Exhibit 6

William Kennedy, P.E., *Comments Regarding the Proposed NPDES Permit for Public Service of New Hampshire's Merrimack Station* (August 2014)

Comments Regarding the Proposed NPDES Permit

for

Public Service of New Hampshire's

Merrimack Station

William Kennedy, P.E.

August 2014

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On April 18th, 2014, Region I of the United States Environmental Protections Agency (EPA) issued a revised draft National Pollution Discharge Elimination System (NPDES) permit for Public Service of New Hampshire's (PSNH) Merrimack Station. The proposed permit identified Vapor Compression Evaporation (VCE) as Best Available Technology (BAT) for the Merrimack Station's Flue Gas Desulfurization (FGD) purge stream based on an EPA Best Professional Judgment (BPJ) evaluation.

Under the current revision of the Steam Electric Generating Station Effluent Limitation Guidelines (SEEG), (40 CFR 423, 47 Fed. Reg. 52290: November 19, 1982) FGD purge water is characterized as a low volume waste stream with Best Control Technology (BCT) limits on total suspended solids and oil & grease only. As such, NPDES permits for sites including FGD wastewaters use Water Quality Based Effluent Limitations (WQBEL) for the combined discharge of a facility as the primary evaluation criterion.

The determination of VCE as BAT for Merrimack Station and the resulting proposed zero discharge permit limits for FGD wastewaters is arbitrary and capricious considering:

- This determination is not consistent with the current SEEGs;
- EPA identified SEEGs for revision in 2005 as part of their annual industry review required under the Clean Water Act (CWA): however the Office of Water after nine years of study and review, has yet to promulgate a revised rule identifying an industry wide BAT for FGD wastewaters;
- The complexity of FGD wastewaters and their associated treatment systems are such that EPA is continuing to collect and review data in support of an industry wide BAT determination while the subject permit is under review;
- There is limited data documenting the successful performance of VCE in FGD service;
- There have been multiple unsuccessful applications of VCE in FGD service in the U.S.;
- The associated cost per toxic weighted pollutant equivalent (TWPE) for a zero discharge limit for FGD wastewaters is onerous and far in excess of past precedents;
- The installed enhanced physical/chemical treatment system meets or exceeds reduction of mercury and arsenic seen in reference systems for the proposed SEEG.

I. Other Systems

In its evaluation of other VCE systems in FGD service, the Region failed to note in the draft permit Fact Sheet that, along with the six systems it briefly mentions, only one of which is in the U.S., there have been three unsuccessful attempts at operating VCE.

Milliken Station

The Department of Energy's (DOE) Milliken Clean Coal Demonstration Project, located in Lansing, New York, involved retrofitting the New York State Electric & Gas's (NYSEG) Milliken station's two 150 MW pulverized coal units with FGD scrubbers and was to be a three year full-scale demonstration of several technologies. The project attempted to operate with zero liquid discharge (ZLD) while producing commercial grade gypsum and calcium chloride brine.

To achieve the goal of ZLD, a 30 gallon per minute (gpm) capacity brine concentrator manufactured by Resources Conservation Co. (RCC), now GE, was installed following an Infilco Degremont Inc. (IDI) designed physical/chemical treatment system. (*Project Performance and Economics Report*, Milliken Clean Coal Technology Demonstration Project, NYSEG, DE-FC22-93-PC92642, December 1996). The physical/chemical treatment system design at Milliken is identical to Duke Energy's Miami Fort system, identified as BAT for arsenic and mercury removal from FGD waters in the proposed SEEG.

The project report states that "the brine concentrator system experienced numerous operating problems through the demonstration." The system supplier made changes to the operating conditions to address issues with influent chemistry; however, at the time of the report, DOE was unable to produce brine suitable for resale and failed to achieve the project goal of zero discharge due to boron buildup, brine concentrator vibration, and fouling. *(Project Performance Summary, Clean Coal Technology Demonstration Program,* Milliken Clean Coal Demonstration Project, DOE/FE-0451, November 2002). The end use of the calcium chloride brine was "for use in dust control, soil stabilization, ice control, and other highway construction related purposes." It is of note, that RCC/GE has not reported the installation of another VCE system in FGD service since this 1995 attempt.

Big Hanaford

TransAlta's Centralia Big Hanaford Station, located in Centralia, Washington, installed a brine concentrator in 2004 supplied by Swenson Process Equipment, Inc. The station has two 700 MW FGD scrubbed units, originally burning a locally mined sub-bituminous coal. The brine concentrator was installed in an effort to capture high quality water for cooling tower make-up. The intent was to achieve a concentration factor of ten and then use the brine concentrate for fly ash conditioning and landfill. This goal was not achieved. After only six cycles of concentration, the quality of the distillate was so poor, primarily due to high levels of boron causing an extremely low pH, that it could not be reused in the cooling towers. The brine concentrator was abandoned in 2005.

Dallman

Springfield City Water, Light and Power's Dallman Generating Station, located in Springfield, Illinois, brought on-line Unit 4, a 200 MW, FGD scrubbed unit designed to burn high sulfur Illinois Basin coal, in 2009. Due to an increase in boron in their FGD purge, two Aquatech designed brine concentrators were purchased, followed by a spray dryer. A fourfold increase in projected capital costs, coupled with concern over the hydroscopic nature of the salts generated and how they would behave in a landfill, operating costs, and complexity of operation, caused the project to be abandoned. In lieu of primary treatment, Dallman was permitted to discharge their FGD wastewater to a local Publicly Owned Treatment Works (POTW).

In addition to the three abandoned attempts to apply VCE to FGD wastewaters, the only other operating VCE system in the U.S. is of a dissimilar design from Merrimack Station and experiencing operational challenges.

Iatan

Kansas City Power and Light's (KCPL) Iatan Generating Station, located near Weston, Missouri, operates two FGD scrubbed generating units configured to burn a sub-bituminous Powder River Basin (PRB) fuel, low in sulfur and chlorides. The system incorporates a pretreatment clarifier for solids removal, followed by two 30 gpm capacity falling film brine concentrators. The brine concentrate is used for fly ash conditioning/blending. The system began partial operation, Unit 1 only, in 2009 and full scale operation in late 2010.

Following a protracted start-up, numerous system operating modifications to address plugging issues have been made and are ongoing in an attempt to achieve reliable continuous operations. As recently as March 2014, the Missouri Department of Natural

Resources Air Pollution Control Program issued a temporary permit, number 032014-004, allowing for the testing and evaluation of an alternative to Iatan Station's VCE system.

It is disingenuous for EPA to site facilities which have had "some" success at VCE as an example of the availability of the technology and then fail to mention sites which have failed to work out the problems with similar technology. It is even more disingenuous for EPA to assume that Merrimack Station's VCE system is exactly like the systems installed at one U.S. facility and five Italian facilities. In fact, there are significant differences that prevent a rational comparison, e.g. type of fuel burned, boiler design, FGD operations, constituent make-up and chemistry of the FGD wastewater, quantity of ash produced, etc.

II. Complex Operations

Brine Concentration and Crystallization operations are complex and sensitive to constituent concentration and composition. The highly variable characteristics and composition of FGD wastewater, subject to fuel, unit load shifting, and the variability of upstream air pollution control system operations, make steady state reliable operation of a VCE system challenging. Recent air and solid waste regulations and the requirement to adjust operations to meet these rules, i.e. Mercury and Air Toxics Standards (MATS) and Coal Combustion Residuals (CCR), require the use of additives and even more modifications to power plant operating conditions. The emerging regulations only increase the variability of the resultant FGD purge stream and the complexity of downstream treatment systems.

A loss of pH control, due to variable buffering capacity, i.e. influent water chemistry, can rapidly lead to fouling of the VCE components or carryover of undesirable compounds into the distillate. Specifically, boron salts, an inadequate ratio of sodium to calcium ions, and the presence of organic compounds will result in premature crystallization, the rapid deposition of solids on equipment surfaces, or excessive foaming. These upset events typically result in either the fouling of heat transfer surfaces or the physical obstruction of fluid flow through the system components. Recovery from such upsets necessitates the removal/cleaning of the offensive materials from the equipments, i.e. system shutdown.

Both Iatan and Merrimack operations have reported blockage of the falling film distribution header of the brine concentrator and fouling of the heat transfer surfaces. In addition the use of anti-foam in the FGD absorber, a common industry practice, has resulted in violent foaming in the brine concentrator, requiring a system flush.

Without the opportunity to discharge a purge stream and to have redundancy of critical system components, the reliability of overall station operations is significantly diminished. Two factors influence the reliability of the Merrimack VCE system:

1. The lack of redundant major VCE system components:
    a. Brine Concentrator
    b. Crystallizer
    c. Belt Filter

2. The lack of sufficient in-situ ash production to accommodate the fixation of a continuous brine concentrator purge stream in the event of upsets or maintenance requirements in the crystallization or filtration portion of the system.

Merrimack Station's secondary WWTS is inherently complex and subject to a number of upstream variable factors. It is most accurately described as a volume reduction system, concentrating, yet not reducing to any appreciable degree, constituents of concern remaining in the wastewater matrix. Constituent reduction occurs in the primary, enhanced physical/chemical, treatment system.

III. Enhanced Physical/Chemical Treatment

The physical/chemical treatment portion of the Merrimack FGD wastewater treatment system (WWTS) is comparable in design to others in the industry which EPA referenced as potential BAT, FirstEnergy's Hatfield's Ferry Station (now closed), NRG's Keystone and Duke Energy's Miami Fort Station, in the proposed revision to the SEEG (*Technical Development Document for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category*, USEPA, EPA-821-R-13-002, April 2013).

EPA proposed physical/chemical treatment as BAT for arsenic and mercury and as a pretreatment step for further biological treatment. The EPA's proposed physical/chemical treatment consists of:

- pH elevation (8.4 - 9.2)
- Sulfide precipitation
- Iron co-precipitation
- Clarification/Filtration

Arsenic and mercury were selected as surrogate constituents. Treatment to reduce these surrogates to target concentrations would also reduce a number of other metals, to include: aluminum, antimony, cadmium, calcium, chrome, copper, lead, magnesium, nickel, silver and zinc.

The Merrimack enhanced physical/chemical treatment system includes all the of EPA's proposed treatment steps with the following additions:

- pH elevation to 10.6
- Soda ash softening
- Acid neutralization reactor
- Enhanced Mercury and Arsenic Removal System (EMARS)

Each of these additional treatment operations, as applied to FGD wastewater treatment, is unique to Merrimack Station.

Hydrated lime (calcium oxide) is typically used to raise the pH and reduce the solubility of metals and arguably to desaturate gypsum (hydrated calcium sulfate) from the FGD water matrix. Most systems typically raise the pH to a range of 8.4 to 9.2, balancing metals removal with sludge formation, i.e. the higher the pH the greater the volume of solids precipitated. Higher pH adjustments require the use of additional lime and increased solids handling/disposal expenses. The Merrimack system increases the pH to ~10.6. The benefit from operating at this higher alkaline range is: a 25 to greater than 50 percent increase in the precipitation of a number of dissolved metals of concern; precipitation of calcium and magnesium; and the reduction of up to 50 percent of boron. Boron reduction is not achieved at pH less than 10.

Soda ash softening is not typically used to treat the FGD wastewater matrix. The advantage of its use for Merrimack Station is that the more soluble sodium salts precipitate calcium and magnesium salts. The reduction of calcium and magnesium compounds from the matrix reduces the risk for scaling and plugging in the VCE system. The replacement of calcium and magnesium allows for the crystallization and production of a salt filter cake, consisting of sodium chloride. It should be noted that without this step, calcium chloride could be produced with great difficulty, yet it is hydroscopic and would rapidly absorb atmospheric moisture and return to a liquid, dissolved, form.

Both the elevated pH and soda ash steps increase the suspended solids in the matrix, providing increased surface area for the adsorption, and subsequent removal, of colloidal mercury from the matrix during clarification and filtration. These steps also enhance the effectiveness of the iron coprecipitation. The increase in crystal growth of the bulk precipitants leads to an increase in capture of micro constituents, such as arsenic, cadmium, etc, within the lattice structure.

Adequate mixing and reaction time for pH neutralization following clarification is a common inadequacy of FGD wastewater treatment systems, resulting in significant pH swings in the physical/chemical treatment system effluent. This is a frequent occurrence, especially during system restarts and sludge transfer from the clarifier. The Merrimack design addresses this common issue with the incorporation of an inline reaction chamber. This reactor allows for sufficient residence time to accommodate a greater range of flows and still maintain the target pH adjustment.

The use of organo-sulfide for mercury capture, while not unique to the industry, is certainly not ubiquitous. In fact, none of the physical/chemical plus bioreactor systems identified by EPA as BAT for selenium and nitrate reduction, Duke Energy's Belews Creek and Allen Stations, currently use organo-sulfide. Organo-sulfide, a relatively expensive family of treatment chemicals, captures mercury at a molecular level on a polymeric chain. The use of organo-sulfides has the advantage over less expensive inorganic sulfide compounds in that the larger molecule facilitates precipitation and filtration of the mercury to remove it from the water matrix.

EMARS is a Siemens, now Evoqua, proprietary adsorption media technology used to capture arsenic and mercury. The system consists of sub-micron filtration followed by two different media to polish the water matrix. The filtration step reduces particulate constituents below the nominal 0.45 micron dissolved threshold. The media then captures mercury to low nanogram per liter and arsenic to low microgram per liter concentrations. This technology was independently tested by Siemens on post physical/chemical treated FGD wastewater at Duke Energy's Belews Creek prior to incorporation into the Merrimack design. The application of this technology to FGD wastewater treatment is unique to Merrimack Station.

It has been the concern of EPA that physical/chemical treatment systems alone do not significantly treat dissolved constituents in the waste stream. This is not the case for the Merrimack WWTS. Performance of the physical/chemical treatment system plus the absorption media has reduced mercury concentrations an order of magnitude below levels proposed in the SEEG. A summary of key constituent removal in the enhanced physical/chemical treatment system is shown in Table 1.

Table 1: Average Concentration from Enhanced Phys/Chem Effluent Compared to Proposed BAT

	Merrimack[2]	Hatfield's Ferry[1]	Keystone[1]	Miami Fort[1]	SEEG (30-day)
As (µg/L)	6.1	6.682	4.006	4.483	6
Hg (ng/L)	24.8	75.404	64.260	168.569	242

Note 1: Source Table 13-3, EPA-821-R-13-002, April 2013

Note 2: Non-detect values treated as 50% of reporting limits

It is argued in a number of comments in the docket to the proposed SEEG that physical/chemical treatment systems that EPA reviewed were operated to meet site specific permit limits, not optimized to achieve maximum performance. As demonstrated by the aggressive operation of Merrimack's primary treatment system, a number of constituents of concern are removed to analytical reporting limits, meeting or exceeding the performance of other systems proposed as BAT for the industry.

IV. Zero Discharge of FGD Waste Water is Unreasonable

The expectation of a zero discharge from the FGD wastewater treatment system is counter to the design intent of the system, which has little to no redundancy of equipment and unit operations to maintain treatment system and generating station reliability without the ability to have a purge stream. The primary treatment system, physical/chemical treatment with an enhanced polishing operation, removes the overall balance of constituents of concern. Further treatment, utilizing the secondary, VCE, should more accurately be considered a volume reduction system, with little additional constituent reduction. The lack of 100 per cent redundancy of all key components of the secondary treatment system and operational challenges make operating the current treatment system in a zero discharge configuration unachievable while maintaining overall generating station reliability/availability.

A comparison of the Merrimack system to other installed VCE systems in FGD service is not appropriate due to site specific factors, i.e. system configurations, type of fuel burned, quantity of ash generated, etc. In fact, it is the relatively large volume of wastewater relative to the volume of ash available at Merrimack that makes a zero discharge particularly difficult.

The five ENEL Power and one ENDESA owned VCE systems in FGD service, installed by Aquatech and HPD/Veolia respectively, have taken several years of optimization, trouble shooting and technical support to achieve their current state of operation. Operational challenges have included corrosion, boron silicate fouling of heat transfer surfaces, blockage and poor salt quality. Two of these VCE systems are currently not operating and it is not well documented as to whether the remaining systems are actually operating with zero liquid discharge.

Each of the VCE systems referenced to be in service was designed to address site specific factors and each of the generating units is relatively unique unto themselves. Iatan's design anticipated that brine concentration alone would sufficiently reduce the volume of water for wetting the available ash. Duke's Mayo Station VCE system, under construction, also anticipates that brine concentration will provide sufficient volume reduction for fixation with ash and returns landfill leachate to the VCE.

Contrary to the proposed NPDES Permit Fact Sheet, significant additional capital expenditures are necessary to install the required operational redundancy to operate with zero discharge. An increase in operating costs will also be necessary to meet the short fall in available fly ash to fixate a purge stream, i.e. offsite procurement of ash or other comparable materials. The Region erroneously assumed that these costs do not exist and did not accurately evaluate the economic impact in their BPJ evaluation of BAT for Merrimack Station.

V. Conclusion

The following conclusions are made following a review of the Merrimack FGD WWTS design, operations and draft NPDES permit:

1. The primary, enhanced physical/chemical, treatment system meets or exceeds the performance of other referenced systems considered by EPA as BAT for arsenic and mercury reduction.
2. The primary treatment system removes a significant fraction of constituents of concern.
3. The discharge from the primary treatment system, considering WQBELs, the proposed SEEG, and the Technical Development Document related to the SEEG , should be considered the compliance point for an internal NPDES outfall for FGD wastewaters.
4. The secondary, VCE, treatment system serves primarily as a volume reduction system to facilitate the wetting of ash, as ash is available. There is not a sufficient quantity of ash available to accommodate the expected continuous operation of the VCE.
5. The discharge to a water body or POTW from a FGD WWTS is regulated as a low volume waste under the existing SEEG.

Exhibit 7

The Air Compliance Group, LLC, *Performance Test Report for FGD Wastewater Treatment System of Units 1 and 2 at the PSNH Merrimack Station in Bow, New Hampshire* (June 1, 2012)

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Performance Test Report for FGD Wastewater Treatment System of Units 1 and 2 at the PSNH Merrimack Station in Bow, New Hampshire

Prepared for

URS Corporation

Princeton, New Jersey

Test Dates: December 20-21, 2011

January 03 - 07, 2012

Report Date: June 1, 2012

ACG Contract Numbers V11894

Table 6: Summary of Wastewater Test Results				
	Performance Test Requirements		Total Average Results	
Constituent	Influent Design Maximum	Design Effluent Concentration (Total)	Influent	Effluent
Total Suspended Solids	2.0 wt% 20,000 mg/L	3 mg/L	4,540	2*
Total Dissolved Solids, mg/L	36,000	Not Applicable	25,400	19,400
pH, standard units	5.5 to 6.5	6 to 9	6.3	7.2
Chloride, mg/L	18,000	18,000 or slight increase	10,020	10,200
Temperature, degrees F	130	130 (No increase)	108	85
Aluminum, mg/L	800	1.0	198	< 0.02
Antimony, mg/L	0.50	0.5 (No change)	0.02	< 0.0003
Arsenic, mg/L	3.0	0.02	0.22	0.004
Barium, mg/L	5.0	5.0 (No change)	0.51	0.24
Beryllium, mg/L	0.1	0.1 (No change)	0.01	< 0.0007
Cadmium, mg/L	0.5	0.05	0.02	< 0.0001
Chromium III, mg/L	5.0	0.05	< 0.25	< 0.004
Chromium VI, mg/L	0.1	0.1 (No change)	< 0.75	< 0.004
Copper, mg/L	2.0	0.05	0.33	< 0.0007
Iron, mg/L	500	0.1	120	< 0.03
Lead, mg/L	4.0	0.1	1.66	< 0.0001
Magnesium, mg/L	7,000	Not Applicable	953	769
Manganese, mg/L	380	3.0	23.82	0.54
Mercury, mg/L	2.5	0.000014	0.26	0.000009
Nickel, mg/L	6.0	1.0	1.06	0.008
Selenium, mg/L	18	9.0	2.74	0.08
Silver, mg/L	0.30	0.05	< 0.0004	< 0.0002
Sulfate, mg/L	15,500	Not Applicable	2,900	1,280
Thallium, mg/L	0.6	0.6 (No change)	0.02	0.005
Zinc, mg/L	8.0	0.1	4.29	< 0.0004
Oil & Grease, mg/L	None Detected	No Net Increase	< 5	< 5
Secondary Performance Guarantee				
Constituent	Performance Test Requirements		Test Result	
Dewatered Filter Cake	Minimum of 45% dry solids, by weight	Pass Paint Filter Liquids Test (PFLT)	60% dry solids, by weight	Passed PFLT

* See discussion in Section 4.2.

TABLE 7

SUMMARY OF WASTE WATER TREATMENT SYSTEM RESULTS

WWT INFLUENT COMPOSITE SAMPLES

PSNH - MERRIMACK STATION

RUN I.D. DATE COLLECTED TIME STARTED TIME ENDED	Day 1 12/20-21/2011 10:30 10:30	Day 2 1/03-04/2012 10:00 10:00	Day 3 1/04-05/2012 10:00 10:00	Day 4 1/05-06/2012 10:00 10:00	Day 5 1/06-07/2012 10:00 10:00	Average
Metals (mg/L)						
Aluminum	65.50	45.20	708.00	85.80	84.30	197.76
Antimony	0.0178	0.0128	0.0145	0.0152	0.0152	0.0151
Arsenic	0.224	0.2060	0.2320	0.2210	0.2330	0.2232
Barium	0.579	0.5820	0.6570	0.4070	0.3010	0.5052
Beryllium	0.00739	0.00976	0.0122	0.0112	0.0101	0.0101
Cadmium	0.0159	0.0198	0.0208	0.0206	0.0201	0.0194
Chromium	0.665	0.5350	0.7180	0.6080	0.6590	0.6370
Chromium (III)	< 0.176	0.3280	< 0.0442	< 0.0442	0.6590	< 0.2503
Chromium (VI)	< 0.176	0.2070	1.3500	1.9100	< 0.0683	< 0.7463
Copper	0.279	0.3140	0.3570	0.3380	0.3410	0.3258
Iron	116	104	137	117	128	120
Lead	1.89	1.65	1.70	1.51	1.58	1.66
Magnesium	870	970	948	1010	968	953
Manganese	22.30	25.50	25.90	22.10	23.30	23.82
Mercury	0.183	0.268	0.303	0.239	0.277	0.258
Nickel	1.03	1.08	1.16	1.03	0.992	1.06
Selenate	0.0852	0.052	0.0593	0.0592	0.0799	0.0669
Selenite	0.0647	0.0563	0.0594	0.0876	0.0728	0.0702
Selenium	2.93	2.71	2.86	2.62	2.66	2.74
Selenocyanate	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022	< 0.022
Silver	0.000761	< 0.0003	< 0.0003	< 0.0003	< 0.0003	< 0.0004
Thallium	0.0200	0.0128	0.014	0.0155	0.0178	0.02
Zinc	5.10	3.75	4.56	4.11	3.91	4.29
Suspended Solids (mg/L)	7,600	2,900	3,500	3,200	5,300	4,540
Dissolved Solids (mg/L)	22,000	30,000	25,000	25,000	25,000	25,400
Sulfate (mg/L)	2,200	3,200	2,800	3,200	3,100	2,900
Chloride (mg/L)	9,100	10,000	10,000	10,000	11,000	10,020

Notes:

"<" preceding a value indicates a nondetect in which the reporting limit was used (or average contains one or more of these runs).

TABLE 8

SUMMARY OF WASTE WATER TREATMENT SYSTEM RESULTS

WWT EFFLUENT COMPOSITE SAMPLES

PSNH - MERRIMACK STATION

RUN I.D. DATE COLLECTED TIME STARTED TIME ENDED	Day 1 12/20-21/2011 10:30 10:30	Day 2 1/03-04/2012 10:00 10:00	Day 3 1/04-05/2012 10:00 10:00	Day 4 1/05-06/2012 10:00 10:00	Day 5 1/06-07/2012 10:00 10:00	Average
Metals (mg/L)						
Aluminum	0.0274	< 0.0044	0.0427	< 0.0222	< 0.0222	< 0.0238
Antimony	< 0.000023	0.000338	0.000552	< 0.00023	< 0.00023	< 0.000275
Arsenic	0.0030	0.00375	0.00459	< 0.00255	0.00752	0.0043
Barium	0.141	0.272	0.238	0.256	0.270	0.235
Beryllium	0.0004	< 0.000227	0.000652	< 0.00114	< 0.00114	< 0.0007
Cadmium	< 0.000021	< 0.000042	0.000225	< 0.000208	< 0.000208	< 0.000141
Chromium	< 0.00004	< 0.00009	< 0.00009	< 0.00045	< 0.00045	< 0.00022
Chromium (III)	< 0.00442	< 0.0022	< 0.0011	< 0.0088	< 0.0044	< 0.00418
Chromium (VI)	< 0.0044	< 0.0022	< 0.0011	< 0.0088	< 0.0044	< 0.0042
Copper	0.00246	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.00073
Iron	< 0.0065	< 0.0130	< 0.0130	< 0.0650	< 0.0650	< 0.0325
Lead	< 0.00002	< 0.000039	< 0.000039	< 0.000195	< 0.000195	< 0.00010
Magnesium	605	900	750	824	767	769
Manganese	1.30	0.311	0.243	0.432	0.394	0.536
Nickel	0.00259	0.00778	0.0107	0.00973	0.00948	0.00788
Selenium	0.110	0.0699	0.0846	0.060	0.0703	0.079
Silver	< 0.00003	< 0.00006	< 0.00006	< 0.0003	< 0.00030	< 0.00015
Thallium	0.00274	0.00551	0.00889	< 0.000056	0.00674	0.00479
Zinc	< 0.00008	< 0.00016	< 0.00016	< 0.00082	< 0.00082	< 0.00041
Suspended Solids (mg/L)	3 *	2 **	1 ***	2 **	< 1 ***	< 2
Dissolved Solids (mg/L)	15,000	21,000	20,000	20,000	21,000	19,400
Sulfate (mg/L)	1,200	1,300	1,300	1,300	1,300	1,280
Chloride (mg/L)	8,000	10,000	11,000	11,000	11,000	10,200

Notes:

"<" proceding a value indicates a nondetect in which the reporting limit was used (or average contains one or more of these runs).

* Initial analysis was 8 mg/L. The sample was reanalyzed with a lower detection limit (1 mg/L). The reanalysis result is shown; however, the reanalysis occured outside of the recommended holding time.

** Initial analysis was < 5 mg/L. The sample was reanalyzed with a lower detection limit (1 mg/L). The reanalysis result is shown. The reanalysis occurred within the recommended holding time.

*** Initial analysis was < 5 mg/L. The sample was reanalyzed with a lower detection limit (1 mg/L). The reanalysis result is shown. The reanalysis occurred outside the recommended holding time.

TABLE 9

SUMMARY OF WASTE WATER TREATMENT SYSTEM RESULTS

GRAB SAMPLES
DAY 1

PSNH - MERRIMACK STATION

RUN I.D. DATE COLLECTED INFLUENT/EFFLUENT TIME COLLECTED	Grab 1 12/20/11 12:30 / 11:45	Grab 2 12/20/11 19:30 / 15:00 *	Grab 3 12/20/11 22:40 / 18:00 **	Grab 4 12/21/11 08:15 / 08:30	AVERAGE
Influent					
Oil & Grease (mg/L)	N/A	< 5	N/A	N/A	< 5
Temperature (degrees C)	34	34	34.7	33	34
Temperature (degrees F)	93	93	94	91	93
pH (SU)	6.6	6.6	6.6	6.6	6.6
Effluent					
Oil & Grease (mg/L)	N/A	N/A	< 5	N/A	< 5
Temperature (degrees C)	19	20	20	20	20
Temperature (degrees F)	66	68	68	68	68
pH (SU)	7.3	7.3	7.3	7.2	7.3
Mercury (mg/L)	0.00000761	0.00000827	0.00000853	0.00001020	0.00000865

Notes:

"<" preceding a value indicates a nondetect in which the reporting limit was used (or average contains one or more of these runs).

* Because the influent did not have proper flow for collection of a concurrent grab sample, the Effluent Grab 2 sample was taken at 15:00, and the Influent Grab 2 sample was taken at 19:30.

** Due to lack of flow, the Influent Grab 3 sample could not be collected in the same time frame as Effluent Grab 3, which was collected at 18:00. Siemens personnel collected Influent Grab 3 pH and temperature at 22:40.

TABLE 10

SUMMARY OF WASTE WATER TREATMENT SYSTEM RESULTS

GRAB SAMPLES
DAY 2

PSNH - MERRIMACK STATION

RUN I.D. DATE COLLECTED INFLUENT/EFFLUENT TIME COLLECTED	Grab 1 01/03/12 10:00 / 10:00	Grab 2 01/03/12 13:20 / 13:20 (pH & Temp.) & 14:00 (Hg)		Grab 3 01/03/12 18:00 / 18:00	Grab 4 01/04/12 07:30 / 07:30		AVERAGE
Influent							
Oil & Grease (mg/L)	N/A	N/A	<	5	N/A	<	5
Temperature (degrees C)	45	44		42	41		43
Temperature (degrees F)	113	111		108	106		109
pH (SU)	6.2	6.3		6.3	6.3		6.3
Effluent							
Oil & Grease (mg/L)	N/A	N/A	<	5	N/A	<	5
Temperature (degrees C)	N/A *	34		33	30		32
Temperature (degrees F)	N/A *	93		91	86		90
pH (SU)	7.2	7.2		7.2	7.3		7.2
Mercury (mg/L)	0.00000752	0.00000809		0.00000801	0.00000852		0.00000804

Notes:

"<" preceding a value indicates a nondetect in which the reporting limit was used (or average contains one or more of these runs).

* Temperature could not be measured due to instrument malfunction.

TABLE 11

SUMMARY OF WASTE WATER TREATMENT SYSTEM RESULTS

GRAB SAMPLES
DAY 3

PSNH - MERRIMACK STATION

RUN I.D. DATE COLLECTED INFLUENT/EFFLUENT TIME COLLECTED	Grab 1 01/04/12 10:00 / 10:00		Grab 2 01/04/12 14:17 (pH & Temp.) & 14:00 (Hg)		Grab 3 01/04/12 18:00 / 18:00		Grab 4 01/05/12 08:00 / 08:00		AVERAGE
Influent									
Oil & Grease (mg/L)	N/A		N/A	<	5		N/A	<	5
Temperature (degrees C)	43		46		44		44		44
Temperature (degrees F)	109		115		111		111		112
pH (SU)	6.2		6.2		6.3		6.2		6.2
Effluent									
Oil & Grease (mg/L)	N/A		N/A	<	5		N/A	<	5
Temperature (degrees C)	31		29		31		30		30
Temperature (degrees F)	88		84		88		86		86
pH (SU)	7.2		7.3		7.2		7.2		7.2
Mercury (mg/L)	0.00000711		0.00000837		0.00000819		0.00000859		0.00000807

Notes:

"<" preceding a value indicates a nondetect in which the reporting limit was used (or average contains one or more of these runs).

Exhibit 8

GZA GeoEnvironmental, Inc., *Summary of Historic Stream A Analytical Results* (January 2012 to February 2013)

SUMMARY OF HISTORIC STREAM A ANALYTICAL RESULTS

Public Service Company of New Hampshire
Merrimack Station
Bow, New Hampshire

PARAMETER	STREAM A RESULTS 1/05/2012 EPA 1638 (mg/L)	STREAM A RESULTS 1/05/2012 EPA 200.8MOD (mg/L)	STREAM A RESULTS 01/26/2012 (mg/L)	STREAM A RESULTS 2/2/2012 (mg/L)	STREAM A RESULTS 2/9/2012 (mg/L)	STREAM A RESULTS 3/2/2012 (mg/L)
Aluminum	0.0411	< 0.0800	< 0.080	0.218	< 0.200	-
Ammonia	0.92	-	1.2	1.1	-	-
Antimony	0.000520	0.000408	0.000758	0.00155	-	-
Arsenic	0.00498	0.00851	0.00956	0.0121	< 0.00750	0.00812
Barium	0.300	0.240	0.208	0.243	-	-
Beryllium	0.000522	< 0.00120	< 0.00120	< 0.00300	-	-
BOD	< 6	-	< 6	< 6	-	< 6
Cadmium	0.000207	< 0.000400	0.000587	< 0.00100	< 0.00100	< 0.000400
Calcium	5,050.000	5,010.000	-	-	-	-
Chloride	11,000	-	9500	9,300	-	11,000
Chromium (T)	< 0.00050	< 0.00200	< 0.00200	< 0.00500	< 0.00500	< 0.00200
COD	130	-	180	140	-	170
Cobalt	-	-	-	-	< 0.00500	-
Copper	< 0.00050	< 0.00200	0.00261	0.00553	< 0.00500	< 0.00200
Cyanide (T)	0.02	-	0.01	< 0.01	-	0.02
Iron	< 0.050	< 0.200	< 0.200	< 0.500	-	< 0.200
Lead	< 0.000200	< 0.000800	< 0.000800	< 0.00200	< 0.00200	< 0.000800
Magnesium	-	-	-	-	-	-
Manganese	0.293	0.280	0.349	0.631	1.730	-
Mercury	0.0000105	0.0000105	0.0000122	0.0000360	0.0000209	0.0000172
Molybdenum	0.140	0.134	0.373	0.195	0.110	0.419
Nitrate	100	-	68	65	-	-
Nitrate+Nitrite	100	-	-	-	-	-
Nickel	0.00803	0.00979	0.00776	< 0.00500	0.0126	0.0291
Selenium	0.0740	0.0689	0.104	0.121	0.0822	0.109
Silver	< 0.000100	< 0.000400	< 0.000400	< 0.00100	< 0.00100	< 0.000400
Sodium	277.000	259.000	-	-	-	-
Sulfate	1,200	-	-	1,200	-	-
TDS	21,000	-	-	19,000	-	24,000
Thallium	0.00664	0.00556	0.00565	0.00685	-	-
Tin	-	-	-	-	-	-
Titanium	-	-	-	-	-	-
TSS	14	-	-	6	-	2
Vanadium	-	-	-	-	< 0.00500	-
Zinc	< 0.00100	< 0.004000	< 0.00400	< 0.0100	< 0.0100	< 0.00400
TKN	6	-	-	-	-	-
Boron	980.000	493.000	-	-	357.000	-
Total Phosphorous	0.01	-	-	-	-	-

ANALYTICAL DISCUSSION

FGD wastewater requires specialized analytical techniques to overcome matrix interferences for analysis of certain trace metals. To assist you in evaluating this issue further, we offer an excerpt below from the EPA web site and a link to their draft SOP for trace metals analysis of FGD wastewater that contains further guidance.

<u>LABORATORY ANALYSIS OF FGD WASTEWATER</u>

Wastewater from FGD systems can contain constituents known to cause matrix interferences. EPA has observed that, during inductively coupled plasma–mass spectrometry (ICP-MS) analysis of FGD wastewater, certain elements commonly present in the wastewater may cause polyatomic interferences that bias the detection and/or quantization of certain elements of interest. These potential interferences may become significant when measuring trace elements at concentrations in the low parts-per-billion range.

As part of a recent sampling effort for the steam electric power generating effluent guidelines rulemaking, EPA developed an SOP that was used in conjunction with EPA Method 200.8 to conduct ICP-MS analyses of FGD wastewater. The SOP describes critical technical and quality assurance procedures that were implemented to mitigate anticipated interferences and generate reliable data for FGD wastewater. EPA regulations at 40 CFR 136.6 already allow the analytical community flexibility to modify approved methods to lower the costs of measurements, overcome matrix interferences, or otherwise improve the analysis. The draft SOP developed for FGD wastewater takes a proactive approach toward looking for and taking steps to mitigate matrix interferences, including using specialized interference check solutions (i.e., a synthetic FGD wastewater matrix). EPA's draft SOP is being made available to laboratories contemplating ICP-MS analysis of FGD wastewater, either for adoption as currently written or to serve as a framework for developing their own laboratory-specific SOPs. For further information, see:

Standard Operating Procedure for Trace Element Analysis of Flue Gas Desulfurization Wastewaters using Inductively Coupled Plasma/Mass Spectrometry (ICP-MS) Collision/Reaction Cell Procedure. http://water.epa.gov/scitech/wastetech/guide/steam-electric/upload/ICPMS_FGD_Collision-Reaction-Cell-Procedure_draft_03-11-2013.pdf

Considering that specialized analytical techniques are necessary to overcome matrix interference for certain analysis of trace metals in FGD wastewater, we recommend any analysis performed on FGD wastewater be conducted in accordance with the EPA draft SOP for trace metals analysis of FGD wastewater. Accordingly, the analytical methods used to produce the metals data presented above, were performed in accordance with the draft EPA procedure for the analysis of FGD wastewater.

Exhibit 9

March 17, 2014 correspondence from the Missouri Department of Natural Resources' Air Pollution Control Program granting Kansas City Power & Light Company's request for a temporary air permit at Iatan Generating Station

MAR 17 2014

Mr. Steve Courtney
Environmental Affairs, HQ
Kansas City Power & Light Company - Iatan Generating System
P.O. Box 418679
Kansas City, MO 64141

RE: New Source Review Temporary Permit Request - Project Number: 2013-12-037
Installation ID Number: 165-0007
Temporary Permit Number: 032014-004
Expiration Date: March 1, 2016

Dear Mr. Courtney:

The Missouri Department of Natural Resources' Air Pollution Control Program has completed a review of your request to install a pilot process water concentrator system at Kansas City Power & Light Company - Iatan Generating System (KCP&L), located near Weston, Missouri. The Air Pollution Control Program is hereby granting your request to conduct this temporary operation at this location in accordance with Missouri State Rule 10 CSR 10-6.060(3).

KCP&L intends to install a process water concentrator system that will be used to test the potential reductions in the volume of process water flows. The process water concentrator system is rated to process 35 gallons of process water per minute and consists of a 30.0 MMBtu per hour propane fired burner/evaporation chamber, entrainment separator and a liquid/solid separating process.

A slip stream of process water will be flashed through the propane heated chamber. From the propane fired burner/evaporation chamber the solids and steam is sent to an entrainment separator. The steam from the entrainment separator will exit a water vapor vent. The solids and remaining water in the system is then transferred to a liquid/solids separating process. The solids exit the separating system as a wet cake and are transferred to haul trucks which transfer the material to KCP&L's existing landfill. The remaining water is recirculated back to propane fired burner/evaporation chamber. According to KCP&L's application the estimated wet cake density is 60 pounds per cubic foot and the process water concentrator system will generate approximately 37 cubic yards of wet cake material per day. Based on these assumptions the new process water concentrator system will generate 1.25 tons of wet cake per hour.

The criteria pollutants of concern for the process water concentrator system is particulate matter (PM), particulate matter less than ten micron in aerodynamic diameter (PM_{10}) and particulate matter less than 2.5 micron in aerodynamic diameter ($PM_{2.5}$) as well as the combustion emissions from the fired burner/evaporation chamber. PM, PM_{10} and $PM_{2.5}$ emissions are expected from the water vapor vent and added haul road activity.

The potential emissions from the propane fired burner/evaporation chamber were calculated using the Environmental Protection Agency document AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition (AP-42), Section 1.5, *Liquefied Petroleum Gas Combustion* (July 2008). The haul road PM, PM_{10} and $PM_{2.5}$ potential emissions were calculated using AP-42, Section 13.2.1, *Paved Roads* (January 2011). The average silt loading value of 7.4 g/m^2 for municipal solid waste landfill was determined to be the most representative silt loading value for KCP&L. The potential emissions from the water vapor vent were estimated using a vendor stack test. KCP&L sent sample process water to the vendor to test the process water concentrator system using EPA Method 5 testing method for total particulate. The stack test was run at lower process rate of 7.3 gallons per minute. The emission rate from the stack test was scaled up based on the MHDR of the system, 35 gallon per minute, to estimate the potential emissions of the water vapor stack. The total particulate emission rate was considered to be the PM_{10} and $PM_{2.5}$ emission rate. The table below summarizes the potential emissions of this pilot plant.

Table 1: Emissions Impact Pilot Process Water Concentrator System

Criteria Air Pollutant	Potential Emissions (lb/hr)	Projected Emissions (tpy)
PM	1.46	6.37
PM_{10}[1]	1.45	6.36
$PM_{2.5}$[1]	1.42	6.22
SO_X	0.49	2.15
NO_X	4.26	18.67
VOC	0.33	1.44
CO	2.46	10.77
CO_{2e}	4,191	18,343
$CO_{2(mass)}$	4,099	17,952
HAPs	0.06	0.24

[1]PM_{10} and $PM_{2.5}$ include condensable particulate matter emissions

Permission to conduct the trial burns is granted with the following conditions:

If a construction permit is sought by KCP&L, the permittee shall submit a project report to the Air Pollution Control Program with the construction permit application. The report shall include:

a. A table of emission factors developed from the stack testing conducted during the trial. The developed emission factor table shall include sample calculations and a full stack testing report.
b. The emission factors shall be reported in pounds of pollutant per gallon of water processed and lb/MMBtu of fuel burned.
c. An emission factor summary including discussion of the methods used to develop the emission factors.
d. Conclusions reached concerning the long-term feasibility of the process water concentrator system.

Although stack testing is not required for this temporary activity, KCP&L should be aware that stack test results would be helpful if KCP&L should decide to pursue further permitting under 10 CSR 10-6.060, *Construction Permits Required.* KCP&L shall seek approval of the test methods being implemented from the Air Pollution Control Program's Stack Testing Unit 30 days prior to performing the stack test.

The potential emissions of this temporary activity is below the de minimis level for all criteria pollutants and also is below the 100 ton per year threshold for all criteria pollutant for temporary/pilot plant operations therefore this temporary permit will be issued. This permit expires two years from the date of issuance.

This temporary permit does not give KCP&L the authority to exclude any emissions associated with this temporary activity from any applicable emission limit. Additionally, KCP&L is still obligated to meet all other applicable air pollution control rules, Department of Natural Resources' rules, or any other applicable federal, state, or local agency regulations. Specifically, you shall not violate:

- 10 CSR 10-6.165, *Restriction of Emission of Odors*
- 10 CSR 10-6.170, *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*
- 10 CSR 10-6.220, *Restriction of Emission of Visible Air Contaminants*
- 10 CSR 10-6.260, *Restriction of Emission of Sulfur Compounds*
- 10 CSR 10-6.400, *Restriction of Emission of Particulate Matter From Industrial Processes*

A copy of this letter should be kept with the unit and be made available to Department of Natural Resources' personnel upon verbal request. If you have any questions regarding this determination, please do not hesitate to contact Gerad Fox at the departments' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102, or by telephone at (573) 751-4817. Thank you for your time and attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Kyra L. Moore

Kyra L. Moore
Director

KLM:gfk

c: Kansas City Regional Office
PAMS File: 2013-12-037

Exhibit 10

Golder Associates, *Assessment of the FGD Technology of 7 Italian Power Plants Fired with Coal* (July 2014)

REPORT

July 2014

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

Assessment of the FGD technology of 7 Italian power plants fired with coal

Submitted to:
Public Service Company of New Hampshire
780 No. Commercial Street
Manchester, NH 03101

Report **Number** 14508430358

Distribution:

1 copy: Golder Associates S.r.l.
1 copy: PSNH

Golder Associates

Table of Contents

1.0 INTRODUCTION

Golder Associates S.r.l. (hereinafter "Golder") is assisting and supporting the Public Service Company of New Hampshire (hereinafter PSNH) in the environmental permitting process of the Merrimack station, a coal fired power plant (520 MW) located in Bow on Merrimack river (between Concord and Manchester), New Hampshire, United States.

The Merrimack Station generates electricity by means of two coal-fired steam turbine units (producing 470 MW) and two oil-fired combustion turbines units (50 MW).

PSNH installed a wet Flue Gas Desulfurization (wet "FGD") technology at Merrimack Station, which significantly reduces sulphur dioxide and mercury emissions from the coal-fired units. It mainly consists of a "scrubber" system that captures approximately 95% of the mercury in the coal and reduces sulphur dioxide emissions by more than 90%.

Wastewater is generated from the FGD process, and it is treated by primary and secondary wastewater treatment systems at the plant. The secondary system at the plant uses a vapor compression evaporation (VCE) and crystallizer technology, which greatly reduces (but does not eliminate) liquid discharges from the FGD scrubber.

The US Environmental Protection Agency ("EPA") has issued a draft permit setting limits and conditions on wastewater discharges of the Merrimack plant. Essentially, the draft permit imposes a "zero liquid discharge" ("ZLD") requirement for the wet FGD and VCE systems. The draft permit has been released by EPA for review and comment by all interested parties.

As part of its rationale for imposing the limits on PSNH and for claiming the feasibility of a ZLD limit, EPA has cited operations at six power stations in Italy, namely: Fusina, Torrevaldaliga Nord, Sulcis, La Spezia, Brindisi Sud, and Monfalcone. EPA states in the draft permit that FGD wastewater at all but 2 of these plants have been operating for more than 5 years.

PSNH retained Golder's services in order to learn more information about the specific operations of all these plants, their permit limits, FGD and scrubber operations.

Golder provides technical support to assess the Italian sites emission abatement technology (mentioned by the EPA) in comparison to the Merrimack station technology.

This report has been prepared by Golder in response to PSNH's request.

2.0 OBJECTIVES

The specific objectives of the assessment are:

1) Gain an understanding of the characteristics and operations of the coal-fired plants at issue, with particular emphasis on the treatment of FGD wastewater treatment systems;
2) Assess, if possible, whether the 7 Italian plants truly implement zero liquid discharge ZLD techniques
3) Assess, if possible, whether the 7 plants are able to consistently achieve a ZLD limit for FGD wastewater treatment and, if so, assess what technologies and/or processes the plants have successfully employed;
4) Assess similarities (if any), as well as gaps (in terms of environmental performance) between Merrimack plant and the Italian plants, with particular reference to ZLD techniques.

Specific PSNH requests of information, insofar as possible from publicly available information and with specific focus on Brindisi Sud and Torrevaldaliga plants, were formulated as follows:

- Identify the scrubber technology used on each coal plant to compare to what is installed at Merrimack Station;
- Determine, as possible, the design basis of the scrubber wastewater treatment system and in particular whether the system has redundancy and whether there is allowance for occasional effluent discharge.
- In reviewing publicly available information, pay particular attention to air and water permits (air permits may indicate fuel limitations), permit modifications, permit violations, and any scrubber wastewater discharges;
- Learn the fuel specifications of the coal used since that impacts the chemistry parameters being managed in the scrubber vessel.

3.0 SCOPE OF WORK

3.1 Italian plants to be assessed

The list of plants to be assessed provided by the Client is proposed in the Table below.

Table 1: List of power plants assessed

No.	Power Plant name	property of/operator	Link to permitting documentation
1	**Fusina**	Enel Produzione S.p.A.	http://aia.minambiente.it/DettaglioImpiantoPub.aspx?id=94
2	**Torrevaldaliga Nord**	Enel Produzione S.p.A.	http://aia.minambiente.it/DettaglioImpiantoPub.aspx?id=178
3	**Sulcis**	Enel Produzione S.p.A.	http://aia.minambiente.it/DettaglioImpiantoPub.aspx?id=51
4	**La Spezia**	Enel Produzione S.p.A.	http://aia.minambiente.it/DettaglioImpiantoPub.aspx?id=45
5	**Brindisi Sud**	Enel Produzione S.p.A.	http://aia.minambiente.it/DettaglioImpiantoPub.aspx?id=106
6	**Monfalcone**	A2A S.p.A.	http://aia.minambiente.it/DettaglioImpiantoPub.aspx?id=57
7	**Brindisi Nord**	Edipower S.p.A.	http://aia.minambiente.it/DettaglioImpiantoPub.aspx?id=49

The plants mentioned in the EPA permitting documentation are those indicated as No. 1 to 6 in the table. Amongst these plants the Client asked to review also plant No. 7.

Amongst No. 1 to 6, the plants that EPA mentions as "not yet in operation" are "Sulcis" and "Fusina".

3.2 Activities performed

In order to achieve the objective indicated in section 2, Golder completed the following activities:

1) Review of documentation provided by the Client related to Merrimack station:
   - Documents related to EPA permitting;
   - technical documentation on FGD and wastewater treatments;
2) Two conference calls with PSNH representatives to get a better understanding of the work objectives and scope and to provide preliminary results of Golder assessment;
3) Review of publically available information (at national and EU level) related to Best Available Techniques (BAT) for large combustion plants:
   - Current EU Guideline on BAT (*Reference Document on BAT - Large Combustion Plants*, July 2006) http://eippcb.jrc.ec.europa.eu/reference/BREF/lcp_bref_0706.pdf
   - Revision (not yet finalized) of EU Guideline on BAT (*BAT Reference Document for the Large Combustion Plants – Draft 1*, June 2013) http://eippcb.jrc.ec.europa.eu/reference/BREF/LCP_D1_June_online.pdf
   - Italian guideline on BAT for large combustion plants issued with *Ministerial Decree 01/10/2008* http://aia.minambiente.it/Documentazione.aspx
4) Review of publically available information of the subject plants:
   - Environmental integrated permits (so called "AIA" Autorizzazione Integrata Ambientale) and related documentation available on the website (http://aia.minambiente.it/) of the Ministry of Environment; related documentation includes permit application, changes, updates, renovations and reports of ISPRA inspection (if any)
   - EMAS[1] public environmental statements[2], only for the plants that implemented the EMAS voluntary environmental management system; these declarations were found available on the website of ENEL Produzione (not available for Brindisi Sud) (http://www.enel.it/it-IT/azienda/ambiente/registrazioni_emas/impianti_registrati/)
   - Environmental report of A2A and on the website of A2A (http://www.a2a.eu/it/sostenibilita/strumenti/politica/dichiarazioni_ambientali.html);
5) Assessment of the of FGD system and wastewater treatment techniques used at the subject plants versus the Client plant;
6) Reporting.

3.3 Limitations/Assumptions

The assessment has been carried out with the following limitations and considering the following assumptions:

- assessment of only publicly available information and information provided by the Client;
- no site visit envisaged at present and no contacts with plant owners;
- no contacts with public authorities;
- Golder is not responsible for the validity of information retrieved from reports and documentation produced by third parties.

[1] Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community Eco-Management and Audit scheme (EMAS).

[2] EMAS environmental statement: comprehensive, regular reports to the public on the organisation's structure and activities; environmental policy and management system; environmental aspects and impacts; environmental programme, objectives and targets; environmental performance and compliance with applicable environmental law etc.

Should a compliance assessment of Merrimack plant be deemed necessary Golder Italy can involve Golder US (with offices in New Hampshire) with specific experience in US regulation (e.g. Clean Air Act, Clean Water Act etc.) and local regulation.

3.4 Definitions and abbreviations

ZLD – Zero Liquid Discharge

BAT – Best Available Techniques (at reasonable costs)

MoE - Ministry of Environment

FGD – Flue Gas Desulphurization unit

WWTP – WasteWater Treatment Plant

ITAR – Traditional physical-chemical WWTP dedicated to general site's acid/alkaline wastewater steams (also referred to as)

ITSD – Traditional physical-chemical WWTP dedicated to FGD wastewater stream (or purge)

SEC – FGD wastewater treatment technology composed of 3 sections Softening, Evaporation and Crystallization

WWTP1 - referred to ITAR

WWTP2 - referred to ITSD/SEC

4.0 QUALITY OF AVAILABLE INFORMATION

Golder assessed quality and detail of the information contained in the publicly available permitting documentation reviewed, with reference to the specific objectives of the present work. Main outcomes of this assessment can be summarized as follows:

- Permitting documentation (i.e. both applications prepared by the plants operators and permits issued by the MoE) was found not to have the same level of detail and not to include the same figures. The reason for not providing similar information appears to be the following:
  - Plants having different characteristics and different development history;
  - Application prepared by different teams (even though working for the same operator);
  - Permits prepared by different MoE Inquiry Commissions ("commissione istruttoria");
- In general the level of detail of the permitting documentation was significantly lower than the level of detail provided by the Client for the Merrimack plant. For example:
  - No detailed flow diagrams of the FGD and of the WWTPs was available; in some cases only general flow diagram of the whole plant water cycle was available in some other not even a flow diagram; the significant flow diagrams available are attached to this document as Appendix B,C and D;
  - No technology description entering into details of each unit/sub-unit was available; process description for FGD and for WWTPs is kept in all cases at a general level; significant details of FGD and WWTPs processes caught by Golder during documentation review is provided in the Plants Summary Table in Appendix A of this document.
  - No mass balances were available detailing type/amount of chemicals used in the FGD and WWTPs; in some cases Golder located the design capacity of the main units and figures of the streams treated on an annual basis.
  - No detailed information is available regarding the production of liquid-waste/sludge streams (e.g. no details on single streams and flow rates) from WWTPs; this would have allowed Golder to better assess the true implementation of ZLD technologies at the sites.
- The website of the MoE is expected to provide information regarding the inspection of ISPRA (national Environmental Protection Agency) on a five year basis; no evidence of such inspections were found on the MoE website, except for an inspection at the Sulcis plant (Nov. 2012); however the inspection does not include information useful for this work.

The above mentioned conditions result in a limited capacity for Golder to achieve objectives No. 3 and 4 indicated in section 2.

These objectives could be achieved only by obtaining more detailed information directly from the Italian plants operators.

Golder provided as much detailed information as possible in the Plant Summary Table (Appendix A) in order to allow PSNH process experts to make specific considerations comparing figures of the Italian plants with those of Merrimack station and identify aspect to be further deepened.

5.0 SUMMARY OF FINDINGS

The present section reports the summary of the findings related to the assessment commissioned to Golder on the 7 Italian coal fired power plants. The subsection below provides general considerations and site specific considerations.

5.1 General considerations on EU and Italian Guidelines on BATs

- Current EU Guideline on BAT (*Reference Document on BAT - Large Combustion Plants*, July 2006, http://eippcb.jrc.ec.europa.eu/reference/BREF/lcp_bref_0706.pdf) does not indicate any ZLD technique for wet FGD wastewater discharges treatment (section 4.4.7, 4.5.13). The BAT indicated for wet FGD discharges is considered the optimized traditional chemical physical treatment and closed loop for wastewater reduction (with no specific details on how to implement the closed loop); furthermore it states that the application of these techniques is "site specific". ZLD techniques such as evaporation and crystallization are not even mentioned in section 4.6 "emerging techniques".

- The revision of EU Guideline on BAT is still a draft (*BAT Reference Document for the Large Combustion Plants – Draft 1*, June 2013, http://eippcb.jrc.ec.europa.eu/reference/BREF/LCP_D1_June_online.pdf) and it mentions ZLD techniques in a short paragraph (section 3.1.10.4 page 119): "*In some cases, a ZLD system is adopted to reduce the environmental impact even further. After the neutralization and sedimentation unit (pH adjustment, ferric co-precipitation, flocculation, clarification, etc.), a Softening/Evaporation/ Crystallization (SEC) system can be installed. The products of this system are high quality water, to be recycled, and salts, to be disposed of.*"

  Further the draft EU Guideline indicates:

  - (section 3.3.5.10 page 291) "*Concentrated waste water and/or sludge production*" as a cross-media effect of the SEC technology and "*very sensitive receiving wastewater*" as driving force for installing SEC;

  - (section 10.1.6-11 page 746 - BAT conclusions on emissions to water) that SEC is "*Applicable only to plants discharging to very sensitive receiving waters, where techniques (a – Mechanical treatment) and (b – Physicochemical treatment) do not enable meeting the environmental quality standards*".

  Finally it can be stated that the draft EU Guideline:

  a) does not exclude for SEC technology a residual liquid stream/purge (whether it is a wastewater or a liquid waste) and in some way acknowledges that a liquid stream can be produced (see page 291);

  b) indicates the SEC technology as an opportunity only in specific circumstances (see page 746).

- Italian guideline on BAT for large combustion plants issued with *Ministerial Decree 01/10/2008* (http://aia.minambiente.it/Documentazione.aspx) does not mention ZLD techniques in line with current EU Guideline on BAT.

5.2 General considerations on the 7 plants

- The permits issued for the 7 assessed plants and the prescriptions included therein appear to be in line with the EU and Italian guidelines on BATs. Regarding the SEC technologies implemented in the 7 plants the permits issued by the MoE in general:

- acknowledge the presence of the SEC technologies after the traditional chemical Physical treatment and the fact that they were declared as "zero wastewater discharge" technologies, although in some cases the permits expressly declare the technologies as "almost" or "practically" "zero wastewater discharge";
- do not expressly prohibit a liquid purge from the SEC that may be handled as liquid waste (and sent off-site) or further treated and discharged using another authorized WWTP through an authorized discharge point.

- Most of the permits mention that the objective for the Company is to have "zero wastewater discharge" (somehow different from "ZLD", as "zero wastewater discharge" is compatible with the production of a liquid waste stream to be disposed off-site); in addition most of the permits allows the FGD purge, in case of need or emergency conditions, to be sent to the general WWTP provided with an authorized discharge point (i.e. the WWTP treating all industrial acid and alkaline wastewater streams but the FGD purge).

5.3 Specific considerations on the 7 plants

5.3.1 Specific considerations on Fusina Plant

- Fusina plant does have a wet FGD and a traditional chemical-physical treatment plant (ITSD) for the FGD discharge treatment. Before 2008 it is understood that ITSD discharge was sent into Venice lagoon. After 2008 (not clear when) a SEC section was installed for treating ITSD discharge with the objective of eliminating wastewater discharges from FGD. The permit (dated November 2008) states that this improvement has led to "zero wastewater discharges"; however the permit (page 41) allows sending the ITSD discharge to an external WWTP (SIFA) in case of upset/emergency of the SEC section. No information was available on whether emergency/upsets of the SEC section actually occurred.
- Based on permit update granted by the MoE dated 23 Dec. 2010, the ITSD wastewater discharge (previously sent to SEC unit) is currently treated by an external WWTP operated by SIFA. This change was operated in the context of a project, sponsored by the Regional authority, aimed at improving water quality of the Venice lagoon. SIFA plant in fact discharges wastewater to open sea rather than into the Venice lagoon.
- It appears as the site preferred to send the ITSD wastewater discharge to an external WWTP rather than treating it using the newly installed SEC section.

5.3.2 Specific considerations on Torrevaldaliga Nord Plant

- Torrevaldaliga Nord plant does have a wet FGD and a dedicated plant for the FGD discharge treatment composed of a traditional chemical-physical treatment section (ITSD) and a SEC section. The site has also another chemical-physical treatment plant (so called "ITAR") for the treatment of all industrial discharges other than FGD discharge.

  The permit clearly states (page 41) that "*the site, while confirming the goal of "zero wastewater discharge", estimates a maximum quantity of wastewater (including industrial acid/alkaline wastewater from production units and wastewater from FGD) potentially discharged by ITAR plant through discharge point "UTc" of 1,270,000 m^3/y*".

- As a matter of fact, based on EMAS statement, in 2010 and in 2011, no industrial wastewater has been discharged by ITAR as it has been reused. However in 2008 and in 2009 ITAR industrial wastewater discharge was of 135,000 m^3 and 161,590 m^3.
- In the technical description of FGD discharge treatment provided in the permit it is acknowledged "*an issue*" related to the formation of highly soluble salts, due to the excess of Calcium ion with respect to

Sulphate ion. This is addressed with the softening by substituting calcium with sodium in order to obtain a solid residue that can be handled easier. No further information is provided regarding this "issue".

5.3.3 Specific considerations on Sulcis Plant

- A wet FGD and a traditional chemical physical plant (ITSD) for FGD wastewater discharge treatment are in operation. The SEC section has been authorized in the permit, has been installed and it is still in an "experimental phase" (October 2011). The permit states (page 20) that with the start-up of the SEC section "*the discharge of the ITSD is expected to decrease of 600,000 m³/y and to reduce the seawater intake from 1,000,000 m³/y to 500,000 m³/y*". No information is available whether the SEC section has been actually started-up.

- The permit states that the BAT standards for the SO2 air emissions cannot be achieved since the plant is fed with a mix of coal and biomass.

5.3.4 Specific considerations on La Spezia Plant

- La Spezia plant does have a wet FGD and a dedicated plant for the FGD discharge treatment composed of a traditional chemical-physical treatment section (ITSD) and a SEC (Softening/Evaporation/Crystallization) section. The permit states that (page 33) the site has also another chemical-physical treatment plant (ITAR) for the treatment of:

  - acid and alkaline industrial wastewater other than FGD discharge;
  - FGD discharge, if the flow rate exceed treatment capacity of ITSD/SEC plants.

  The estimated annual flow rate of the FGD discharge is of 200.000 m³/y (not clear whether calculated at maximum capacity); while the treatment capacity of the ITSD/SEC plant is of 15 m³/h (i.e. 131,400 m³/h). The ITSD/SEC plant appears to be undersized with respect to the actual FGD discharge flow rate.

- In the monitoring plan (Table 16 page 26) issued by the national EPA (attached to the permit issued by the MoE) the wastewater discharge to sea of ITAR plant (namely "SF1 No. 3") is reported as including the Purge of FGD.

- Considering wastewater flow diagram provided by the site for the permit application and included in the EMAS statement 2012, it is clear that the FGD discharge can go either to the ITSD/SEC plant (chemically treated, evaporated, condensed and then reused) or to ITAR (chemically treated and then reused or discharged to sea). A "normally closed" valve is indicated in the flow diagram on the connection between FGD and ITAR (see Appendix B).

- Based on site EMAS statement 2012 (page 53), 2012 data, compared to 2011 data, show a sudden drop (more than 50%) of sludge production from the ITSD/SEC plants, and a sudden increase of sludge from ITAR, while the production of ash remain stable. This can be explained assuming that a part of FGD purge has been shifted from ITSD/SEC to ITAR.

5.3.5 Specific considerations on Brindisi Sud Plant

- Brindisi Sud plant does have a wet FGD, a traditional chemical-physical treatment plant (ITSD) and a SEC (Softening/Evaporation/Crystallization) plant for the FGD discharge treatment. The permit (dated June 2012) states that this configuration entails "zero wastewater discharges"; however the permit (page 31-33 and 93) allows sending the ITSD wastewater discharge (namely "DeSOx purge") directly to the sea through discharge point "S9S", in case of upset/emergency of the SEC section.

- In case of SEC unavailability and of "S9S" discharge to the sea activation, the permit prescribes a wastewater sampling procedure to be followed; the procedure is included in the monitoring plan issued by national EPA (page 20) attached to the permit issued by the MoE. The sampling procedure has to be activated within 3 hours from the upset/emergency situation. No information is available on whether emergency/upsets of the SEC section actually occurred and no evidence is available on the application of the sampling procedure.

- In a process flow diagram of the site wastewater treatment system (attached to the permit application), a stream named "C2" goes directly from ITDS plant to the sea, likely the S9S discharge point (see Appendix C).

5.3.6 Specific consideration on Monfalcone Plant

- The company declared in the permit application that there is no discharge from the WWTP treating FGD purge. No information useful for the purpose of this study was identified.
- It should be noted that this plant is the only plant out of the 6 mentioned by EPA, whose ITSD/SEC plant was constructed by Veolia and not by Aquatech.

5.3.7 Specific consideration on Brindisi Nord Plant

- Brindisi Nord plant has no FGD units installed (neither wet nor dry); as BAT (acknowledged by the EU and Italian guidelines) the plant uses coal with a very low content of sulphur (i.e. average 0.1%; max 0.24%);
- The flue gas treatment consists of a Catalytic De-nitrification System (SCR) and electrostatic precipitators only.

6.0 CONCLUSIONS

The assessment carried out by Golder on the 7 coal fired Italian plants allowed Golder only to partially achieve the objectives set out in the proposal phase, mainly due to lack of detailed/homogeneous information in the publically available documentation reviewed.

In particular Objectives No. 3 and No. 4 indicated in section 2 (i.e. assess specific conditions to determine whether the Italian plants are able to consistently achieve a ZLD limit for FGD wastewater treatment and, if so, assess what technologies and/or processes the plants have successfully employed, as well as assess similarities and gaps between Merrimack station and the Italian plants, with reference to FGD wastewater treatment techniques) could be achieved only by obtaining more detailed information directly from the Italian plants operators.

Golder gained an understanding (Objective No. 1) of the characteristics and operations of the 7 Italian plants with particular emphasis on the treatment of FGD wastewater treatment systems. The Plant Summary Table (Appendix A) provides as much detailed information as possible (not always homogeneous) in order to allow PSNH process experts to make specific considerations comparing figures of the Italian plants with those of Merrimack station and identify aspect to be further deepened. This information includes aspects (not with the same level of detail for all the plants) related to: scrubber technology, scrubber wastewater treatment system, allowance for occasional effluent discharge, coal/fuel specification and limitations, air emission limits.

No evidence of permit violations were found in the publically available documentation reviewed.

The main findings of the assessment are related to assessing whether the 7 Italian plants truly implement **Zero** Liquid Discharge techniques. This finding can be summarized as follows:

- Current National and EU guidelines do not mention ZLD. The proposed revision of the EU guideline (still draft) identifies technology to be used to achieve ZLD (i.e. SEC technology: softening, evaporation and crystallization) as a BAT under specific site conditions and acknowledge the presence of a purge from the system.
- In the permits and in the permits application can be found indications/evidences of liquid discharge (whether it is a liquid waste or a wastewater stream) these evidences can be listed as follows:
  - permits in some cases use the wording "almost" or "practically" "zero wastewater discharge";
  - permits, do not expressly prohibit a liquid purge from the SEC that may be handled as liquid waste (and sent off-site) or further treated and discharged using another authorized WWTP through an authorised discharge point.
  - Most of the permits mention that "zero wastewater discharge" (somehow different from "ZLD", as "zero wastewater discharge" is compatible with the production of a liquid waste stream) is an objective; liquid waste streams (that could be the purge of the SEC technology) are also mentioned in the permits
  - some of the permits allow the FGD purge, in case of need or emergency conditions (SEC upset/unavailability), to be sent to the general WWTP provided with an authorized discharge point (i.e. the WWTP treating all industrial acid and alkaline wastewater streams but not the FGD purge).
- It appears that the FGD-SEC system presents management difficulties at least for the Sulcis and Fusina plants:
  - Sulcis' SEC is still in a testing phase for several years;
  - Fusina plant decided to send FGD wastewater discharge to an external plant rather than using the newly installed SEC.

Report Signature Page

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APPENDIX A

Plants Summary Table

Plant No. and Name	1. FUSINA "ANDREA PALLADIO"	2. TORREVALDALIGA NORD - CIVITAVECCHIA	3. SULCIS "GRAZIA DELEDDA"	4. LA SPEZIA "EUGENIO MONTALE"	5. BRINDISI SUD "FEDERICO II"	6. MONFALCONE
Company/Operator	ENEL Produzione S.p.A.	ENEL Produzione S.p.A.	Enel Produzione SpA	ENEL Produzione S.p.A.	ENEL Produzione S.p.A.	A2A SpA
Location	Fusina (VE) - Italy	Civitavecchia (RM) - Italy	Portoscuso (Carbonia Iglesias) - Italy	La Spezia (SP) - Italy	Brindisi (BR) - Italy	Monfalcone (GO) - Italy
Integrated Environmental Permit (AIA)	Decree Ministry of Environment No. 248 dated 25/11/2008	Decree Ministry of Environment No. 114 dated 05/04/2013	Decree Ministry of Environment No. 579 dated 31/10/2011	Decree Ministry of Environment No. 244 dated 06/09/2013	Decree Ministry of Environment No. 253 dated 08/06/2012	Decree Ministry of Environment No. 224 dated 24/03/2009 and Update of the Permit No. 12089 dated 28/04/2014
Presence of surface water bodies (sea, lakes, rivers)	Plant located on the Venice lagoon (close to Adriatic sea)	Plant located on the seacoast (Tyrrhenian Sea)	Plant located on the seacoast (Tyrrhenian Sea)	Plant located on the seacoast (Tyrrhenian Sea)	Plant located on the seacoast (Adriatic Sea); plant located near Fiume (River) Grande Channel	Plant located on the seacoast (Adriatic Sea), on the Valentinis Channel
Plant power (electrical) [MWe]	GR1: 165 MWe GR2: 171 MWe GR3: 320 MWe GR4: 320 MWe GR5: 160 MWe Tot : 1,136 MWe	SP2: 660 MWe (start-up aug-2010) SP3: 660 MWe (start-up jan-2010) SP4: 660 MWe (start-up jun-2009) Tot : 1,980 MWe	SU2: 350 MWe (operating since 2005) SU3: 240 MWe (operating since 1986) Tot : 590 MWe	SP1: 340 MWe (completely revamped in 1999) SP2: 340 MWe (completely revamped in 1999/2009) SP3: 600 MWe (completely revamped in 2000) ~~SP4: 600 MW (idle since sept. 1999)~~ Tot : 1,280 MWe	Tot. 2,640 MWe	Tot. 1,110 MWe
Plant power (thermal) [MWt]	GR1: 415 MWt GR2: 430 MWt GR3: 793 MWt GR4: 793 MWt GR5: 431 MWt Tot : 2,863 MWt	SP1: 1,420 MWt SP2: 1,420 MWt SP3: 1,420 MWt Tot : 4,260 MWt	SU2: 800 MWt SU3: 670 MWt Tot : 1,470 MWt	SP1: 635 MWt SP2: 635 MWt SP3: 1,540 MWt Tot : 2,810 MWt	G1 + G2+ G3 + G4: about 1700 MWt each Tot : 6,560 MWt	GR1: 420 MWt (coal and biomass) GR2: 435 MWt (coal and biomass) GR3: 800 MWt (fuel oil) GR4: 800 MWt (fuel oil) Tot: 2,455 MWt (declared)
Fuel feed	Sections 1-2: coal, methane for the start-up, fuel oil (OCD) in case of anomalies Sections 3-4: coal + solid waste fuel Section 5: fuel oil until 1999, today out of service Coal consumption: Section 1-2: 55 t/h Section 3-4: 110 t/h	All 3 units fired with coal (gas as auxiliary fuels e.g. for start-up and in transitory situation (e.g. coal feed problems) Coal consumption: 2011: 4.075.569 tons max capacity: 4,500,000 tons @25.2 MJ/kg	SU2: coal, limestone and ashes, biomass SU3: coal and biomass (fuel oil and diesel as auxiliary fuels e.g. for start-up and in transitory situation) Coal consumption (from foreign country): in 2009: 739,810 tons; Coal consumption (national): in 2009: 156,460 tons; Biomass consumption: in 2009: 153,841 tons	SP1 / SP2: natural gas SP3: coal (gas and oil as auxiliary fuels e.g. for start-up) Coal consumption: 2010: 1,140,251 tons (6,717 h/y) max capacity: 1,916,099 tons (8,760 h/y)	Coal (Diesel and fuel oil used only during the start up of the boiler) Coal consumption: 2007: 5,805,982 tons max capacity: tons	Coal (GR1 And GR2), fuel oil (GR3 and GR4), oil, biomass Coal consumption: in 2011: 584,000 tons; Biomass consumption: in 2011: 39,000 tons
Coal Characteristics (sulphur, ash and metals)	Coal is delivered by ships . Storage capacity 600,000 tons. The Permit states that the Plant is authorized to use coal with a sulphur content < 1%	Coal is delivered by ship through two dedicated jetties and transported to the site through conveyor belts. Storage capacity of the domes: 2x138,000 tons (18 days autonomy). Coal is milled, dried, heated and screened before being sent to burning. No specific prescriptions are given on coal characteristics, other than sulphur content <1%. Coal (each lot) characteristics have to be analysed.	Coal is delivered by ships . Storage capacity 170,000 tons. Coal characteristics (from foreign country): The site declared sulphur content = 0,6 - 0,61% in 2009 Coal characteristics (national): The site declared sulphur content = 6,43% in 2009 Biomass characteristics: The site declared sulphur content =0,03 - 0,08% in 2009	Coal is delivered by ship in the harbour of La Spezia and transported to the site through conveyor belts. Storage capacity 450,000 tons. No specific prescriptions are given on coal characteristics. Coal (each lot) characteristics have to be analysed. The site declared: i) ash content: 5%-15% (in weight) ii) sulphur content <1%; 0,673% in 2010	Coal coming from the Port of Brindisi is delivered to the site through conveyor belts. Storage capacity 750,000 tons. Coal characteristics: The site declared: i) sulphur content <1%; 0,6% in 2005	Coal is delivered in the Port of Monfalcone by ships . Storage capacity 100,000 tons. Coal characteristics: The site declared sulphur content = 0,75% in 2011 Biomass characteristics: The site declared sulphur content = 0,22% in 2011
Production Units characteristics: - boilers (No) - turbines (No)	5 boilers	Each of the 3 units: 1 ultra-super critical boiler equipped with low-NOx burners, Ljungstroem air-flue gas heat exchanger, steam turbine group with for sections HP, MP, LP1 and LP2, alternator 750 MVA (efficiency 44,7%)	SU2 and SU3 each of them made of: - steam generator (boiler); - steam turbine; - coaxial alternator;- seawater shell and tube condenser; - condensate cooling system.	SP1: 1 x CCGT (efficiency 54%) SP2: 1 x CCGT (efficiency 54%) SP3: 1 boiler equipped with 36 low-NOx burners (that can achieve as low as 900 mg/Nm³), steam turbines group, alternator (efficiency 39%)	G1, G2, G3 and G4, each of them made of: - steam generator (boiler); - steam turbine; - coaxial alternator ; - shell and tube condenser; - condensate cooling system. 2 auxiliary boilers fed by oil (when the auxiliary steam is not available in 1 of the 4 units)	GR1, GR2, (feed with coal) each of them made of: - boiler TOSI; - turbine TOSI; - alternator MARELLI; GR3, GR4, (feed with fuel oil) each of them made of: - boiler ANSALDO; - turbine ANSALDO; - alternator AGEN;
Flue gas treatment -step I (DeNOx)	Sections 1-2-3-4: catalytic denitrification (SCR) (ammonia)	Each of the 3 units: - 1 x SCR "High Dust"; catalyser: vanadium, tungsten and titanium oxides; using ammonia produced on site through urea hydrolization; efficiency on NOx 85%. At max capacity the urea consumption is 26.000 tons/y. - 1 x bag filter - efficiency on dust 99,5% (considering also FGD)	No NOx abatement system exists for SU2. For SU3: - 1 x SCR - 1 x Electrostatic precipitator	SP3: - 1 x SCR High Dust (ammonia/water 25%) - efficiency on NOx 80% - 1 x Electrostatic precipitator - efficiency on dust 97,5%	G1, G2, G3 and G4, each of them provided with: - 1 x SCR High Dust (ammonia/water 25%) - efficiency on NOx 80% - 1 x Electrostatic precipitator	No DeNOx SCR installed; NOx values declared exceed values indicated by BAT; BAT not implemented yet (DeNOx to be installed in 2015)
Flue gas treatment -step II (DeSOx)	Wet DeSOx for sections 1-2-3-4 with limestone (about 31.000 t/y), and/or "marmettola" slurry, coming from the processing of marble of the <u>Verona area</u> (about 45.000 t/y). Declared DeSOx abatement: 82%; however the Permit considers an efficiency of 92% (BREF docs indicates > 90%)	Each of the 3 units have a FGD unit designed for coal with sulphur content <1%: No pre-scrubber 1 x Wet Scrubber (with venturi effect enhancing efficiency): it uses limestone (<=70%)+ marble powder in slurry phase (>=30%) a by-product of marble extraction activity and air. Declared SOx abatement efficiency: 97%. At max capacity the limestone+ marble powder consumption is 150.000 tons/y. 1 x GGH (regenerative Gas-Gas Heat exchangers, "zero leakage type") Centrifuges for gypsum separation	No SO2 abatement system exists for SU2. For SU3: two line in parallel (Linea A and Linea B) each of them treating the 50% of the flow rate and made of: - pre scrubber ; - main scrubber (with limestone). The system is design to treat flue gas coming from the combustion of coal with a maximum sulphur content of 8%. Water from the DeSOx system is treated in the TSD treatment plant and discharged to the sea.	No pre-scrubber 1 x Wet Scrubber dual loop (17 m diameter) using limestone (or alternatively slaked lime); currently substituted with (marble powder) a by-product of marble extraction activity. (declared SOx abatement efficiency 82.3% ; <u>national guidelines indicates 92%-98% achievable; the BAT is therefore declared as partially implemented</u>) 1 x demister 2 x GGH (regenerative Gas-Gas Heat exchangers) centrifuges for gypsum separation	- pre scrubber (with seawater and/or industrial water from ITSD treated water - from primary treatment); - scrubber (with limestone). The WET-FGD is designed to work with both fuel oil and coal . Limestone consumption for DeSOx | gypsum production: coal: 7,75 t/h | 15 t/h oil: 13,75 t/h | 26 t/h Declared SOx abatement efficiency: 84%	DeSOx for GR1, GR2 with limestone; sea water scrubber; no more details are given about the flue gas treatment; declared SOx abatement efficiency 92% ; national guidelines indicates 92%-98% achievable; the BAT is therefore declared as implemented Limestone consumption for DeSOx: 7,480 tons in 2011
Flue gas flow rate Nm³/h	CF1: 600.000 Nm³/h CF2: 620.000 Nm³/h CF3: 1040.000 Nm³/h each (2 stacks)	2,100,000 x 3 stacks (declared at max capacity)	n.a.	2,156,705 (not clear if 2010 figure or figure declared at max capacity)	4 stacks (E15, E25, E35, E45) each of them 2,400,000 Nm³/h at max capacity	5 stacks (PE1, PE2, PE3, PE4, PE5): PE1 and PE2 for GR1 and GR2: Flue gas: 1,082,000 Nm³/h at max capacity
SOx (mg/Nm³) at stack Applicable limits __________ Declared/measured concentration at stack -	Applicable limits CF1, CF2, CF3 only COAL: 200 mg/Nm³ (monthly average on hourly average) %O2 = 6% CF3 (2 channels) COAL + Fuel Oil: 185 mg/Nm³	78-82 (hr av. - 97.5% percentile in 2010) 67-73 (day av. - 97.5% percentile in 2010) < 100 (hr av. declared at max capacity) __________ < 100 (hr av. limit) < 80 (day av. Limit)	Stack SU2 - Applicable limits (SO2): 200 mg/Nm³ (+ 10 mg/Nm³ for each percentage point of National coal used. Maximum limit: 400 mg/Nm³) - Declared 2009 (SO2): 235,68 mg/Nm³ - Declared max capacity (SO2): 400 mg/Nm³ Stack SU3 - Applicable limits (SO2): 200 mg/Nm³ (+ 10 mg/Nm³ for each percentage point of National coal used. Maximum limit: 400 mg/Nm³) - Declared 2009 (SO2): 303,96 mg/Nm³ - Declared max capacity (SO2): 400 mg/Nm³ The permit states that the BAT standards for the SO2 air emissions cannot be achieved since the plant is fed with a mix of coal and biomass.	215.1 (av. year 2010) 259.7 (max month av.) 366.3 (max day av.) __________ 400.0 (former limit on month av. until sep-2013) 350.0 (new limit on month av. from sep-2013 to sep-2016) 180.0 (new limit on daily av. from sep-2016) __________ EU guideline indicate daily average achievable of 20-200 mg/Nm³; the emissions are declared as not in line with BAT	monthly measures in 2008 < 400mg/Nm³ 320 (AIA release) 300 from 12° month 280 from 24° month (today) 240 from 36° month 200 from 48° month % O2 = 6% __________ Stack 1: between 94,9 and 253,3 (av. Months 2008); Stack 2: between 62,5 and 326,9 (av. Months 2008); Stack 3: between 89,0 and 266,6 (av. Months 2008); Stack 4: between 122,4 and 273,9 (av. Months 2008); __________ EU guideline indicate daily average achievable of 20-200 mg/Nm³; it appears as if the declared values are not in line with BAT.	200 (monthly average on hourly average) __________ No declared data

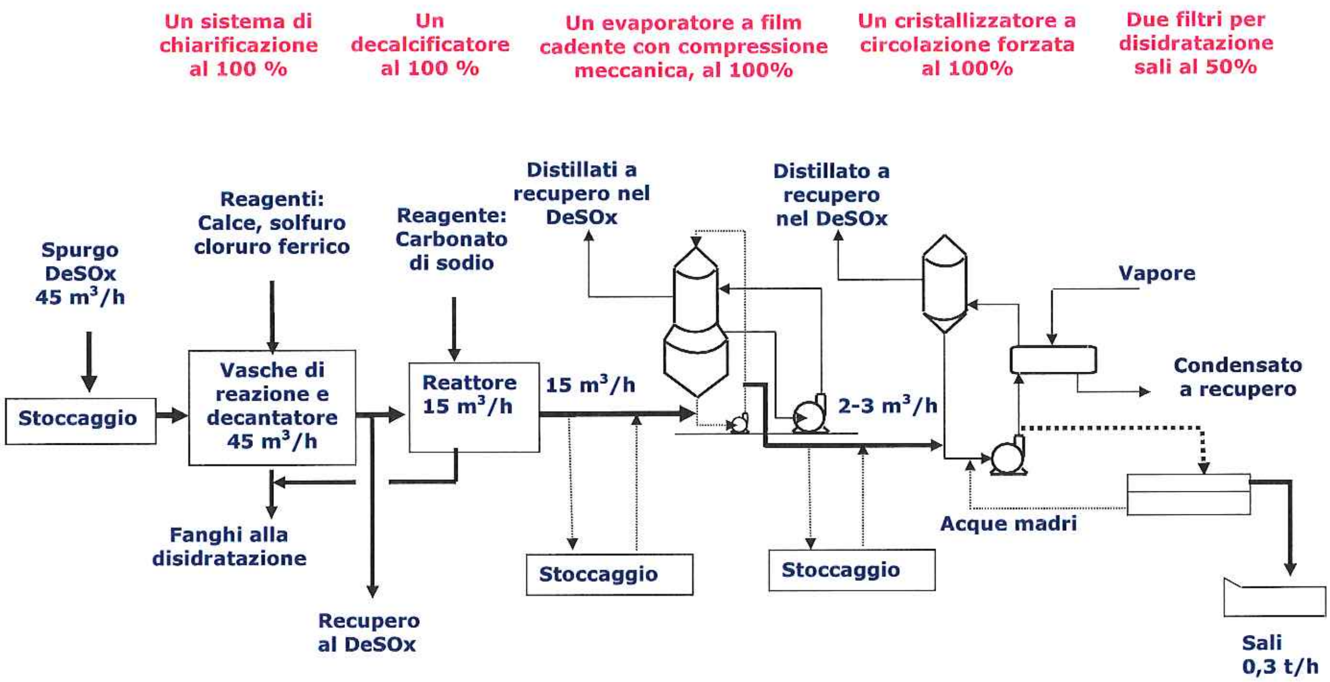
Plant No. and Name	1. FUSINA "ANDREA PALLADIO"	2. TORREVALDALIGA NORD - CIVITAVECCHIA	3. SULCIS "GRAZIA DELEDDA"	4. LA SPEZIA "EUGENIO MONTALE"	5. BRINDISI SUD "FEDERICO II"	6. MONFALCONE
NO_x (mg/Nm^3) at stack Applicable limits Declared/measured	Applicable limits (from PiC and ISPRA) CF1, CF2, CF3 only COAL: 200 mg/Nm^3 (monthly average on hourly average) CF3 (2 channels) COAL + OCD: 200 mg/Nm^3	85-88 (hr av. - 97.5% percentile in 2010) 64-72 (day av. - 97.5% percentile in 2010) < 100 (hr av. declared at max capacity) < 100 (hr av. limit) < 80 (day av. Limit)	Stack SU2 - Applicable limits: 200 mg/Nm^3 - Declared 2009: 120 mg/Nm^3 - Declared max capacity: 200 mg/Nm^3 Stack SU3 - Applicable limits: 200 mg/Nm^3 for coal combustion (is calculated depending on the fuel used in SU3) - Declared 2009: 141,74 mg/Nm^3 - Declared max capacity: 200 mg/Nm^3 No information on the efficiency of the SCR (DeNOx) available in the Permit.	186.1 (av. year 2010) 192.0 (max month av.) 225.6 (max day av.) 200.0 (former limit on month av. until sep-2013) 200.0 (new limit on month av. from sep-2013 to sep-2016) 180.0 (new limit on daily av. from sep-2016) EU guideline indicate daily average achievable of 90-200 mg/Nm^3; the emissions are declared as not in line with BAT	160 Stack 1: between 120,1 and 164,0 (av. Months 2008); Stack 2: between 80,4 and 157,1 (av. Months 2008); Stack 3: between 127,4 and 151,2 (av. Months 2008); Stack 4: between 131,8 and 167,8 (av. Months 2008); EU guideline indicate daily average achievable of 90-200 mg/Nm^3.	500 (monthly average on hourly average) (actual) 200 (from 2016) No declared data
CO (mg/Nm^3) at stack Applicable limits Declared/measured	Applicable limits (from PIC and ISPRA) CF1, CF2, CF3 only COAL: 30 mg/Nm^3 for CF1 and CF2 50 mg/Nm^3 for CF3 CF3 COAL + Fuel Oil: 50 mg/Nm^3	150-383 (hr av. - 97.5% percentile in 2010) 93-105 (day av. - 97.5% percentile in 2010) < 130 (day av. declared at max capacity) < 120 (day av. limit) Sometimes the plant is forced to reduce the load in order to meet the limit of 130 for the daily average. EU guideline indicates daily average achievable of 30-50 mg/Nm^3; the emissions are declared as not in line with BAT	Stack SU2 - Applicable limits: 150 mg/Nm^3 - Declared 2009: 60,85 mg/Nm^3 - Declared max capacity: 150 mg/Nm^3 The system used for the abatement of CO emission are declared as in line with BAT, but no information are given on the used technology Stack SU3 - Applicable limits: 250 mg/Nm^3 for coal combustion (is calculated depending on the fuel used in SU3) - Declared 2009: 66,51 mg/Nm^3 - Declared max capacity: 250 mg/Nm^3 The system used for the abatement of CO emission are declared as in line with BAT, but no information are given on the used technology	66.0 (av. year 2010) 92.8 (max month av.) 167.8 (max day av.) 150.0 (former limit on month av. until sep-2013) 150.0 (new limit on month av. from sep-2013 to sep-2016) 150.0 (new limit on daily av. from sep-2016) EU guideline indicates daily average achievable of 30-50 mg/Nm^3; the emissions are declared as not in line with BAT	monthly measures in 2008 < 400mg/Nm^3 200 (AIA release) 180 from 12° month 160 from 24° month (today) 130 from 36° month 100 from 48° month % O2 = 6% Stack 1: between 36,4 and 75,1 (av. Months 2008); Stack 2: between 35,3 and 73,8 (av. Months 2008); Stack 3: between 31,0 and 77,4 (av. Months 2008); Stack 4: between 31,5 and 73,4 (av. Months 2008); EU guideline indicate daily average achievable of 30-50 mg/Nm^3.	150 (monthly average on hourly average) Stack 1: 21,3 (av. year 2011); Stack 2: 24,1 (av. year 2011) EU guideline indicate daily average achievable of 30-50 mg/Nm^3; the emissions declared are in line with BAT
Particulate matter (mg/Nm^3) at stack Applicable limits Declared/measured	Applicable limits (from PiC and ISPRA) CF1, CF2, CF3 only COAL: 20 mg/Nm^3 (monthly average on hourly average) CF3 (2 channels) COAL + OCD: 20 mg/Nm^3	1.7-3.1 (hr av. - 97.5% percentile in 2010) 1.6-2.7 (day av. - 97.5% percentile in 2010) < 15 (hr av. declared at max capacity) < 10 (hr av. limit) < 8 (day av. Limit) EU guideline indicates daily average achievable of 5-10 mg/Nm^3; the emissions are declared as not completely in line with BAT	Stack SU2 - Applicable limits: 30 mg/Nm^3 - Declared 2009: 5,39 mg/Nm^3 - Declared max capacity: 30 mg/Nm^3 Stack SU3 - Applicable limits: 50 mg/Nm^3 for coal combustion (is calculated depending on the fuel used in SU3) - Declared 2009: 13,79 mg/Nm^3 - Declared max capacity: 50 mg/Nm^3	11.0 (av. year 2010) 12.2 (max month av.) 21.9 (max day av.) 50.0 (former limit on month av. until sep-2013) 25.0 (new limit on month av. from sep-2013 to sep-2016) 15.0 (new limit on daily av. from sep-2016) EU guideline indicates daily average achievable of 5-10 mg/Nm^3; the emissions are declared as not in line with BAT	40 (AIA release) 35 from 24° month 30 from 48° month Stack 1: between 1,8 and 13,6 (av. Months 2008); Stack 2: between 2,4 and 15,4 (av. Months 2008); Stack 3: between 7,0 and 23,5 (av. Months 2008); Stack 4: between 1,1 and 25,9 (av. Months 2008); EU guideline indicates daily average achievable of 5-20 mg/Nm^3; it appears as if the declared values are not in line with BAT	30 (monthly average on hourly average)
Metals (µg/Nm^3) at stack Applicable limits Declared/measured	Applicable limits from PIC and ISPRA Be, Hg + Cd + Tl = 0,05 mg/Nm^3 others = 0,5 mg/Nm^3					
Hg (µg/Nm^3) at stack Applicable limits Declared/measured	0,05 mg/Nm^3 = 50 µg/Nm^3	0,05 (hr av. limit) (Hg abatement estimated by the site >90%)		0.0015 (declared representative value) 0,1000 (new limit on Hg+Cd+Tl 1 hr)	0,08 mg/Nm^3 (new limit on Hg+Cd+Tl)	Applicable limits: Be, Hg, Cd + Tl = 0,05 mg/Nm^3 others = 0,5 mg/Nm^3 No declared data
HF, HCl, HBr, NH3 (mg/Nm^3) at stack Applicable limits Declared/measured	NH3 = 5 m/Nm^3	HF < 5 (limit) HCl < 10 (Limit) HBr - no limit NH3 0.7-3.8 (hr av. - 97.5% percentile in 2010) 0.6-2.7 (day av. - 97.5% percentile in 2010) < 5 (hr av. declared at max capacity) < 5 (hr av. limit) < 4 (day av. Limit)	Stack SU2 - Applicable limits: HCl, 10 mg/Nm^3; HF, 5 mg/Nm^3; NH3 (within 3 yrs from Permit issuing date), 5 mg/Nm^3 - HCl: Declared 2009: 0,198 mg/Nm^3 (09/12/2009); 0,125 mg/Nm^3 (11/12/2009); - HF: Declared 2009: 0,261 mg/Nm^3 (09/12/2009); 0,045 mg/Nm^3 (11/12/2009); -NH3: 1,66 mg/Nm^3 (max. capacity) Stack SU3 - Applicable limits: HCl, 10 mg/Nm^3; HF, 5 mg/Nm^3; NH3, 5 mg/Nm^3 - HCl: Declared 2009: 0,193 mg/Nm^3 (18/11/2009); 0,603 mg/Nm^3 (14/12/2009); - HF: Declared 2009: 0,233 mg/Nm^3 (18/11/2009); 3,66 mg/Nm^3 (14/12/2009); -NH3: Declared 2009: 0,0341 mg/Nm^3 (18/11/2009); 0,118 mg/Nm^3 (14/12/2009)	1.28 (declared representative value) / 4 (new limit 1 hr) 2.03 (declared representative value) / 8 (new limit 1 hr) 0.15 (declared representative value) / no limit 0.90 (declared representative value) / 5 (new limit 1 hr)	HCl: 10 HF: 4 NH3: 5 Declared: Cl (as HCl): between 0,382 and 1,87 (av. year 2008); F (as HF): between 2,24 and 3,42 (av. year 2008); NH3: in 2008, E15: 3,465 mg/Nm^3; E25: 2,042 mg/Nm^3; E35: 0,4406 mg/Nm^3; E45: 0,169 mg/Nm^3)	
Waste from combustion (heavy ash, cinder)		EWC100101 (solid) - 50,000 tons (at max capacity) 26,789 (in 2011)		EWC100101 (solid) - 1,911 tons (2012)	EWC100101 (solid) - 21,850 tons (2010) (max. production 59,961 ton)	EWC100101 (solid) - 3,000 tons (max. production)
Waste from combustion (flying ash)	EWC 100102 (powder) No information available on produced quantity	EWC100102 (powder) - 500,000 tons (at max capacity) 357,714 (in 2011)	EWC100102 (powder) - 220,829 tons (2009) (max. production 416,016 tons)	EWC100102 (powder) - 96,073 tons (2012)	EWC100102 (powder) - 322,500 tons (2010) (max. production 655,009 ton)	EWC100102 (powder) -27,000 tons (max. production)
Waste from EP				EWC100119 (powder) - 15 tons (2012)		EWC100119 (powder) -1,000 tons (max. production)
Waste produced from FGD (gypsum)	EWC 100105 (solid) No information available on produced quantity	EWC100105 (powder) - 250,000 tons (at max capacity) 150,941 (in 2011)	EWC100105 (solid) - 24,355 tons (2009) (max. production 51,576 tons)	EWC100105 (solid) - 38,019 tons (2012)	EWC 100105: 96,300 ton in 2010 (max. production 264,257 ton)	EWC100105 (solid) - 65,000 tons (max. production)
Waste produced WWTP1 Che Phy (sludge)	EWC 100121 (sludge) No information available on produced quantity	EWC100121 (sludge from ITAR) - 2,000 tons (at max capacity)	EWC100107 (sludge) - 10,147 tons (2009) (max. production 16,040 tons)	EWC100121 (sludge) - 5,373 tons (2012)	EWC 100121: 18,251 ton in 2010 (max. production 50,081 ton)	EWC100121 (sludge) - 600 tons (max. production);
Waste produced WWTP2 SEC (sludge)	EWC 100121 (sludge) No information available on produced quantity	EWC100121 (sludge from ITSD) - 30,000 tons (at max capacity) EWC100121 (sludge from SEC) - 5,000 tons (at max capacity)		EWC100121 (sludge) - 332 tons (2012)	EWC 100121: 2,371 ton in 2010 (max. production: 6,507,030 ton)	EWC100107 (sludge) - 1,000 tons (2012) (to be verified if this EWC is referred to the SEC sludge)

Plant No. and Name	1. FUSINA "ANDREA PALLADIO"	2. TORREVALDALIGA NORD - CIVITAVECCHIA	3. SULCIS "GRAZIA DELEDDA"	4. LA SPEZIA "EUGENIO MONTALE"	5. BRINDISI SUD "FEDERICO II"	6. MONFALCONE
Waste Notes		The permit states (page 61) that in 2010 the Site produced 16 tons of <u>liquid waste</u> (EWC100107) from the FGD; in 2011 according to environmental declaration the production of this kind of waste was of 1,847 tons. This could be gypsum with water being disposed off site and not treated on site for the water recovery. Furthermore the sludge produced by WWTP1 in 2010 has been more than twice the amount declared at maximum capacity; this can be due to FGD purge treated at WWTP1 instead of at ITSD/SEC.		In 2012 it is declared the production 17 tons of "not haz. water solution to be treated off-Site" (EWC 161002) from WWTPs; **<u>the source it is not clear; it could come from purge of FGD.</u>** **<u>Based on site Environmental Declaration 2012 (page 53), data related to 2012 show a sudden drop (more than 50%) of sludge production from the WWTP2, and a sudden increase of sludge from WWTP1, while the production of ash remain stable with respect to 2011. This can be explained assuming a part of FGD purge has been shifted from WWTP2 to WWTP1.</u>** BAT (both EU and national) are declared as implemented.		
WWTP1 **General WWTP** **(ITAR)**	Traditional chemical-physical treatment (so called "ITAR") for acid and alkaline industrial wastewater (other than purge of FGD). Currently all wastewater discharges are sent to an external plant operated by SIFA.	Traditional chemical-physical treatment (so called "ITAR") for acid and alkaline industrial wastewater (other than purge of FGD) with a capacity of 150 m^3/h. Composed of the following sections: - storage (2000 m^3) - neutralization (primary and secondary) - flocculation - sedimentation - sand filtration - pH correction - sludge thickener and filterpressing Water from WWTP1 can be either (preferred) sent to industrial waste water tanks for reuse (e.g. in the FGD) reused or discharged to sea (discharge point "UTc")	Traditional chemical-physical treatment (so called "ITAR") for acid and alkaline industrial wastewater (other than purge of FGD) with a capacity of 300 m^3/h. Composed of the following sections: - storage - neutralization - flocculation - clarification - neutralization - pH correction - activated carbon filtration - sludge thickener and filterpressing Water from WWTP1 can be either reused (not specified) or discharged to sea (point C3).	Traditional chemical-physical treatment (so called "ITAR") for: I) acid and alkaline industrial wastewater (other than purge of FGD) II) purge of FGD **<u>if the flow rate exceed treatment capacity of SEC treatment.</u>** Use of HCl, slaked lime, polyelectrolyte, ferric chloride. Composed of the following sections: - storage - sludge precipitation (primary and secondary) - sludge sedimentation (primary and secondary) - chemical oxidation - pH correction - sludge thickener and filterpressing Water from WWTP1 can be either reused or discharged to sea (discharge point "SF1 No. 3")	Traditional chemical-physical treatment (so called "ITAR-ITAA") for acid and alkaline industrial wastewater (other than purge of FGD) with a capacity of 300 m^3/h. Composed of the following sections: - disoleation - storage - neutralization - flocculation - clarification - neutralization - biological oxidation - sludge thickener and filterpressing Water from WWTP1 is completely reused (not specified) but maintain the possibility to discharge to the sea.	No details are given on the primary treatment: reagents declared: slaked lime, Na_2CO_3, polyelectrolyte, ferric chloride, antifoam.
WWTP2 **Dedicated to FGD** **(ITSD/SEC)**	WWs from DeSOx go to ITSD section (treatment capacity = 150 m^3/h) with: primary and secondary neutralization, flocculation-desolforation, sludge sedimentation and thickening, with a recover allowing separated water to be recovered in the FGD. The exceeding quote of sludge is sent to SEC (flow rate = 70 m^3/h). SEC was designed for a flow rate of 70 m^3/h of WWs from ITSD. Waters coming from SEC were completely recirculated in the productive cycle (see Wastewater Notes below), unless in case of emergency. In this case (emergency) discharge point SI2 will be sent to Veritas, through SS1 point. Declared reagents quantity for ITSD treatment plant: lime (about 2,600 t/y), sodium sulphide (90 t/y), ferric chloride (260 t/y), sodium sulphite (10 t/y), polyelectrolytes (3 t/y).	Treatment dedicated to the purge of the FGD (so called ITSD) composed of two sections with the objective to have ZLD: traditional chemical physical treatment and SEC treatment. Traditional treatment, for separation of metals as hydrates or sulphides, is composed of (50 m^3/h): - 3 reaction basins - one clarification basin - tank for sludge storage SEC treatment (35 m^3/h): - softening (for calcium content reduction) - evaporation x2 - crystallization and belt filtration system In the technical description it is acknowledged the problem related to the formation of very soluble salts, due to the excess of Calcium ion with respect to sulphate ion. This is addressed with the softening by substituting calcium with sodium in order to obtain a solid residue that can be handed easier. No purge from the SEC is mentioned. Treated Water is sent to industrial waste water tanks for reuse (e.g. in the FGD).	2 lines (Line A and Line B) each of them made of a Pre scrubber and a Main scrubber with limestone. Traditional chemical-physical treatment (so called "ITSD") for: DeSOx wastewater, heat exchanger wash water drain etc. No details are given on the primary treatment: reagents declared: slaked lime, Na_2CO_3, polyelectrolyte, ferric and ferrous chloride, HCl, Na_2S (sodium sulphide). In the treatment plant a special section is installed for the removal of Hg, Cd, Se, metals and suspended solids Current status: The purge from the DeSOx system is treated in the ITDS plant and discharged to the sea. The ZLD - SEC system (Softening Evaporation Crystallization) has been installed and it is still in an "experimental phase".	Treatment plant dedicated to the purge of the FGD (estimated at 200,000 m^3/y) with the following stages: - pre-treatment - neutralization and clariflocculation using slaked lime, polyelectrolyte, ferric chloride, sodium sulphide - pre-treatment - softening using calcium carbonate (15 m^3/h) - evaporation (15 m^3/h) - crystallization that completely evaporate water (2-3 m^3/h): salts are filterpressed The SEC is reported not to have "direct wastewater discharges". Water from different stages of SEC is reported to be reused for various industrial purposes (including demineralised water production). The SEC treatment has been installed in 2008; before 2008 the FGD wastewater discharge was treated in the WWTP1.	Traditional chemical-physical treatment (so called "ITSD") for: DeSOx wastewater, heat exchanger wash water drain etc. ITSD designed for a flow rate of 500 m^3/h, two parallel-stage (precipitation + sedimentation each); Operating flow rate: 140 m^3/h; 1st stage: 1) primary neutralization (125 m^3) with lime milk + NaOH, 2) secondary neutralization + sulphureting (125 m^3) with lime milk + sodium sulphide, 3) flocculation and desulphurating (125 m^3) with polyelectrolyte and ferrous chloride. WW go to 2 thickeners; 2nd stage: 1) coagulation and neutralization (125 m^3) with lime milk, NaOH, ferric chloride; 2) flocculation (125 m^3) with polyelectrolytes; 3) laminar packs; 4) thicker; 5) oxidation (200 m^3) and pH regulation (125 m^3) with NaOH, HCl, H_2O_2. The discharge flow rate is divided in two: - 70 m^3/h of treated water is reused in the pre scrubber; - 70 m^3/h of treated water is send to the SEC system (WWTP2 - see below). SEC treatment dedicated to the water treated in WWTP(1) (not described): Operating flow rate: 70 m^3/h; - softening - evaporation - crystallization (water completely evaporated) Water evaporated/condensed is reported to be reused for industrial purposes (including demineralized water	
Wastewater discharge limits	Table 3, Annex 5 of Part 3 of D.Lgs. 152/2006	Table 3, Annex 5 of Part 3 of D.Lgs. 152/2006	Table 3, Annex 5 of Part 3 of D.Lgs. 152/2006	Table 3, Annex 5 of Part 3 of D.Lgs. 152/2006	Table 3, Annex 5 of Part 3 of D.Lgs. 152/2006	Table 3, Annex 5 of Part 3 of D.Lgs. 152/2006
Wastewater Notes	Based on the Upgrade of the Permit (dated 23/12/2010), it is understood that currently the ITSD discharge (together with other site wastewater streams) isn't sent to the SEC system, but it is sent to an external WWTP (operated by SIFA) in the context of a project, sponsored by the Regional authority, aimed at improving water quality of the Venice lagoon. SIFA plant in fact discharges wastewater to open sea rather than into the Venice lagoon.	BAT for wastewater treatment (both EU and national) are declared as "implemented" by the site and this is reported in the permit. The permit (page 41) clearly states that "the site, while confirming the goal of ZLD, estimate a maximum quantity of wastewater (including industrial acid/alkaline wastewater from production units and wastewater from FGD) potentially discharged by WWTP1 through discharge point "UTc" of 1,270,000 m^3/y. As a matter of fact, based on Environmental Declaration, in 2010 and in 2011, no wastewater has been discharged by WWTP1 as all wastewater has been reused. In 2008 and in 2009 WWTP discharge was of 135,000 m^3 and 161,590 m^3. Limits for industrial wastewater discharge (WWTP1) for chlorides and sulphates can be derogated.	Current status: a wastewater discharge for ITSD treatment plant is authorized and in operation. The Authorization stated that when the SEC system will be operating the flow rate will be zero.	BAT for wastewater treatment (both EU and national) are declared as "implemented" by the site and this is reported in the permit. There are no specific prescriptions related to - avoiding wastewater discharges from WWTP1 (it is clearly stated that WWTP1 can discharge to sea) - sending all the FGD purge to SEC system. Considering documentation provided by the site for the permit application and Environmental Statement 2012 (i.e. wastewater flow diagram, see Appendix B) it is clear that the FGD purge can go either to the SEC system (evaporated, condensed and then reused) or to WWTP1 (then or reused or discharged to sea). FGD purge stream is reported to be of approx. 200.000 m^3/y while the WWTP capacity is reported of 15 m^3/h (i.e. 131,400 m^3/y); the two figures evidently does not match and show that the WWTP capacity may be not sufficient to treat the entire stream from FGD. The water recovery is declared as "ALMOST total" by the site (page 78). In the monitoring plan (Table 16 page 26) issued by the Ministry the discharge to sea of WWTP1 (namely "SF1 No. 3") is reported as including the Purge of FGD.	Water Discharges outfall S15 to the sea. ENEL asked to maintain the possibility to discharge wastewater treated in ITSD in case emergency or in case of malfunctioning of SEC system. In the Authorization, discharge outfall S15 includes also S95 discharge, named as "DeSOx purge". No more information are available. In case of SEC unavailability and of "S95" discharge to the sea activation, the permit prescribes a wastewater sampling procedure to be followed; the procedure is included in the monitoring plan issued by national EPA attached to the permit issued by the MoE. The sampling procedure has to be activated within 3 hours from the upset/emergency situation. No information is available on whether emergency/upsets of the SEC section actually occurred and no evidence is available on the application of the sampling procedure. In a process flow diagram of the site wastewater treatment system (attached to the permit application), a stream named "C2" goes directly from ITDS plant to the sea (likely the S95 discharge point).	No details are given on the ZLD section (process and equipment by Veolia). The company declared in the permit application that there is no discharge from the WWTP treating FGD purge.

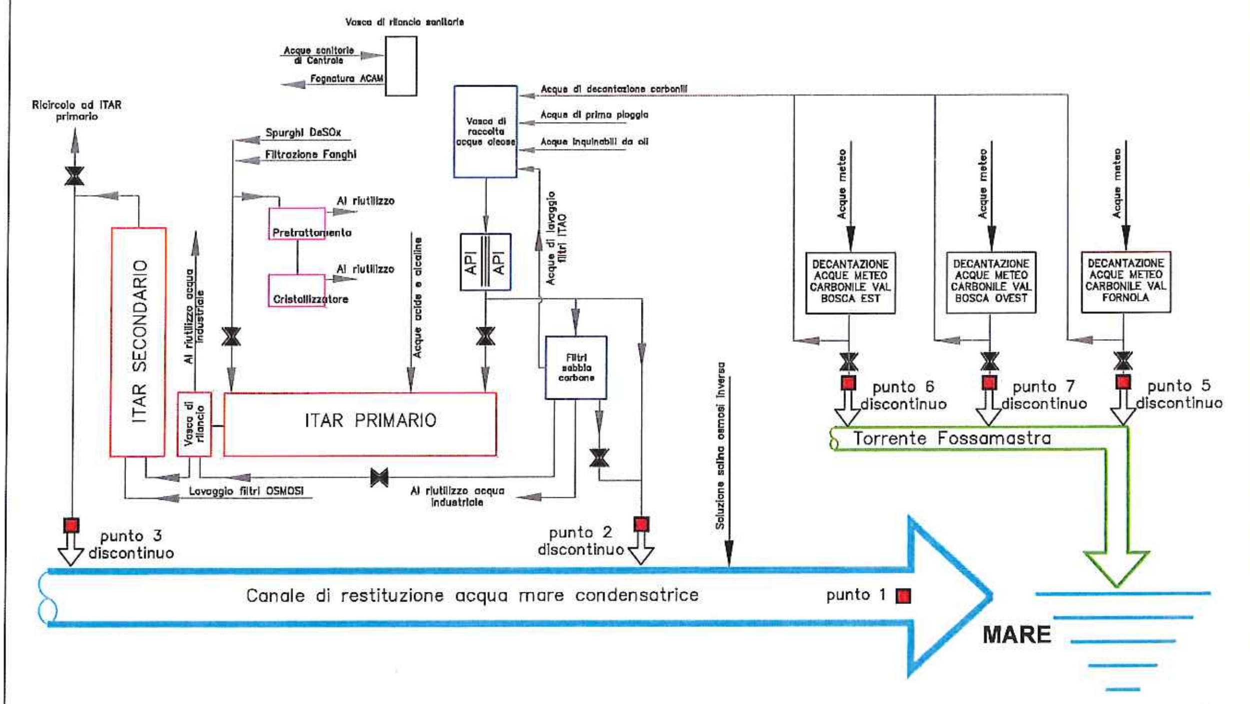
APPENDIX B

La Spezia Flow Diagrams (from permit application)

Appendice
Schema Impianto Evaporazione-Cristallizzazione di La Spezia



Nota : le quantità indicate sono a titolo indicativo



LEGENDA

Collegamento normalmente chiuso (NC)		ITAR	
Pozzetti di campionamento		ITAO	
		SEC	

Allegato 5

CENTRALE DI : LA SPEZIA

RELAZIONE TECNICA PER IL RINNOVO DELL'AUTORIZZAZIONE AGLI SCARICHI

REVISIONE DEL 29/01/2010

Enel

TITOLO : SCHEMA DI FLUSSO SEMPLIFICATO DEGLI IMPIANTI DI TRATTAMENTO DEGLI SCARICHI

APPENDIX C

Brindisi Sud Flow Diagrams (from permit application)

Allegato B.18 - Appendice 2

Nuovo assetto di funzionamento degli impianti DeSOx a seguito dell'installazione dell'impianto SEC

1. PREMESSA

Gli interventi in corso di realizzazione nella Centrale Federico II hanno la finalità di azzerare completamente lo scarico di acque reflue industriali. Allo stato attuale è già attivo un sistema di recupero e riutilizzo di acque reflue, dal quale sono però esclusi i reflui liquidi derivanti dagli impianti di desolforazione.

Per estendere anche a tali reflui la filosofia dello scarico zero (ZLD "Zero Liquid Discharge") sono in corso di realizzazione interventi sul ciclo delle acque e l'installazione di un nuovo sistema di trattamento denominato SEC (Sistema di Evaporazione-Cristallizzazione) che consentiranno di separare l'acqua dalla frazione solida non recuperabile (avviata a smaltimento) ed il riutilizzo integrale in ciclo chiuso di tutte le acque di processo.

L'assetto finale di gestione delle acque con attuazione della filosofia ZLD consentirà di conseguire due obiettivi concomitanti:

a) eliminazione alla radice di ogni potenziale impatto sull'ambiente marino derivante dallo scarico di inquinanti
b) riduzione dei consumi di acqua.

2. RACCOLTA E TRATTAMENTO DEI REFLUI LIQUIDI NELLA CONFIGURAZIONE ATTUALE

I reflui prodotti dagli impianti di desolforazione sono raccolti e trattati separatamente dai reflui convenzionali derivanti dalle altre parti di impianto.

Gli impianti di desolforazione si basano su un processo ad umido realizzato in due stadi successivi di lavaggio dei gas di combustione:

- Prelavaggio (prescrubber) realizzato con acqua avente la funzione di raffreddare i gas saturandoli con vapor d'acqua
- Lavaggio con acqua e calcare (scrubber) avente la funzione di assorbire la $SO2$ per reazione con il calcare.

I due stadi hanno circuiti separati e si differenziano per quantità e qualità dell'acqua di reintegro e dei reflui prodotti. In particolare:

- Nello stadio di prelavaggio, dovendosi compensare l'acqua che è persa per evaporazione, si ha la maggior richiesta d'acqua, per la quale peraltro non vi sono requisiti particolari di purezza e salinità (ed infatti è utilizzata acqua di mare); da questo stadio si spurga in continuo una rilevante quantità di reflui allo scopo di limitare l'incremento della salinità
- Lo stadio di assorbimento è concepito in modo da riutilizzare l'acqua in circuito chiuso; il consumo di acqua è quindi modesto dovendosi compensare solo le inevitabili piccole perdite e gli spurghi controllati; l'acqua di reintegro deve avere bassa salinità per evitare problemi di corrosione dei materiali e per assicurare la produzione di gesso con qualità idonea agli usi industriali (basso contenuto di cloruri); i reflui prodotti contengono inquinanti in misura modesta.

Tutti i reflui prodotti dall'impianto di desolforazione sono convogliati ad un impianto di trattamento (TSD) e dopo depurazione inviati allo scarico.

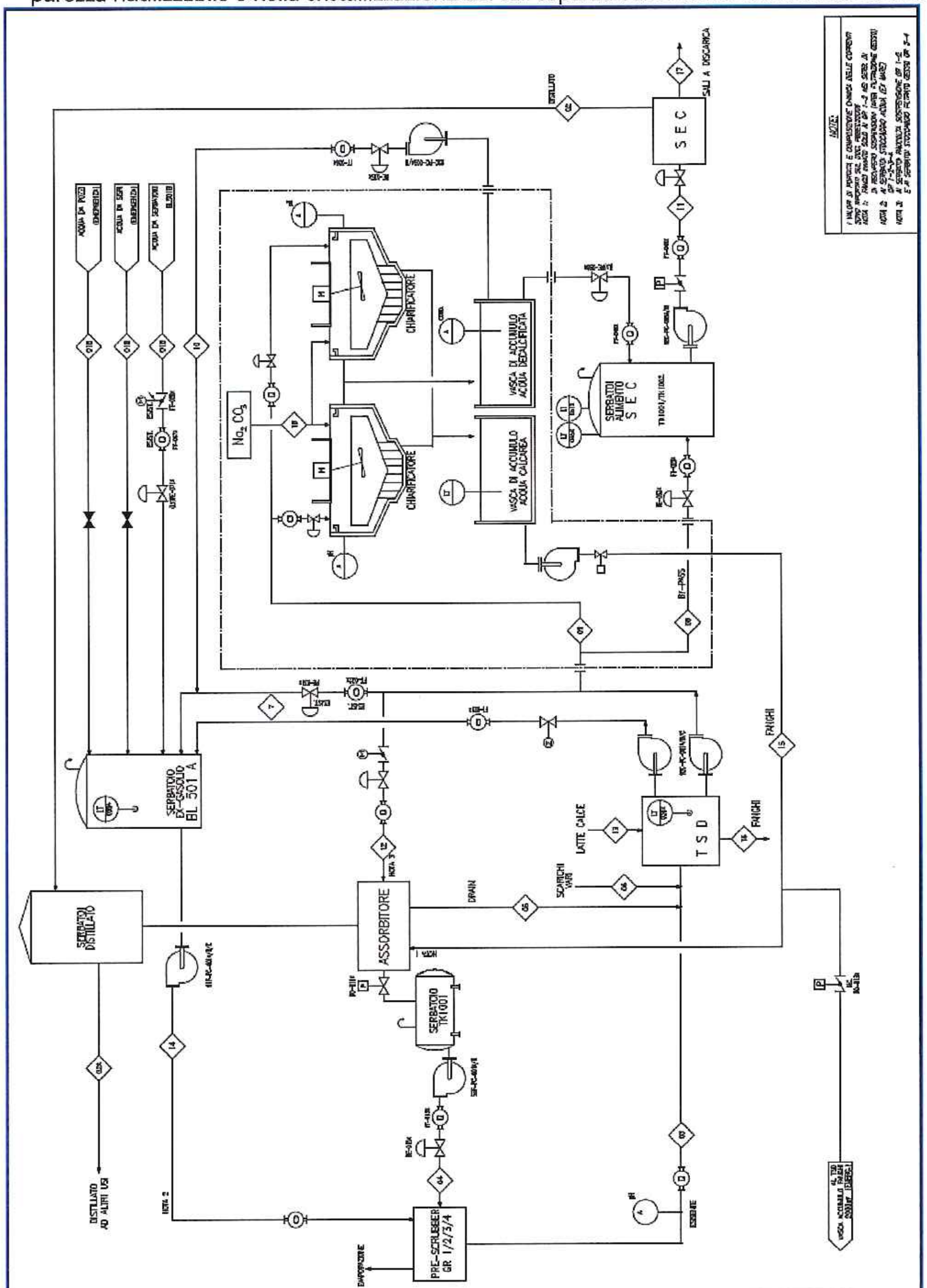
3. INTERVENTI DI MODIFICA PER LA REALIZZAZIONE DELL'ASSETTO CON SCARICO ZERO DI REFLUI LIQUIDI

Le modifiche riguardano il ciclo delle acque degli impianti di desolforazione.

Gli elementi chiave che consentono di chiudere il bilancio delle acque di centrale senza scarichi di reflui industriali sono due (vedi schema):

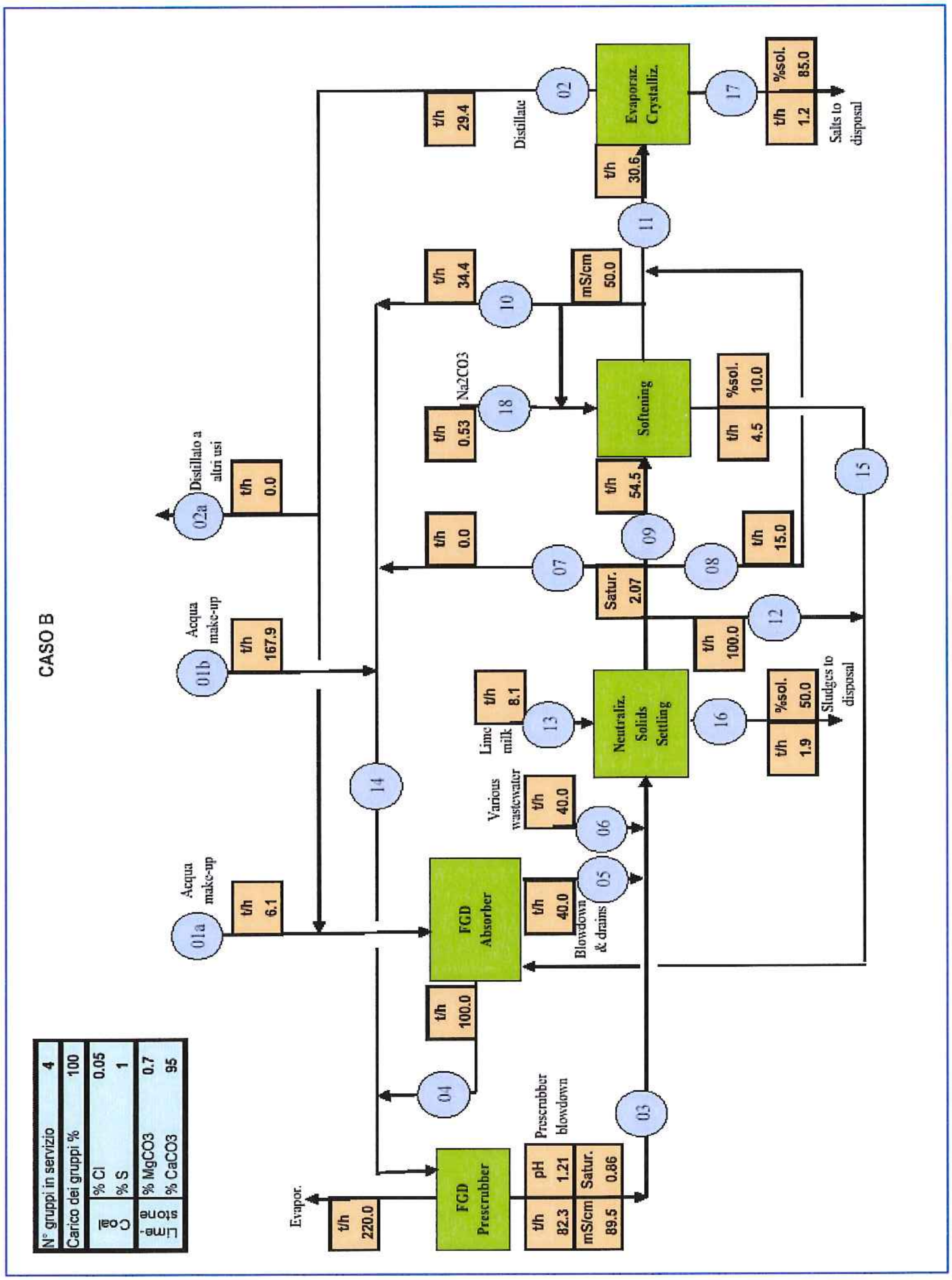
a) Alimentazione dello stadio di prelavaggio con acqua recuperata dall'uscita del TSD (ed integrazione con acqua industriale) in luogo dell'acqua di mare; in questo modo il refluo in uscita dal ITSD, invece di essere scaricato in mare, assolve la funzione di saturazione dei gas. Le acque trattate dal TSD, contenendo una elevata concentrazione di solfato di calcio in soluzione, non possono essere utilizzate tal quali, perché il solfato di calcio in sovrasaturazione precipiterebbe provocando incrostazioni nelle apparecchiature dello stadio di prelavaggio. Prima del riutilizzo quindi le acque vengono addolcite con carbonato di sodio (processo di "softening") in modo da sostituire i sali di calcio con quelli corrispondenti di sodio, molto più solubili. Il carbonato di calcio, che precipita come fango nel trattamento di addolcimento, viene recuperato e riutilizzato nell'impianto di desolforazione, dove esso si comporta come il calcare reagendo con la SO2 e producendo gesso

b) Controllo dell'accumulo di sali disciolti nel circuito chiuso delle acque mediante trattamento di una corrente di liquido prelevata dall'uscita del TSD. Questo trattamento, attuato nell'impianto SEC, consiste nell'evaporazione totale dell'acqua e ricondensazione come distillato di elevata purezza riutilizzabile e nella cristallizzazione dei sali separati come solido disidratato da smaltire.



Il sistema di trattamento effluenti ITSD è dimensionato per una portata di 140 t/h per lo stadio di softening e 70 t/h per lo stadio di evaporazione-cristallizzazione; l'alimentazione al SEC avviene tramite 2 nuovi serbatoi da 2.000 m3 che assolvono anche la funzione di accumulare le acque eventualmente in eccesso rispetto alla potenzialità. Sono previsti i seguenti reagenti: carbonato di sodio polvere (silo da 200 m3); polielettrolita soluzione allo 0,3% (0,7 m3); soda caustica soluzione al 25% peso (25 m3); acido cloridrico 30% (25 m3); antischiuma, antincrostante, solfito di sodio (1 m3 ciascuno).

Nello schema seguente si riporta il bilancio di massa dell'intero sistema nel caso di funzionamento a carbone a pieno carico delle 4 sezioni di centrale:

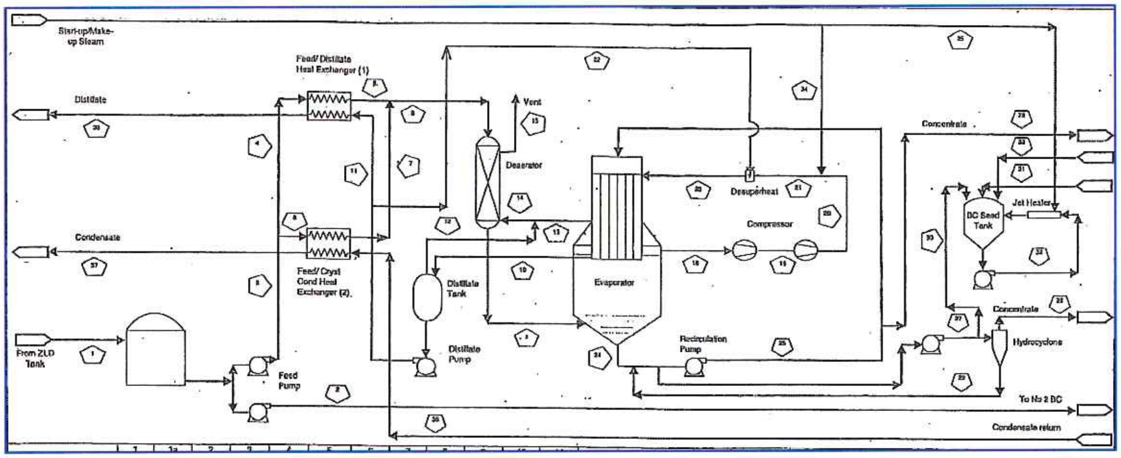


USO PUBBLICO

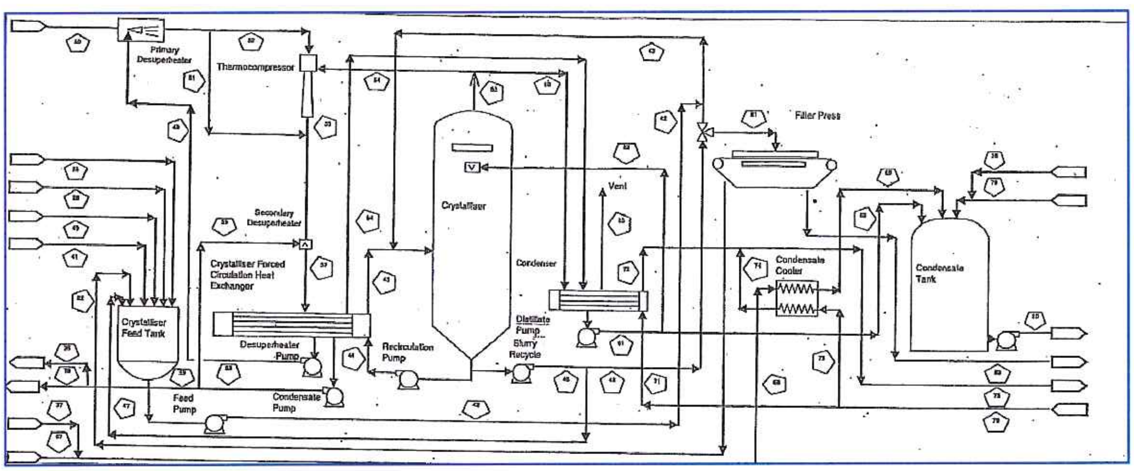
4. DESCRIZIONE DELL'IMPIANTO DI EVAPORAZIONE-CRISTALLIZZAZIONE

L'impianto, fornito dalla Società Aquatech (USA), ha una potenzialità di trattamento di 70 t/h e si articola in due stadi di evaporazione in successione ed in un sistema di disidratazione del solido:

- il primo stadio di evaporazione, avente la funzione di preconcentrare il refluo senza arrivare alla precipitazione dei sali, è costituito da due evaporatori (ciascuno dimensionato per trattare il 50% della portata), del tipo a film sottile discendente, muniti di ricompressione meccanica del vapore per il contenimento dei consumi energetici

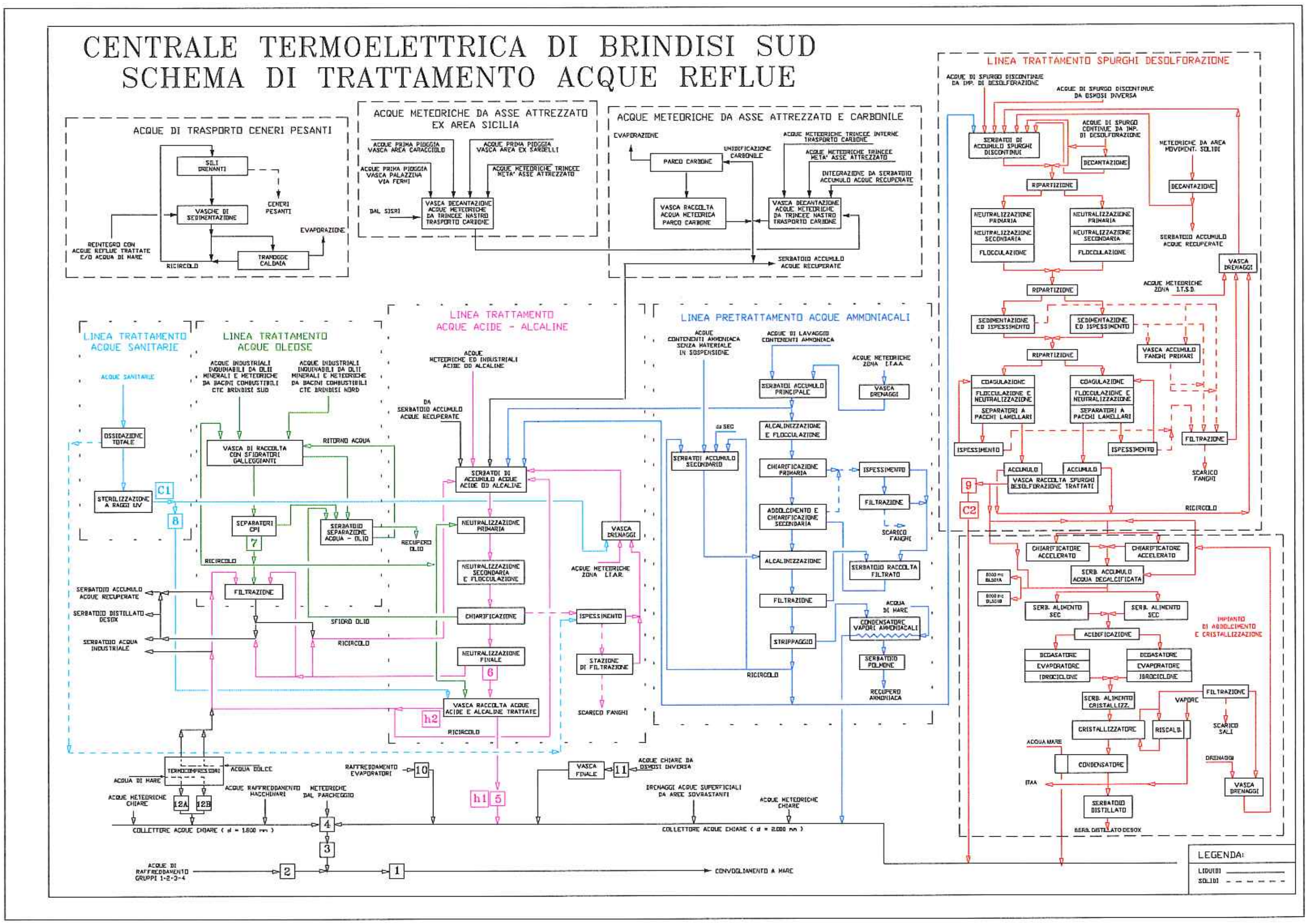


- il secondo stadio di evaporazione, avente la funzione di concentrare ulteriormente il liquido producendo la cristallizzazione dei sali in soluzione, è costituito da un unico evaporatore del tipo a circolazione forzata alimentato con vapore ausiliario di centrale



- Il sistema di disidratazione è costituito da due filtri nastro-pressa che separano i cristalli di sale dal liquido madre, producendo un solido palabile.

Il vapore prodotto in entrambi gli stadi, unitamente a quello di centrale alimentato nel secondo stadio di cristallizzazione, è condensato e recuperato come distillato di buona qualità riutilizzabile in centrale.


CENTRALE TERMOELETTRICA DI BRINDISI SUD
SCHEMA DI TRATTAMENTO ACQUE REFLUE
ACQUE DI TRASPORTO CENERI PESANTI
SILI DRENANTI
CENERI PESANTI
VASCHE DI SEDIMENTAZIONE
REINTEGRO CON ACQUE REFLUE TRATTATE E/O ACQUA DI MARE
EVAPORAZIONE
TRAMOGGE CALDAIA
RICIRCOLO
ACQUE METEORICHE DA ASSE ATTREZZATO EX AREA SICILIA
ACQUE PRIMA PIOGGIA VASCA AREA CARACCIOLO
ACQUE PRIMA PIOGGIA VASCA AREA EX SARDELLI
ACQUE PRIMA PIOGGIA VASCA PALAZZINA VIA FERMI
ACQUE METEORICHE TRINCEE META' ASSE ATTREZZATO
DAL SISRI
VASCA DECANTAZIONE ACQUE METEORICHE DA TRINCEE NASTRO TRASPORTO CARBONE
ACQUE METEORICHE DA ASSE ATTREZZATO E CARBONILE
EVAPORAZIONE
PARCO CARBONE
UMIDIFICAZIONE CARBONILE
ACQUE METEORICHE TRINCEE INTERNE TRASPORTO CARBONE
ACQUE METEORICHE TRINCEE META' ASSE ATTREZZATO
INTEGRAZIONE DA SERBATOIO ACCUMULO ACQUE RECUPERATE
VASCA RACCOLTA ACQUA METEORICA PARCO CARBONE
VASCA DECANTAZIONE ACQUE METEORICHE DA TRINCEE NASTRO TRASPORTO CARBONE
SERBATOIO ACCUMULO ACQUE RECUPERATE
LINEA TRATTAMENTO ACQUE SANITARIE
ACQUE SANITARIE
OSSIDAZIONE TOTALE
STERILIZZAZIONE A RAGGI UV
C1
8
LINEA TRATTAMENTO ACQUE OLEOSE
ACQUE INDUSTRIALI INQUINABILI DA OLII MINERALI E METEORICHE DA BACINI COMBUSTIBILI CTE BRINDISI SUD
ACQUE INDUSTRIALI INQUINABILI DA OLII MINERALI E METEORICHE DA BACINI COMBUSTIBILI CTE BRINDISI NORD
VASCA DI RACCOLTA CON SFIORATORI GALLEGGIANTI
RITORNO ACQUA
SEPARATORI CPI
SERBATOIO SEPARAZIONE ACQUA - OLIO
RECUPERO OLIO
7
RICIRCOLO
FILTRAZIONE
SFIORO OLIO
SERBATOIO ACCUMULO ACQUE RECUPERATE
SERBATOIO DISTILLATO DESOX
SERBATOIO ACQUA INDUSTRIALE
RICIRCOLO
LINEA TRATTAMENTO ACQUE ACIDE - ALCALINE
ACQUE METEORICHE ED INDUSTRIALI ACIDE OD ALCALINE
DA SERBATOIO ACCUMULO ACQUE RECUPERATE
SERBATOI DI ACCUMULO ACQUE ACIDE OD ALCALINE
NEUTRALIZZAZIONE PRIMARIA
NEUTRALIZZAZIONE SECONDARIA E FLOCCULAZIONE
CHIARIFICAZIONE
NEUTRALIZZAZIONE FINALE
6
VASCA RACCOLTA ACQUE ACIDE E ALCALINE TRATTATE
h2
RICIRCOLO
VASCA DRENAGGI
ACQUE METEORICHE ZONA I.T.A.R.
ISPESSIMENTO
STAZIONE DI FILTRAZIONE
SCARICO FANGHI
LINEA PRETRATTAMENTO ACQUE AMMONIACALI
ACQUE CONTENENTI AMMONIACA SENZA MATERIALE IN SOSPENSIONE
ACQUE DI LAVAGGIO CONTENENTI AMMONIACA
ACQUE METEORICHE ZONA I.T.A.A.
VASCA DRENAGGI
SERBATOI ACCUMULO PRINCIPALE
da SEC
SERBATOI ACCUMULO SECONDARIO
ALCALINIZZAZIONE E FLOCCULAZIONE
CHIARIFICAZIONE PRIMARIA
ISPESSIMENTO
FILTRAZIONE
SCARICO FANGHI
ADDOLCIMENTO E CHIARIFICAZIONE SECONDARIA
ALCALINIZZAZIONE
SERBATOIO RACCOLTA FILTRATO
FILTRAZIONE
ACQUA DI MARE
CONDENSATORE VAPORI AMMONIACALI
STRIPPAGGIO
SERBATOIO POLMONE
RECUPERO AMMONIACA
RICIRCOLO
LINEA TRATTAMENTO SPURGHI DESOLFORAZIONE
ACQUE DI SPURGO DISCONTINUE DA IMP. DI DESOLFORAZIONE
ACQUE DI SPURGO DISCONTINUE DA OSMOSI INVERSA
SERBATOI DI ACCUMULO SPURGHI DISCONTINUI
ACQUE DI SPURGO CONTINUE DA IMP. DI DESOLFORAZIONE
DECANTAZIONE
METEORICHE DA AREA MOVIMENT. SOLIDI
DECANTAZIONE
RIPARTIZIONE
NEUTRALIZZAZIONE PRIMARIA
NEUTRALIZZAZIONE SECONDARIA
FLOCCULAZIONE
SERBATOIO ACCUMULO ACQUE RECUPERATE
VASCA DRENAGGI
ACQUE METEORICHE ZONA I.T.S.D.
RIPARTIZIONE
SEDIMENTAZIONE ED ISPESSIMENTO
VASCA ACCUMULO FANGHI PRIMARI
RIPARTIZIONE
COAGULAZIONE
FLOCCULAZIONE E NEUTRALIZZAZIONE
SEPARATORI A PACCHI LAMELLARI
ISPESSIMENTO
FILTRAZIONE
ACCUMULO
VASCA RACCOLTA SPURGHI DESOLFORAZIONE TRATTATI
SCARICO FANGHI
9
C2
RICIRCOLO
CHIARIFICATORE ACCELERATO
SERB. ACCUMULO ACQUA DECALCIFICATA
SERB. ALIMENTO SEC
ACIDIFICAZIONE
DEGASATORE
EVAPORATORE
IDROCICLONE
IMPIANTO DI ADDOLCIMENTO E CRISTALLIZZAZIONE
FILTRAZIONE
SERB. ALIMENTO CRISTALLIZZ.
VAPORE
CRISTALLIZZATORE
RISCALD.
SCARICO SALI
ACQUA MARE
CONDENSATORE
DRENAGGI
VASCA DRENAGGI
SERBATOIO DISTILLATO
SERB. DISTILLATO DESOX
TERMOCOMPRESSORI
ACQUA DOLCE
ACQUA DI MARE
ACQUE RAFFREDDAMENTO MACCHINARI
METEORICHE DAL PARCHEGGIO
ACQUE METEORICHE CHIARE
12A
12B
RAFFREDDAMENTO EVAPORATORI
10
VASCA FINALE
11
ACQUE CHIARE DA OSMOSI INVERSA
h1
5
DRENAGGI ACQUE SUPERFICIALI DA AREE SOVRASTANTI
ACQUE METEORICHE CHIARE
COLLETTORE ACQUE CHIARE (⌀ = 1.800 mm)
COLLETTORE ACQUE CHIARE (⌀ = 2.000 mm)
4
3
ACQUE DI RAFFREDDAMENTO GRUPPI 1-2-3-4
2
1
CONVOGLIAMENTO A MARE
LEGENDA:
LIQUIDI
SOLIDI

APPENDIX D

Fusina Flow Diagram (from permit application)

La combustione di questo tipo di carbone consente alla centrale di Porto Marghera di rispettare il valore limite delle emissioni di SO2 alla ciminiera riportato nella scheda PM_A7_Limiti alle emissioni.

Altresì questo sistema contribuisce al rispetto del valore massico di SO2 stabilito dal DM 19.01.99 per l'intero polo di Fusina – Venezia e dal Protocollo siglato con gli Enti Locali in data 22.06.06 (vedi FS o PM_A6_Autorizzazioni : Protocollo d'intesa).

Desolforazione ad umido (processo calcare – gesso)

La desolforazione ad umido (Wet FGD - Wet Flue Gas Desulphurisation), in particolare il processo calcare gesso, è la tecnologia maggiormente diffusa a livello mondiale; questo è dovuto alla elevata efficienza di abbattimento della SO2 e alla elevata affidabilità ormai raggiunta.

La Figura 9 mostra lo schema di processo del desolforatore calcare / gesso a umido realizzato presso la centrale termoelettrica di Fusina.

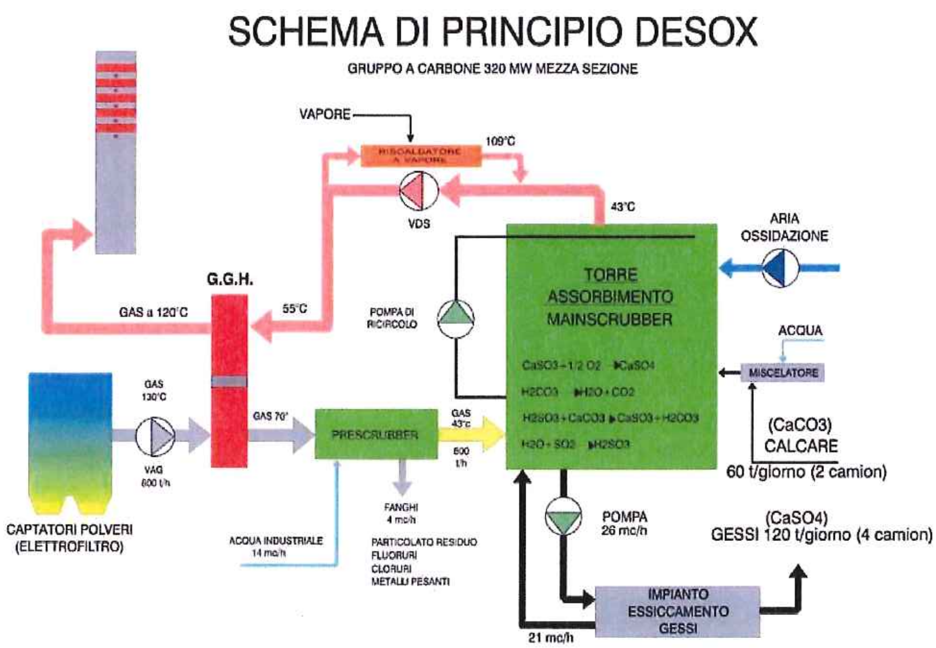


Figura 9

Il reagente utilizzato è il calcare o la "marmettola", mentre il sottoprodotto è il gesso.

Il calcare è ricevuto in polvere e stoccato in due 2 silos della capacità di 3000 m^3 ciascuno, mentre il gesso è stoccato in due silos della capacità di 6500 m^3 ciascuno, nei quali il prodotto arriva dalle aree di filtrazione con un sistema di nastri; allo stesso modo, con un altro sistema di nastri, il gesso dai silos viene inviato in un area allestita per il conferimento a ditte terze per riutilizzo, tramite trasporto su strada o ferrovia.

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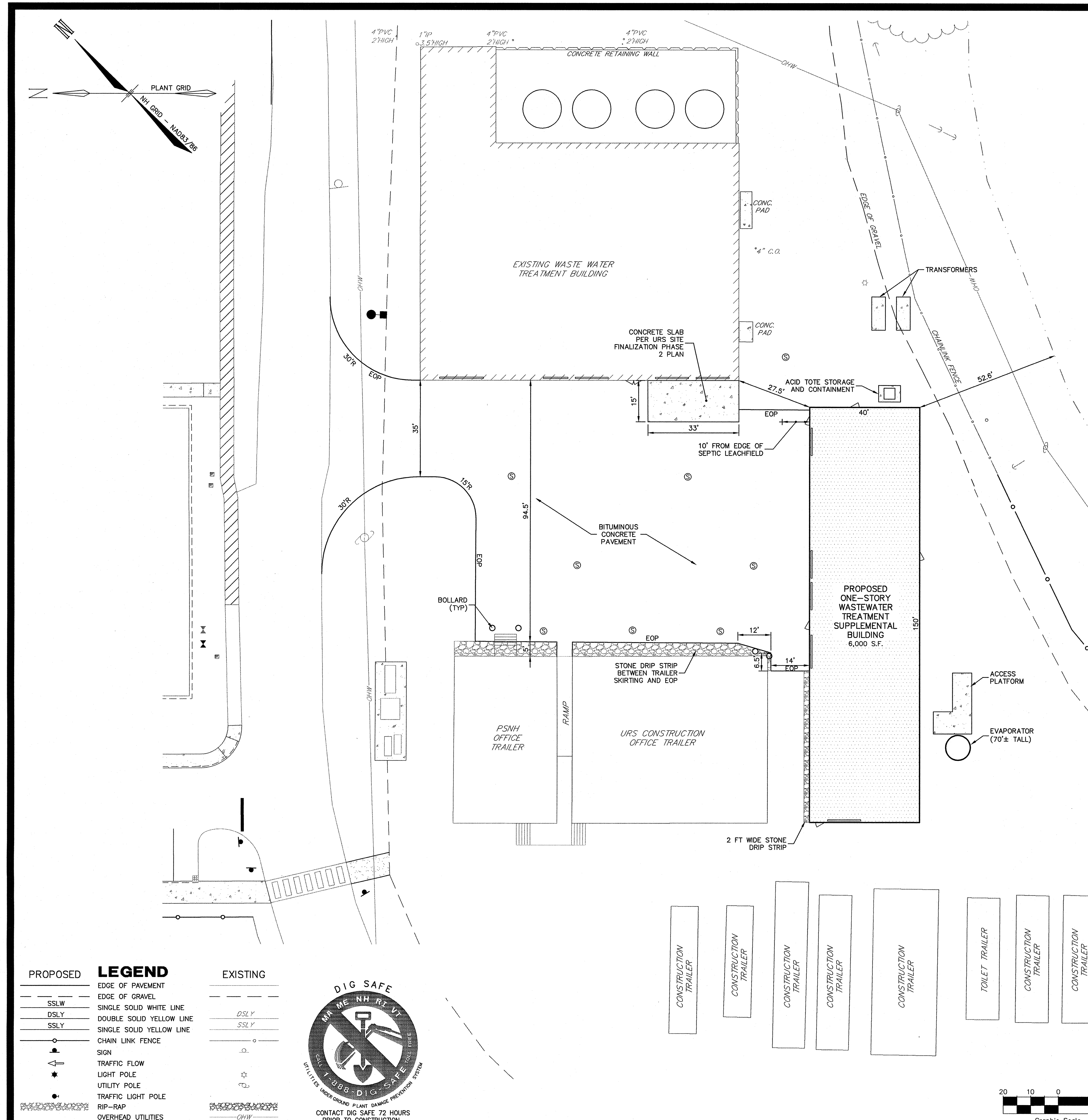
Exhibit 11

Merrimack Station Site Layout Plan (March 2011)



NOTES

1. OWNER OF RECORD OF MAP 41 BLOCK 2 LOT 200: PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, PO BOX 330, MANCHESTER, NH 03105.
   AREA OF LOT 41-2-200 = 10,062,360 S.F.± OR 231 ACRES±

2. THE PURPOSE OF THIS PLAN IS TO SHOW SITE IMPROVEMENTS ASSOCIATED WITH CONSTRUCTION OF A WASTEWATER TREATMENT SUPPLEMENTAL BUILDING.

3. CURRENT ZONING FOR 41-2-200 IS (I-2) INDUSTRIAL 2 ZONING DISTRICT.

	REQUIRED	PROVIDED
MIN. LOT SIZE:	2 ACRES	231 ACRES
MIN. LOT FRONTAGE:	200'	500'+
MIN. BUILDING SETBACKS:		
FRONT	50'	396'
SIDE	30'	500'+
REAR	30'	940'
MAX. BUILDING HEIGHT:	40' (3 STORIES)*	70'
MAX. LOT COVERAGE:	80%	<80%

   *SPECIAL EXCEPTION 6.05 OF BOW ZONING REGULATIONS ALLOWS 100'

4. THE NEW STRUCTURE WILL BE SERVICED BY THE FOLLOWING:

DRAINAGE:	PRIVATE
ELECTRIC:	PSNH
SEPTIC:	PRIVATE
WATER:	PRIVATE

5. THE CONTRACTOR SHALL BID AND PERFORM THE WORK IN ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES, SPECIFICATIONS, REGULATIONS AND STANDARDS.

6. SNOW STORAGE AREAS HAVE BEEN PROVIDED ON THE NORTH SIDE OF THE CONTRACTOR PARKING LOT, EXCESS SNOW SHALL BE TRANSPORTED OFF SITE FOR DISPOSAL IN ACCORDANCE WITH N.H.D.E.S. REGULATIONS.

7. WRITTEN DIMENSIONS HAVE PRECEDENCE OVER SCALED DIMENSIONS. THE CONTRACTOR SHALL USE CAUTION WHEN SCALING REPRODUCED PLANS. IN CASE OF CONFLICT BETWEEN THIS PLAN SET AND ANY OTHER DRAWING AND/OR SPECIFICATION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY FOR CLARIFICATIONS.

8. THE CONTRACTOR IS RESPONSIBLE FOR THE MEANS AND METHODS OF CONSTRUCTION AND FOR CONDITIONS AT THE SITE. THESE PLANS, PREPARED BY TFMORAN, INC., DO NOT EXTEND TO OR INCLUDE SYSTEMS PERTAINING TO THE SAFETY OF THE CONSTRUCTION CONTRACTOR OR THEIR EMPLOYEES, AGENTS OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE SEAL OF THE SURVEYOR OR ENGINEER HEREON DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED INTO THESE PLANS. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS WHICH MAY BE REQUIRED BY THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND/OR LOCAL REGULATIONS.

9. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE HIMSELF WITH THE SITE AND ALL EXISTING CONDITIONS SURROUNDING IT. THE ENGINEER SHALL BE NOTIFIED IF ANY DISCREPANCIES ARE NOTED BETWEEN EXISTING CONDITIONS AND CONDITIONS SHOWN ON THESE PLANS PRIOR TO WORKING IN AFFECTED AREAS.

10. THE CONTRACTOR SHALL MAINTAIN EMERGENCY ACCESS TO ALL AREAS AFFECTED BY HIS WORK AT ALL TIMES.

11. LIGHTING, SIGNAGE, LANDSCAPING, AND SCREENING SHALL MEET THE REQUIREMENTS OF THE TOWN ZONING ORDINANCE AND SITE PLAN REGULATIONS UNLESS OTHERWISE WAIVED BY THE TOWN.

12. SITE WORK SHALL BE CONSTRUCTED FROM A COMPLETE SET OF PLANS, NOT ALL FEATURES ARE DETAILED ON EVERY PLAN. THE ENGINEER IS TO BE NOTIFIED OF ANY CONFLICT WITHIN THIS PLAN SET.

13. ALL WORK IS TO CONFORM TO TOWN OF BOW, DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS.

14. ALL NEW DEVELOPMENT IN THE SITE PLAN SHALL BE SUBJECT TO THE IMPACT FEES IN EFFECT AT THE TIME OF ISSUANCE OF A BUILDING PERMIT.

15. PORTIONS OF THE SUBJECT PROPERTY ARE LOCATED WITHIN A 100-YEAR FLOOD HAZARD AREA AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP FOR COMMUNITY NUMBER 33013 0563E & 0564E, REVISED APRIL 10, 2010.

16. IN THE EVENT OF A CONFLICT BETWEEN PLANS, SPECIFICATIONS, AND DETAILS, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY FOR CLARIFICATION.

17. IF CONDITIONS AT THE SITE ARE DIFFERENT THAN SHOWN ON THE PLANS, THE ENGINEER SHALL BE NOTIFIED PRIOR TO PROCEEDING WITH THE AFFECTED WORK.

18. THESE PLANS WERE PREPARED UNDER THE SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER. TFMORAN INC. ASSUMES NO LIABILITY AS A RESULT OF ANY CHANGES OR NON-CONFORMANCE WITH THESE PLANS EXCEPT UPON THE WRITTEN APPROVAL OF THE ENGINEER OF RECORD.

19. TFMORAN INC. ASSUMES NO LIABILITY FOR WORK PERFORMED WITHOUT AN ACCEPTABLE PROGRAM OF TESTING AND INSPECTION AS APPROVED BY THE ENGINEER OF RECORD.

20. THE LOCATION OF ANY UNDERGROUND UTILITY INFORMATION SHOWN ON THIS PLAN IS APPROXIMATE. TFMORAN INC. MAKES NO CLAIM TO THE ACCURACY OR COMPLETENESS OF UNDERGROUND UTILITIES SHOWN. PRIOR TO ANY EXCAVATION ON SITE THE CONTRACTOR SHALL CONTACT DIG SAFE AT 1-888-DIG-SAFE.

21. ALL FENCING SHALL BE GROUNDED IN ACCORDANCE WITH PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE STANDARDS.

22. THIS PLAN REPRESENTS SHEET 6 OF 12. SHEETS 3 AND 4 ARE TO BE RECORDED AT THE MERRIMACK COUNTY REGISTRY OF DEEDS. ALL OTHER SHEETS ARE ON FILE WITH THE TOWN OF BOW.

23. THE FOLLOWING WAIVERS FROM THE SITE PLAN REVIEW REGULATIONS WERE GRANTED:

A, B	SECTION 5.02.B & 8.02 K – EXISTING CONTOURS
A	SECTION 5.02.E – DESIGNATION OF UNSUITABLE LAND
A, B	SECTION 5.02.J – EXISTING UTILITY LINE RELOCATION UNDERGROUND
A	SECTION 5.02.M – EROSION PLANS
A, B	SECTION 5.02.N – DRAINAGE/GRADING PLAN
B	SECTION 5.02.Q – LANDSCAPING
B	SECTION 5.02.T – MONUMENTS
A, B	SECTION 8.02 – SITE PLAN SCALE NO LESS THAN 1"=100'
A, B	SECTION 8.02.M – LOCATION OF WETLANDS
A, B	SECTION 8.02.O & 8.02.BB.2 – LOT COVERAGE
A, B	SECTION 8.02.P – ACCESS/EGRESS WAYS, STREETS
A, B	SECTION 8.02.Q – MINIMUM PARKING SPACES
B	SECTION 8.02.T – EXISTING & PROPOSED UTILITIES FOR ENTIRE SITE
A, C	BDD SECTION 15.09 B,D,E,F,G – MINIMUM LANDSCAPING AND SCREENING PERFORMANCE STANDARDS
A, C*	BDD SECTION 15.10 A,E,F– EXTERIOR BUILDING FACADE PERFORMANCE STANDARDS
A, B	BDD SECTION 15.12 – MINIMUM PARKING PERFORMANCE REQUIREMENTS

A	WAIVER GRANTED ON OCTOBER 2, 2008
B	WAIVER GRANTED ON FEBRUARY 19, 2009
C	WAIVER GRANTED ON MAY 20, 2010
*	WAIVER GRANTED FOR SECTION 15.10 A,B,D

24. THE FOLLOWING VARIANCES AND SPECIAL EXCEPTIONS WERE GRANTED ON 6/17/08 FROM THE ZONING ORDINANCE ARTICLES FOR A STRUCTURE GREATER THAN 40 FEET:

    CASE #106-08 – SPECIAL EXCEPTION – GYPSUM STORAGE BUILDING 70' 0" IN HEIGHT
    CASE #107-08 – SPECIAL EXCEPTION – WASTE WATER TREATMENT BUILDING 45' 0" IN HEIGHT
    CASE #108-08 – VARIANCE – LIMESTONE STORAGE SILO 160' 0" IN HEIGHT
    CASE #109-08 – VARIANCE – WET SCRUBBER FLUE GAS DESULFURIZATION BUILDING 145'0" IN HEIGHT

25. THE FOLLOWING STATE APPROVALS HAVE BEEN OBTAINED:

    NHDES WETLANDS NO. 2008-02312, APPROVED 12/31/08
    NHDES SEPTIC NO. CA2008094629, APPROVED 9/09/08 AND NO. CA2008095589-A, APPROVED 11/21/08
    NHDES ALTERATION OF TERRAIN NO. WPS-8261, APPROVED 11/13/08, WPS-8356, APPROVED 2/23/09
    NHDES SHORELAND EXEMPTION NO. 2008-2058, APPROVED 10/22/08

PROGRESS PRINT
3/17/11

Graphic Scale: 20 10 0 20

REV.	DATE	DESCRIPTION	DR	CK

TAX MAP 41 BLOCK 2 LOT 200
SITE LAYOUT PLAN
MERRIMACK STATION CLEAN AIR PROJECT
WASTEWATER TREATMENT SUPPLEMENTAL BUILDING
97 RIVER ROAD, BOW, NEW HAMPSHIRE
OWNED BY / PREPARED FOR
PUBLIC SERVICE CO. OF NEW HAMPSHIRE
780 N. COMMERCIAL STREET
MANCHESTER, NH 03101

SCALE: 1"=20' **MARCH 2011**

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