveyors nominal flow is 13 t/h with a maximum flow of 60 t/h.

4.2 The gypsum dewatering system is divided in to two stages. Hydrocyclones are used for the first stage of dewatering producing a stream of highly concentrated slurry rich in gypsum crystals; and this stream is sent to the second stage where vacuum belt filters are used to remove the residual water and produce a dry cake of gypsum that can be then stored in a silo. The silo is sized for a capacity of 2,660 m3 to provide four days of storage for the FGD running at 100% load with the performance coal. From the silo the produced gypsum can be reclaimed and sent to either Drax's existing gypsum storage by conveyor or loaded onto trucks.

5.0 OILS, LUBRICANTS AND GREASES

5.1 The White Rose CCS plant will also require a number of oils, lubricants and greases for the maintenance and operation of the various pieces of plant and equipment. Oils will be stored in accordance with the Oils storage regulations and will either be bunded where stored in bulk or placed on suitable receptacles where being stored outside. Lubricants and greases will generally be delivered on pallets as drums and will again be stored in designated areas.