



الجمعية العربية السعودية للبيئة المائية  
Saudi Arabian Water Environment Association

 **SAWEA**



# Technical Problems of Sewage Treatment Plants in Qassim region Buraydah STP 1 ( Cass Study )

**Eng : Ibrahim S Al-Rroqaibah**

*General Manager of water in Qassim region*

**Chemist : Ayad N Al-Dalbahy**

*Director of Central Laboratory*

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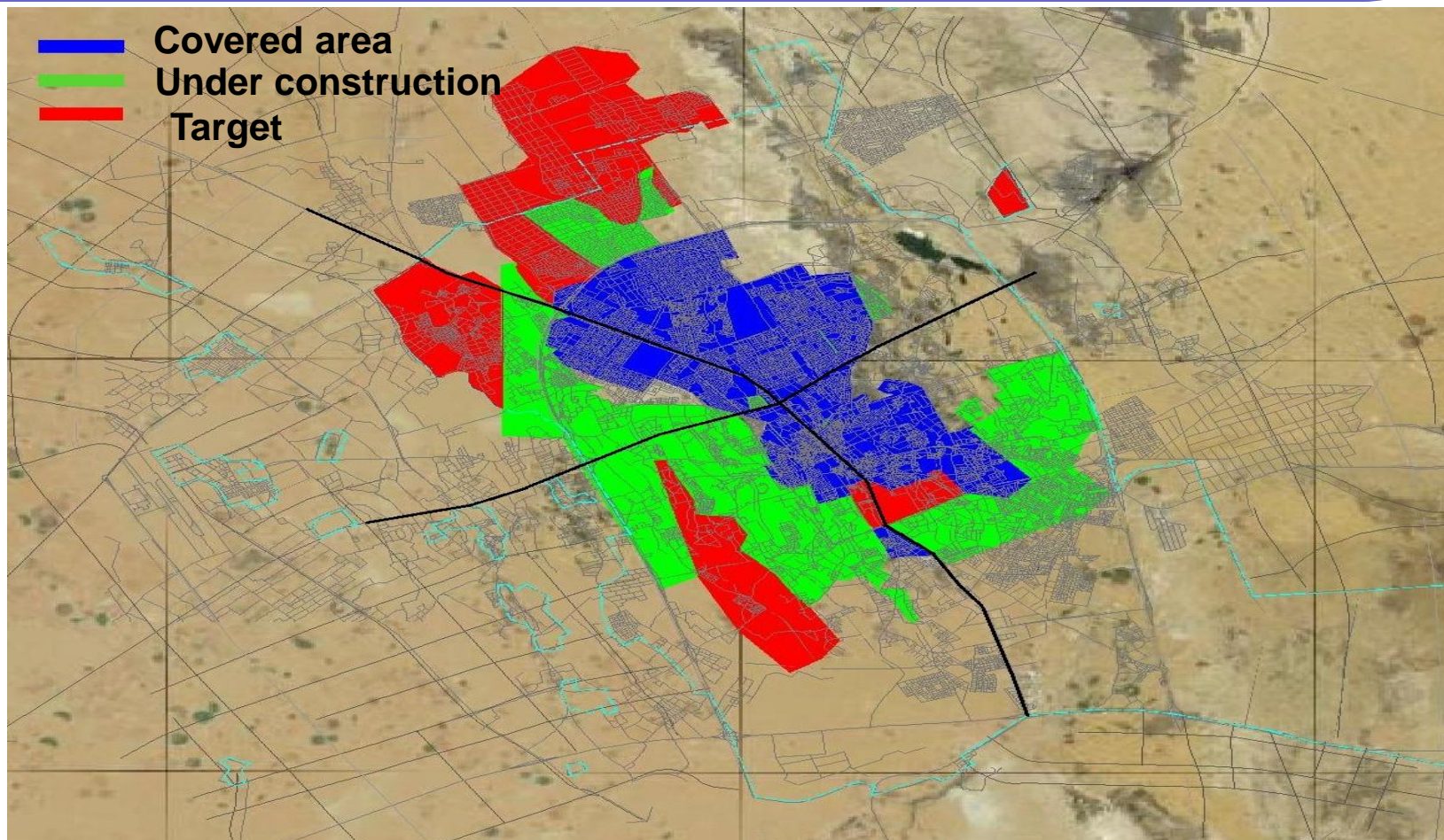
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# *Introduction*



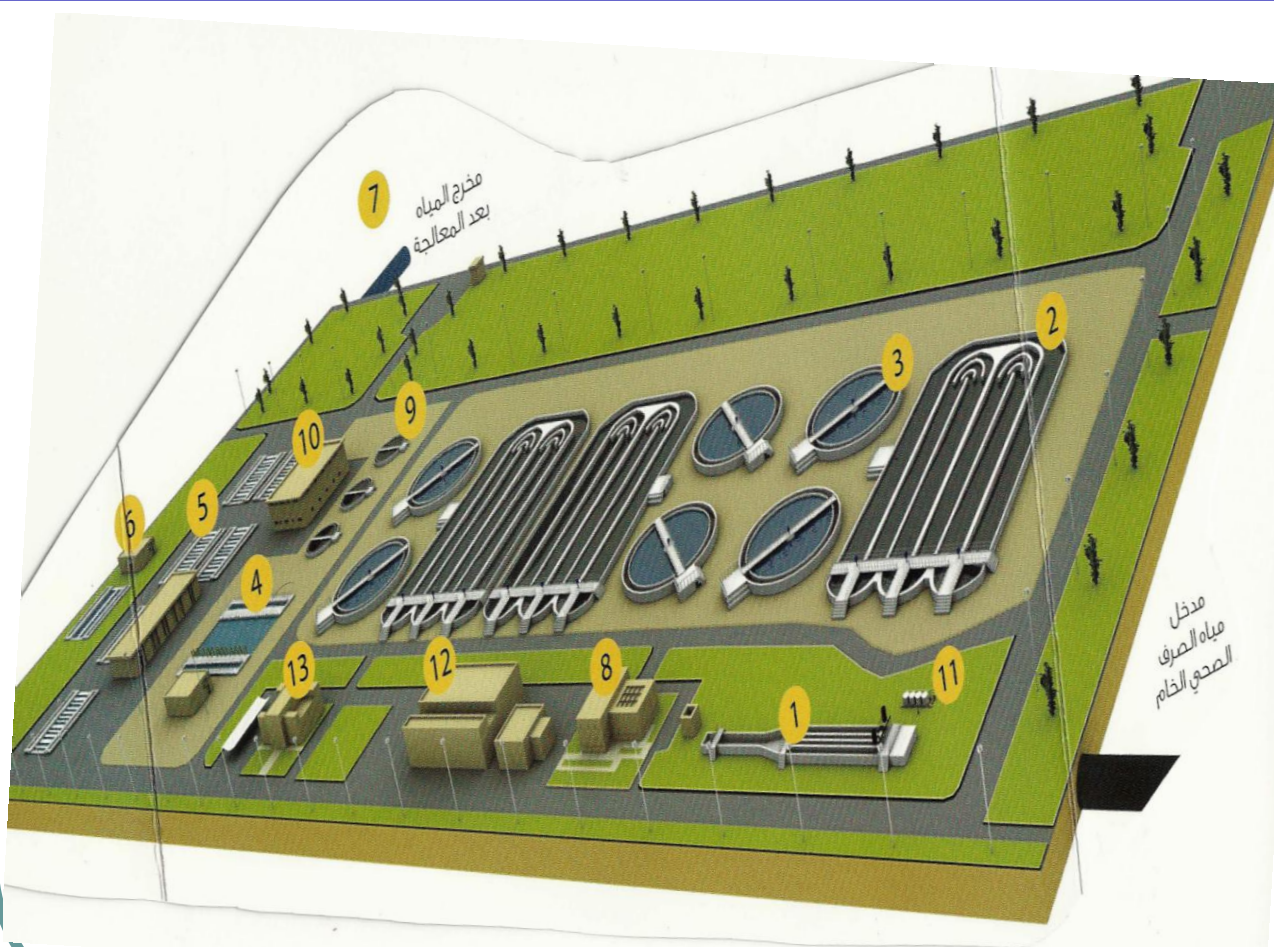
- **The population of Buraydah is (467,410 , according to census 1431 Hijri.**
- **Number of sewer connections (68000) .**
- **Design Capacity of plant is ( 69000 m<sup>3</sup>/d ) .**
- **Operation started on ( Dec. 2002 ).**
- **Plant used carousel system .**

# Sewage networks Coverage in Buraydah City





# Plant Component



- 1 – Mechanical Screen
- 2- Aeration tanks
- 3 - sedimentation tanks
- 4 - sand filters
- 5 - contact chambers
- 6 - water pumping unit
- 7 - water outlet
- 8 - screw pumps
- 9 - condensation tanks
- 10 - sludge piston
- 11 - Deodorant
- 12 - standby generator
- 13 - control unit

# Operational status of plant



- **First:**

operational parameters during flow 69000 m<sup>3</sup> / d  
results as follows:

No.	Standard	Allowable mg/L	Influent mg/L	Effluent mg/L
1	SS	10	160 to 250	3
2	BOD	10	150 to 210	4
3	COD	-----	290 to 420	9
4	N-NH <sub>3</sub>	5	12 to 25	0.3
5	Fecal coliform	2.2 cell / 100 ml	-----	> 1 cell / 100 ml

# Operational status of the station



- **Second:** operational parameters during flow 75000 m<sup>3</sup> / d

No.	Standard	Allowable mg/L	Influent mg/L	Effluent mg/L
1	SS	10	160 to 250	9
2	BOD	10	150 to 210	8
3	COD	-----	290 to 420	21
4	NH <sub>3</sub> -N	5	12 to 25	0.49
5	Fecal coliform	2.2 cell / 100 ml	----	57 <sub>cell</sub> / 100 ml

# Operational status of the plant



- **Third:** operational parameters during flow 78000 m<sup>3</sup> / d

No.	Standard	Allowable mg/L	Influent mg/L	Effluent mg/L
1	SS	10	160 to 250	10
2	BOD	10	150 to 210	10
3	COD	-----	290 to 420	24
4	NH <sub>3</sub> -N	5	12 to 25	5
5	Fecal coliform	2.2 cell / 100 ml	-----	77 <sub>cell</sub> / 100 ml



# Operational status of the plant

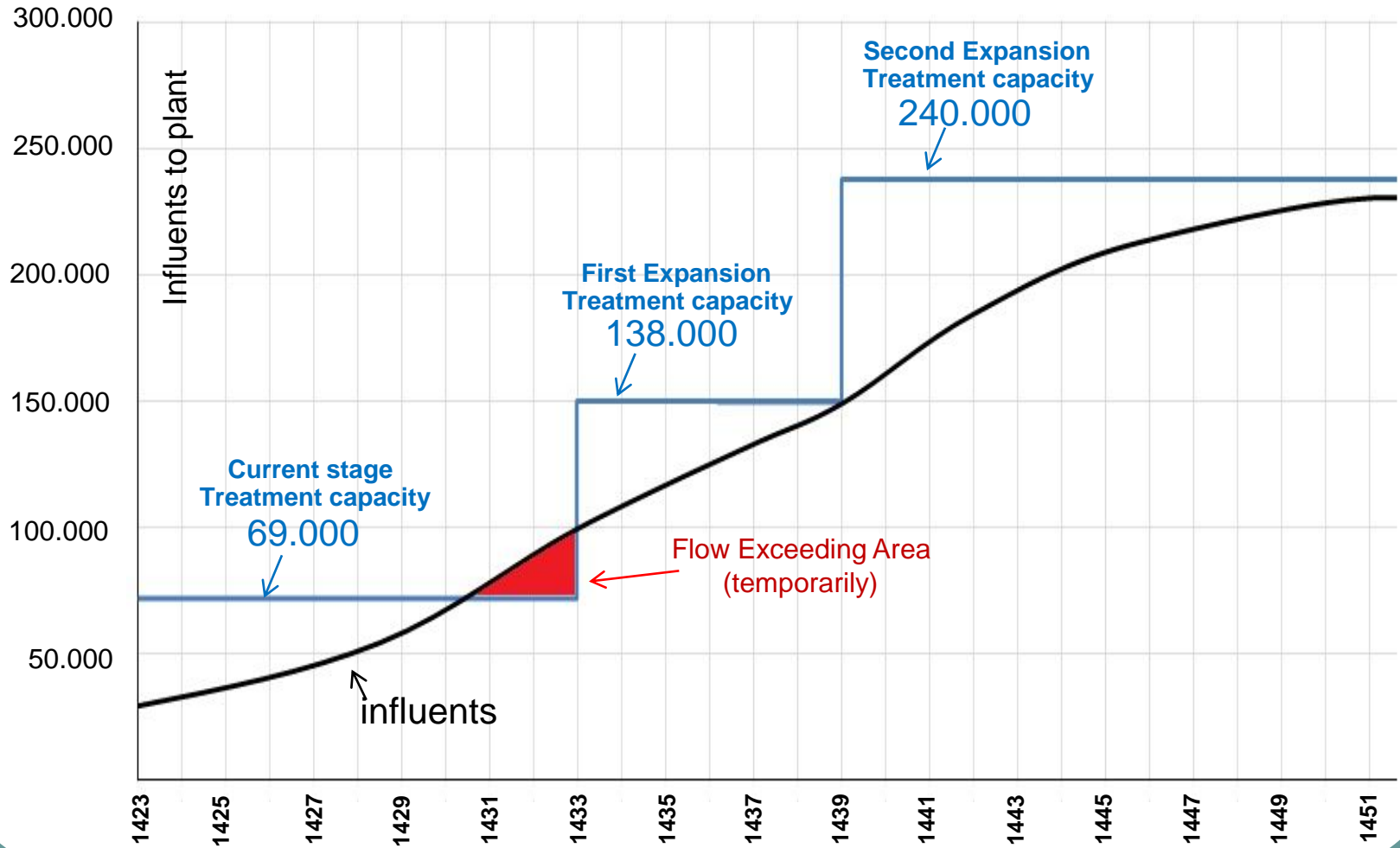


## ● Forth :

operational parameters beyond standard in flow 96000 m<sup>3</sup> / d

No.	Standard	Allowable mg/L	Influent mg/L	Effluent mg/L
1	SS	10	160 to 250	18
2	BOD	10	150 to 210	12
3	COD	-----	290 to 420	44
4	NH <sub>3</sub> -N	5	12 to 25	5.5
5	Fecal coliform	2.2 cell / 100 ml	-----	394 cell / 100 ml

# Influents with treatment ability





**Increasing of influent over design capacity reaching **100,000 m<sup>3</sup>/ day** cause the following problems :**

# Problems :



**First: lack of treatment cause :**

**A- Increasing concentrations of sludge in the aeration tank led to a rise in MLSS (mixed liquor suspended solids)**

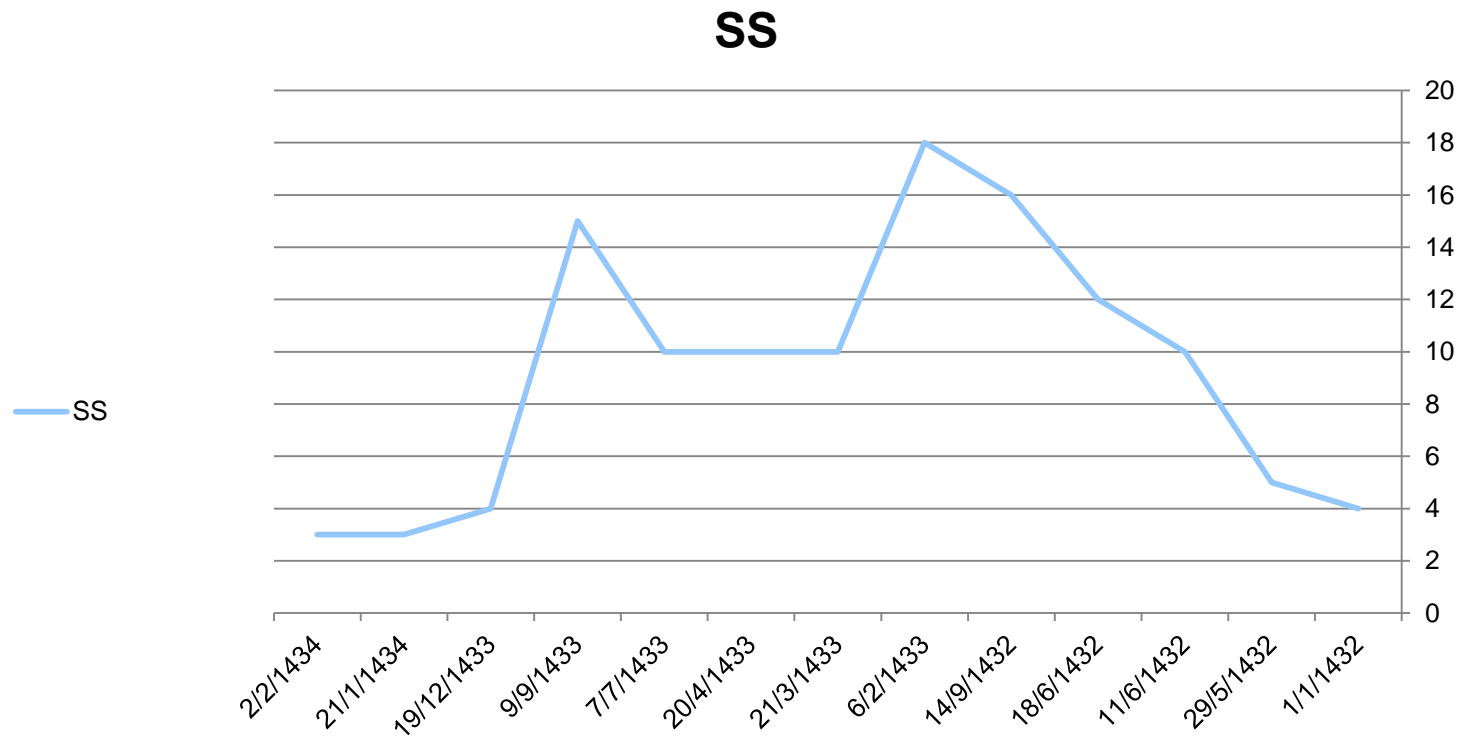
This negative impact occurs on the supply of oxygen to oxidize

	Test	Operational Standard	Result mg/l	
			Before Problem	During the Problem
1	MLSS	3000 - 6000	3100	21500

# Problems :



## b- Increasing Suspended Solids (SS)

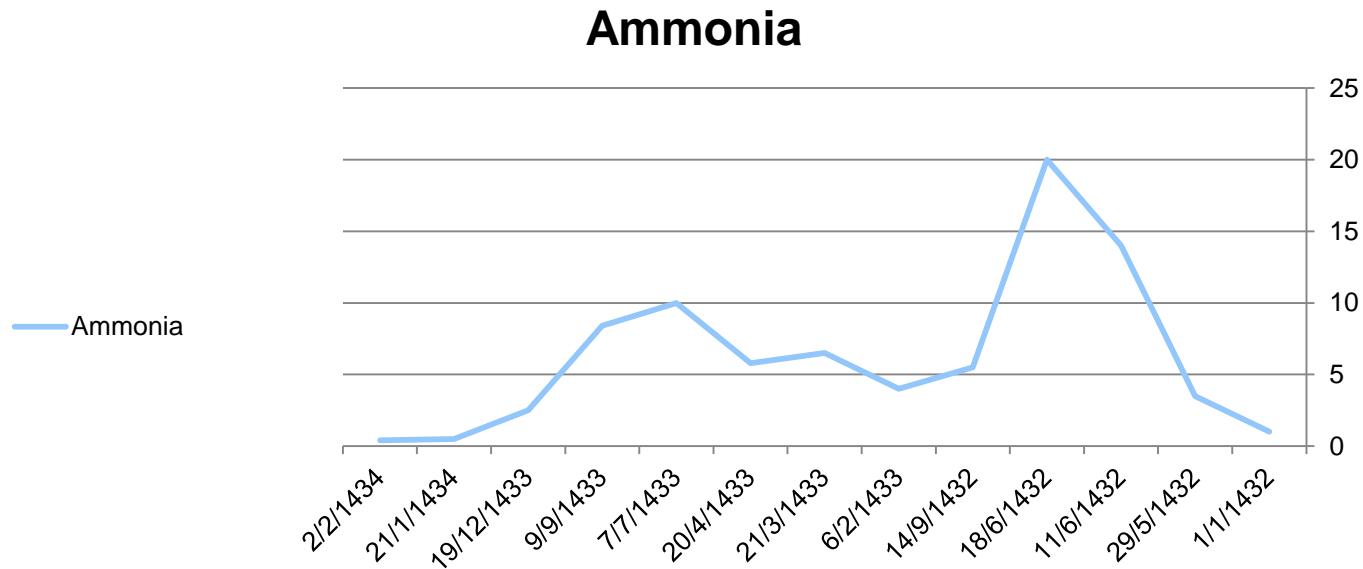




# Problems :



**C- High concentrations of ammonia  $\text{NH}_3$  in effluents of aeration tanks, it is gives an indication of incomplete oxidation of nitrogen**



# *Problems :*



***d- Increased growth of bacterial colonies***

# Analysis Result :



المملكة العربية السعودية  
وزارة المياه والكهرباء  
المديرية العامة للمياه بمنطقة القصيم  
الإدارة العامة لتشغيل والصيانة  
إدارة المواد والمختبر المركزي

نتيجة تحليل عينة مياه صرف صحي

تاريخ العينة : ١٤٣٢/٠٩/١٤ هـ

رقم العينة : ٣٢٠١٣٠٠٥

الجهة المرسله: المختبر المركزي

مكان العينة : محطة المعالجة الأولى داخل/ خارج

الخارج	الداخل	الاختبارات
7.31	7.30	pH الأس الهيدروجيني
5.5	9.5	PO <sub>4</sub> mg / L الفوسفات
1565	1800	T . S. mg / L المواد الصلبة الكلية
16	325	S . S. mg / L المواد الصلبة العالقة
0.46	-	Free Cl <sub>2</sub> mg / L الكلور الحر
6.4	206	BOD <sub>5</sub> mg / L متطلب الأكسجين الحيوي
44	559	COD mg / L متطلب الأكسجين الكيميائي
5.5	30	NH <sub>3</sub> -N mg / L الأمونيا
<1	829.7×10 <sup>5</sup>	TCF - (MPN / 100 ml) العد الكلي لبكتريا القولون
<1	313×10 <sup>5</sup>	FCF-(MPN/100 mL) العد الكلي لبكتريا القولون البرازية

النتيجة :

١- ارتفاع المواد الصلبة العالقة عن الحد المسموح به.

٢- ارتفاع الأمونيا عن الحد المسموح به.

مدير إدارة المختبر المركزي

عبد بن نوار الدلحي



إشراف الكيميائي

عادل العباد

هذا التقرير يخص هذه العينة فقط، ويستعمل من الجهة الطالبة مع عدم قبول الصورة غير المصدقة

# Problems :



## Second: H<sub>2</sub>S and VOC odours

	Sites	8 Am	11 Am	2 Pm	6 Pm	9 Pm	12 Am	2 Am	6 Am
1	Mechanical screen mg/l	4.6	3.5	4.7	3.3	4.3	2.4	4.3	3.9
2	Sludge building mg / l	11.8	7.1	8.5	10.9	9.6	9.4	6.4	7
3	Tracking Area mg /l	0.9	0.00	1.2	1.1	0.00	1.3	0.9	0.4

# *Problems :*



**Third : Inability to discharge the whole quantity through pumping system .**







# **Solutions**

## *Temporary Solutions :*



### **First:**

**Remove sludge from aeration tanks by tankers to the landfill.**

## *Temporary solutions :*



### **The second solution: to reduce odour :**

- Cover inlets area .
- Install carbon filters on sludge building .
- Install a spray system of odour retardant materials next to sludge building .
- Install barriers and covers in tracking area .

# *Temporary solutions :*



## *Temporary solutions :*



- Third: Installed an additional chlorine dosage unit using calcium hypochlorite









## ***First:***

**Start operate the expansion on July 2012 ( 138,000 m<sup>3</sup>/d ).**

# *Plant expansion project (second stage)*



# *Expansion Project*

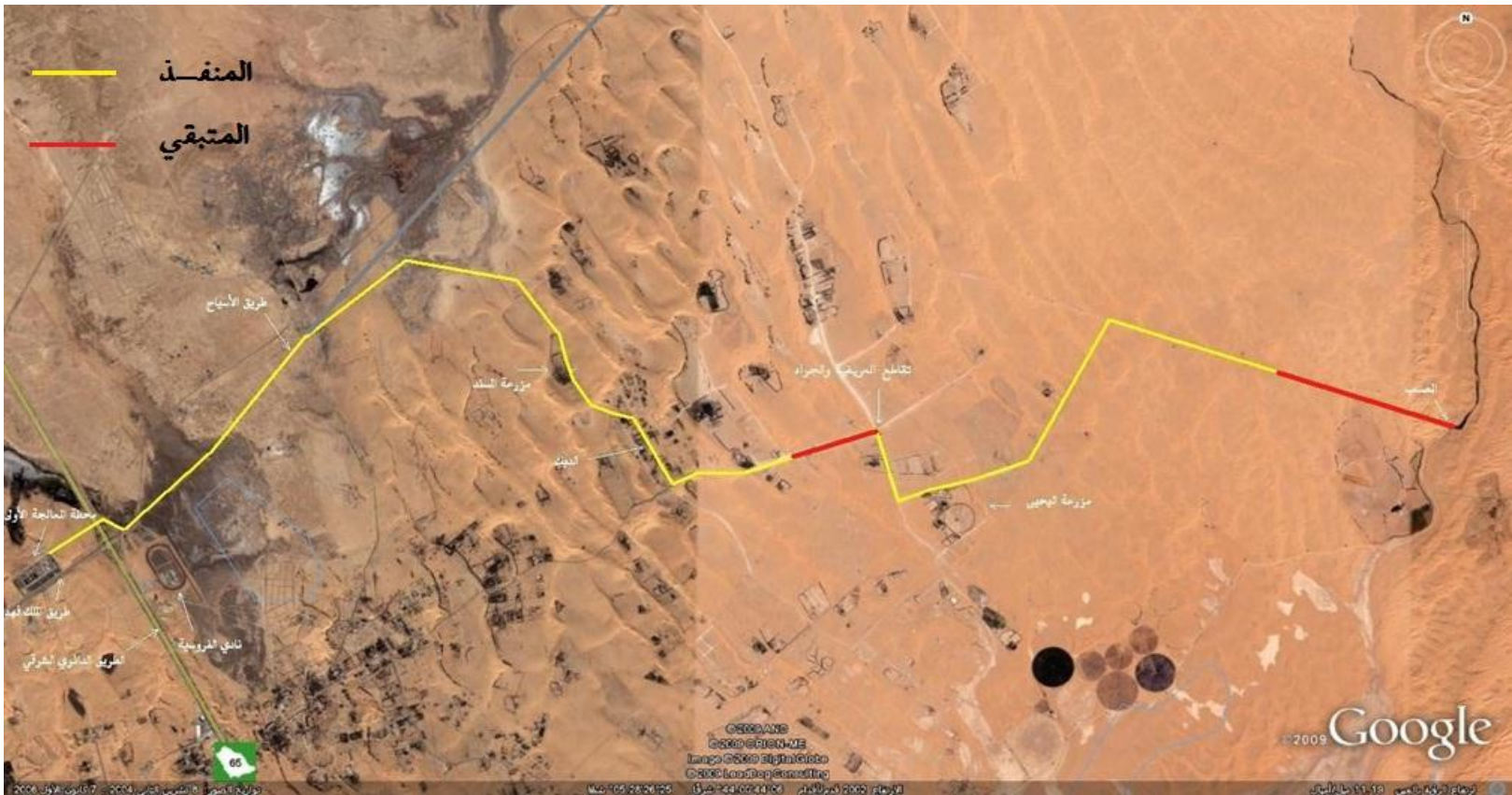




# Permanent Solutions :



## Second: operating a new pumping line





## *Permanent Solutions :*



***Third :***

**Operating emergency lagoon ( total capacity 1.000.000 m<sup>3</sup> ).**

# *emergency lagoon*



## *Permanent Solutions :*



### ***Fourth:***

**Sign a contract to construct a complete odours' control system .**

*Picture simulates odour control project*



## Current operational status :



### Stability in all operational parameter ( flow 105.000 m<sup>3</sup> / d )

No.	Standard	Allowable mg/L	Influent mg/L	Effluent mg/L
1	SS	10	160 to 250	3
2	BOD	10	150 to 210	3
3	COD	-----	290 to 420	8
4	NH <sub>3</sub> -N	5	12 to 25	0.04
5	Fecal coliform	2.2 cell / 100 ml	-----	Less than 1 cell / 100 ml



**Thank you for your kind listening**

