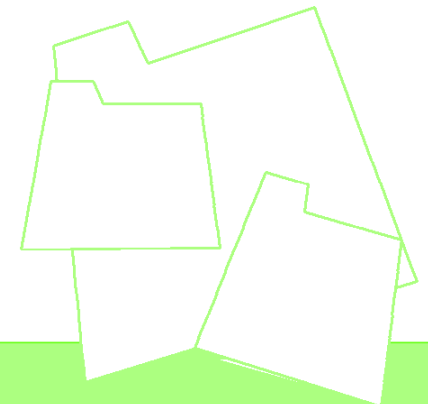


Skript basiertes geoprozessieren

am Beispiel einer

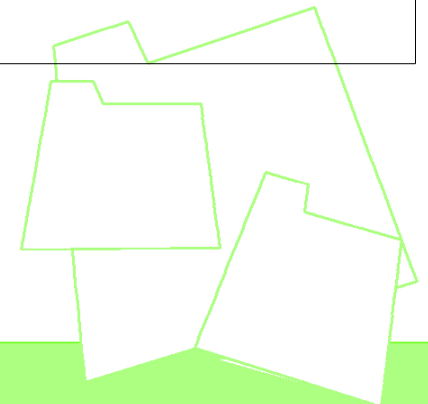
Flächenermittlung von Grundwasserverunreinigungen aus
Punktquellen

mit einem Datenbankmanagementsystem
(PostgreSQL/PostGIS)



Summe aus Einzelflächen ermitteln

		Fahnenkartierungen
+		Altlastflächen
+		Flächenbildung aus einzelnen Messstellen
Σ		Gesamtfläche



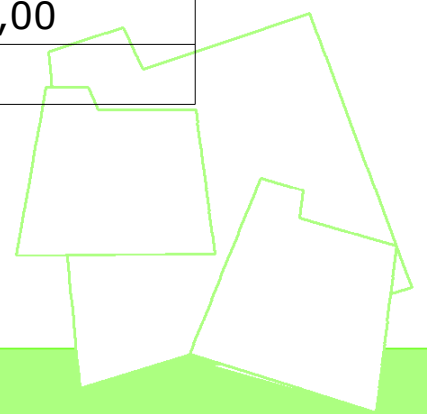
Datenstruktur und Vorlagen:

Liste mit ca. 900.000 Datensätzen (Analysen)

BNR	Prodat	lfd. Nr.	Labor	Stoffgruppe	Stoffkürzel	Wert	Merkmal	Anzahl Nachkommastellen
DD01	16.08.2000	0	51	4	PER	0,40		1
DD01	16.08.2000	0	51	4	TETRACLME	0,10	<	1
...

Liste mit ca. 9.000 Datensätzen (Raumdaten)

BNR	KOR	KOH
00036	2556732,00	5679287,00
100218	2552887,00	5680343,00
...



Geometrie "Simple Features for SQL" erzeugen

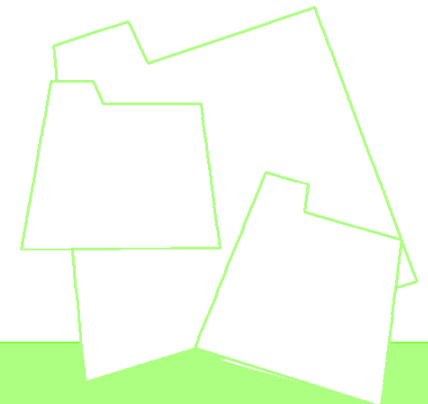
```
UPDATE messstellen SET the_geom = SetSRID(ST_MakePoint(x, y), 31466);
```

Lage auf der Referenzfläche untersuchen

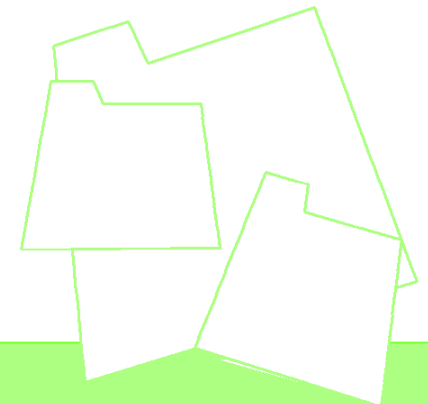
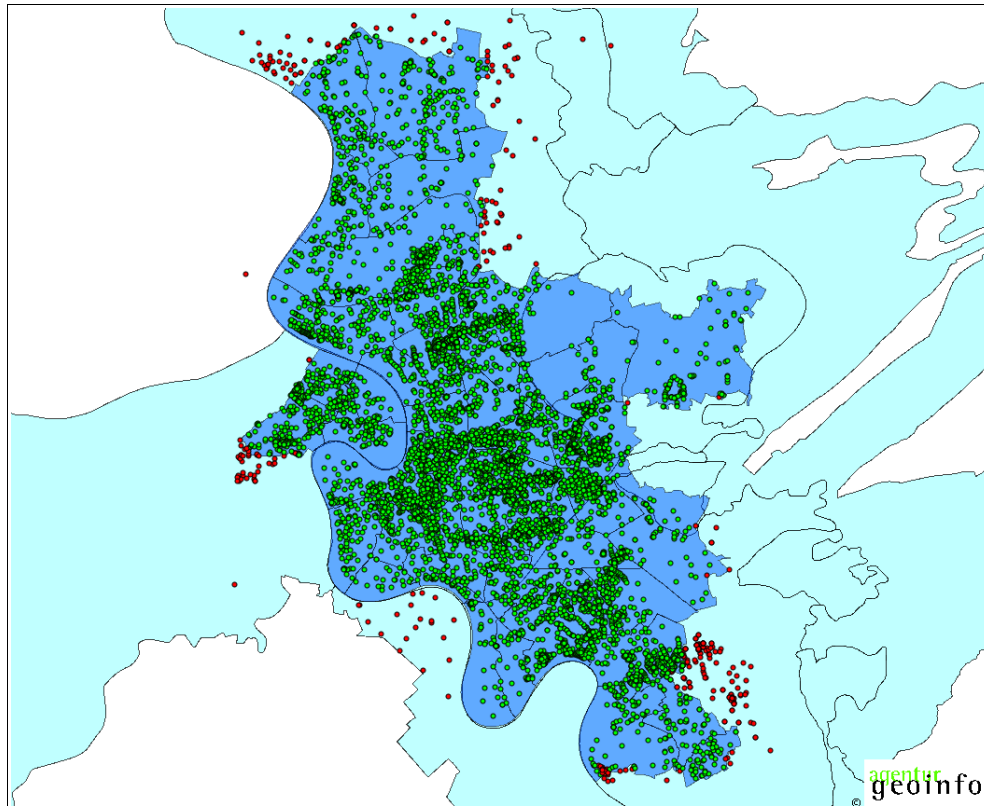
```
UPDATE messstellen c SET in_dssd = TRUE WHERE  
  (SELECT ST_Within(a.the_geom, ST_Union(b.the_geom))  
   FROM messstellen a, die_stadt b  
   GROUP BY a.gid, a.the_geom  
   HAVING c.gid = a.gid );
```

Bezug zum Grundwasserkörper bestimmen

```
UPDATE messstellen b SET tkoerper =  
  (SELECT tkoerper FROM gwkoerper a WHERE  
   (SELECT ST_Within(b.the_geom, a.the_geom))  
   AND a.tkoerper = 'der_eine')  
WHERE b.tkoerper IS NULL;
```



gid	bnr	X	Y	in_dssd	tkoerper
97	DU108	2549610	5689758	f	27_10
2768	100546	2552658.92	5678722.62	t	27_18
...

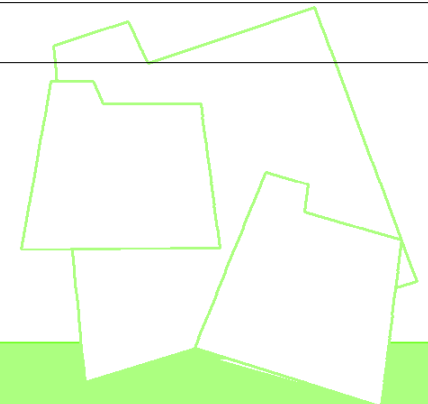


27. August 2008

< harald.schwenk@agentur-geoinfo.de >

Grundwasseranalysen gruppieren

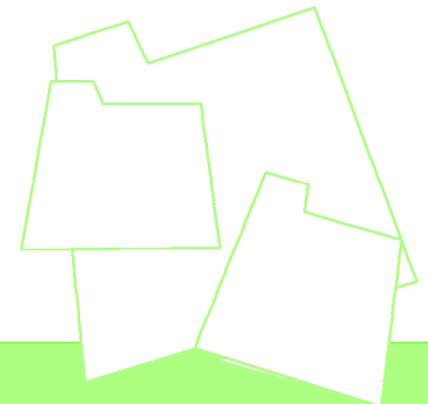
Fortlaufende Nr.	Neue Stoffkürzel	aufsummierende Stoffe
1	Summe PAK	PAK1, PAK2, PAK3, PAK4, PAK5, PAK6, PAK8, PAK9, PAK10, PAK11, PAK12, PAK13, PAK14, PAK15, PAK16, PAK17, PAK18, PAK19, PAK20, PAK21, PAK22, PAK23, PAK24, PAK25
2	Summe Naphthaline	PAK7, PAK7A, PAK7B, PAK7C, PAK7D
3	Summe BTX	BENZ, TOL, XYL, EB, CUMOL, STYR, ETOL, HEM, MES, MPTOL, MPXYL, OETOL, OXYL, PSEUDOC, STYR
4	Summe LHKW	BROMDICHLOR, CISDI, CLDIM, DIBROMCHLOR, DIBROME, DICLE11, DICLE12, DICLM, DICLME, DI11, FRIGEN 11, FRIGEN 113, MONOETHAN, PCE, TCLE1112, TCLE1122, TETRACLME, TRANSDI, TRIBROM, TRICLE111, TRICLE112, TRICLFLE112, TRICLME, TRICLP, TRIFL112, VC, TRI, PER, VC
...



```

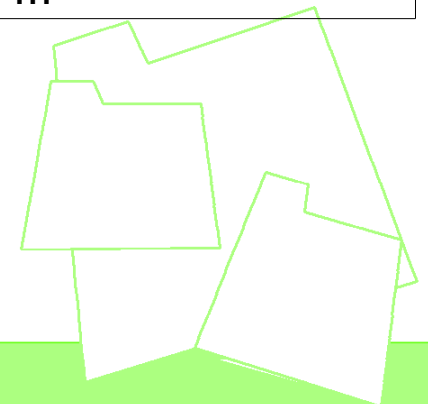
CREATE OR REPLACE VIEW sum_lhkw AS
  SELECT bnr, prodat::date, lfd_nr, labor, stoffgruppe, 'sum_LHKW'::varchar AS stoffkuerzel,
         sum((wert)::numeric)::varchar AS wert,
         (max(anzahl_nachkomma)::int2)::varchar AS anzahl_nachkomma
    FROM analy_00_07_step1
       WHERE (stoffkuerzel = 'BROMDICHLOR'
              OR stoffkuerzel = 'CISDI'
              OR stoffkuerzel = 'CLDIM'
              OR ...
              OR stoffkuerzel = 'VC')
          AND bnr = bnr
          AND prodat = prodat
          AND lfd_nr = lfd_nr
          AND labor = labor
          AND stoffgruppe = stoffgruppe
 GROUP BY stoffgruppe, labor, lfd_nr, prodat, bnr
 ORDER BY bnr, prodat, lfd_nr, labor
;

```



Analysen mit Geringfügigkeitsschwellenwert verknüpfen Maximalwert je Messstelle und Stoff separieren

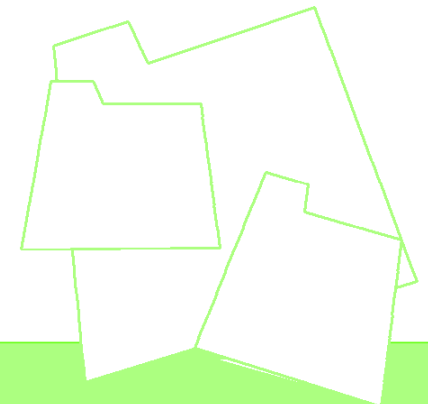
Fortlaufende Nr.	Stoffkürzel	GFS
1	sum_pak	0,2
2	sum_naphthaline	1
3	sum_btx	20
4	sum_lhkw	20
...
31	VC	0,5
32	MTBE	15
33	PESTALL	0,5
...



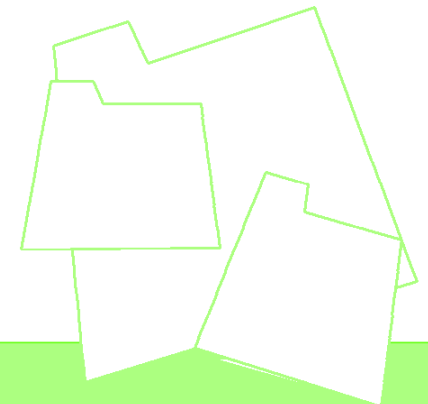
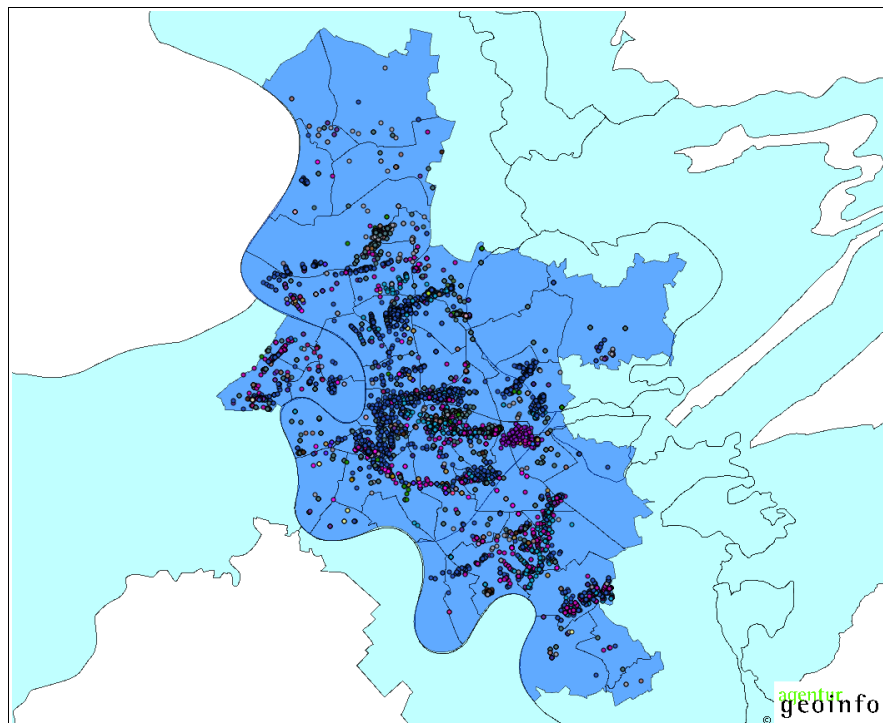

```

INSERT INTO die_tabelle (bnr, prodat, lfd_nr, labor, stoffgruppe, stoffkuerzel, wert, gid, the_geom)
  (SELECT a.bnr, a.prodat, a.lfd_nr, a.labor, a.stoffgruppe, a.stoffkuerzel,
    a.wert, c.gid, c.the_geom
  FROM analy_00_07_step1 a JOIN messstelle c ON a.bnr = c.bnr, analy_00_07_step1 b
  WHERE a.bnr = b.bnr AND a.stoffgruppe = b.stoffgruppe
    AND a.stoffkuerzel = b.stoffkuerzel
    AND ((a.stoffkuerzel = 'AS' AND a.wert::numeric >= 10)
    OR (a.stoffkuerzel = 'PB' AND a.wert::numeric >= 7)
    OR (a.stoffkuerzel = 'CD' AND a.wert::numeric >= 0.5)
    OR (a.stoffkuerzel = 'CR' AND a.wert::numeric >= 7)
    OR ...
    OR (a.stoffkuerzel = 'SPEST9' AND a.wert::numeric >= 0.07))
  GROUP BY a.bnr, a.wert, a.lfd_nr, a.prodat, a.labor, a.stoffgruppe,
    a.stoffkuerzel, c.gid, c.the_geom
  HAVING a.wert::numeric = max(b.wert::numeric)
  ORDER BY a.bnr)
AS foo
;

```



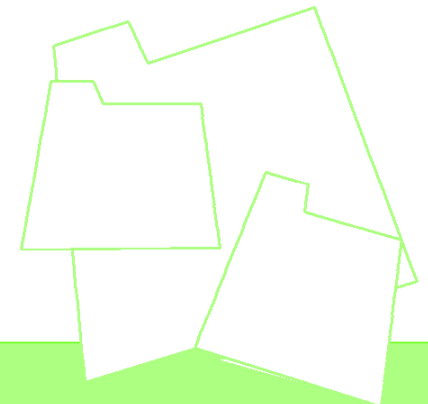
bnr	prodat	lfd_nr	labor	stoffgruppe	stoffkuerzel	wert	tkoerper
DU606	24.11.2000	0	51	1	SO4	250	27_10
DU606	23.05.2000	0	57	1	PAK12	0,01	27_10
...



ausfiltern der Messstellen innerhalb von GW-Fahnen und Altlastflächen

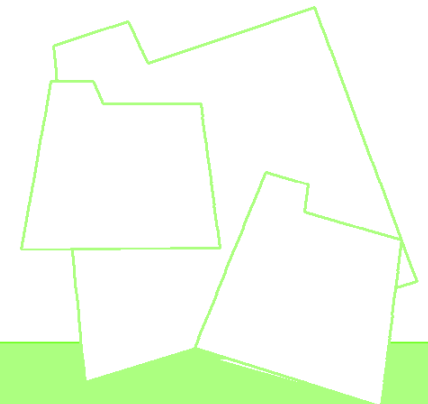
```
DELETE FROM stoffe_typ_a c WHERE
  (SELECT ST_Within(a.the_geom, ST_Union(ST_Buffer(b.the_geom, 30, 15))) FROM
    stoffe_typ_a a, gw_fahnen b
  GROUP BY a.gid, a.the_geom
  HAVING c.gid = a.gid);
DELETE FROM stoffe_typ_b c WHERE
  (SELECT ST_Within(a.the_geom, ST_Union(ST_Buffer(b.the_geom, 30, 15))) FROM
    stoffe_typ_b a, gw_fahnen b
  GROUP BY a.gid, a.the_geom
  HAVING c.gid = a.gid);
DELETE FROM stoffe_typ_c c WHERE
  (SELECT ST_Within(a.the_geom, ST_Union(ST_Buffer(b.the_geom, 30, 15))) FROM
    stoffe_typ_c a, gw_fahnen b
  GROUP BY a.gid, a.the_geom
  HAVING c.gid = a.gid);
```

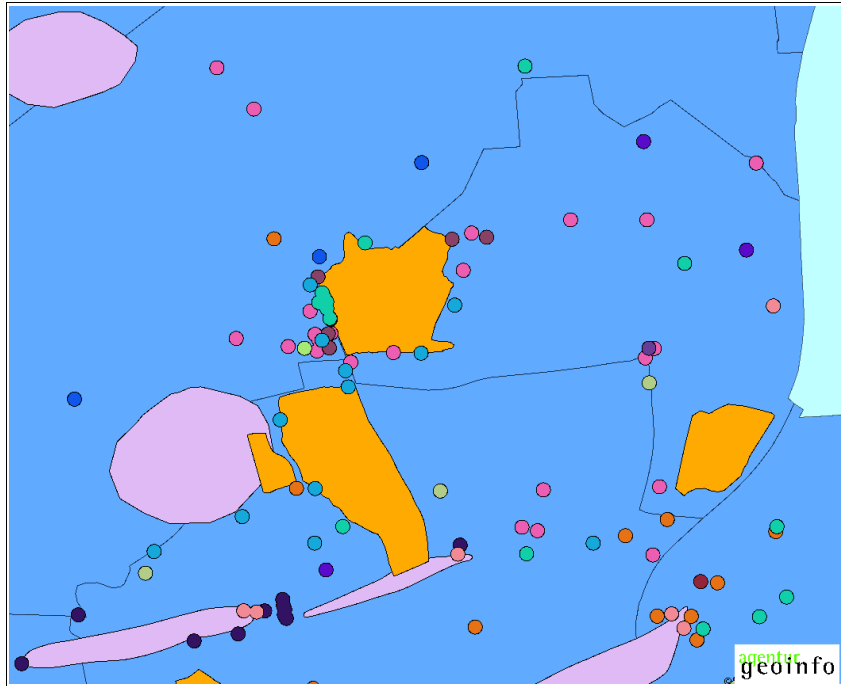
...



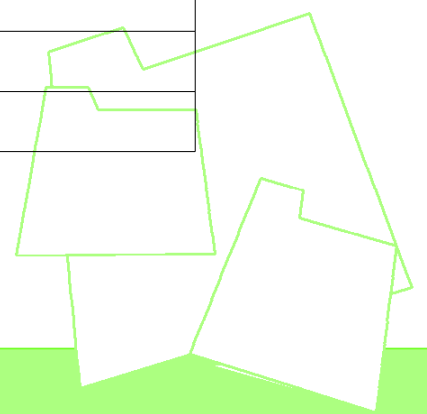
pauschale Flächenbildung auf den Messstellen

```
INSERT INTO die_box (stoffgruppe, stoffkuerzel, the_geom)
  (SELECT stoffgruppe, stoffkuerzel, ST_Multi(ST_Union(ST_Buffer(the_geom, 30, 15))) FROM
    stoffe_typ_a
  GROUP BY stoffgruppe, stoffkuerzel);
INSERT INTO die_box (stoffgruppe, stoffkuerzel, the_geom)
  (SELECT stoffgruppe, stoffkuerzel, ST_Union(ST_Buffer(the_geom, 30, 15)) FROM
    stoffe_typ_b
  WHERE stoffkuerzel = 'AS'
  GROUP BY stoffgruppe, stoffkuerzel);
INSERT INTO die_box (stoffgruppe, stoffkuerzel, the_geom)
  ...
```



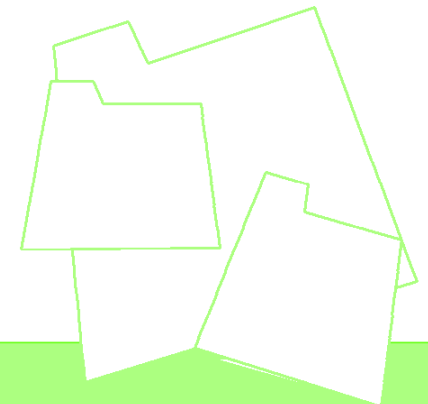


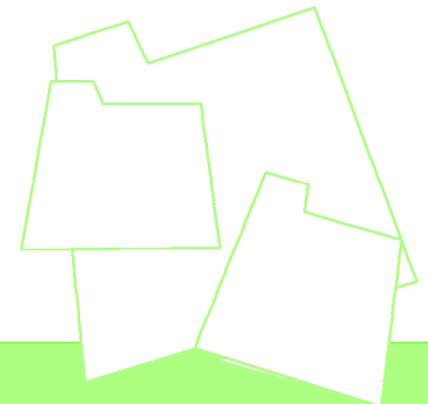
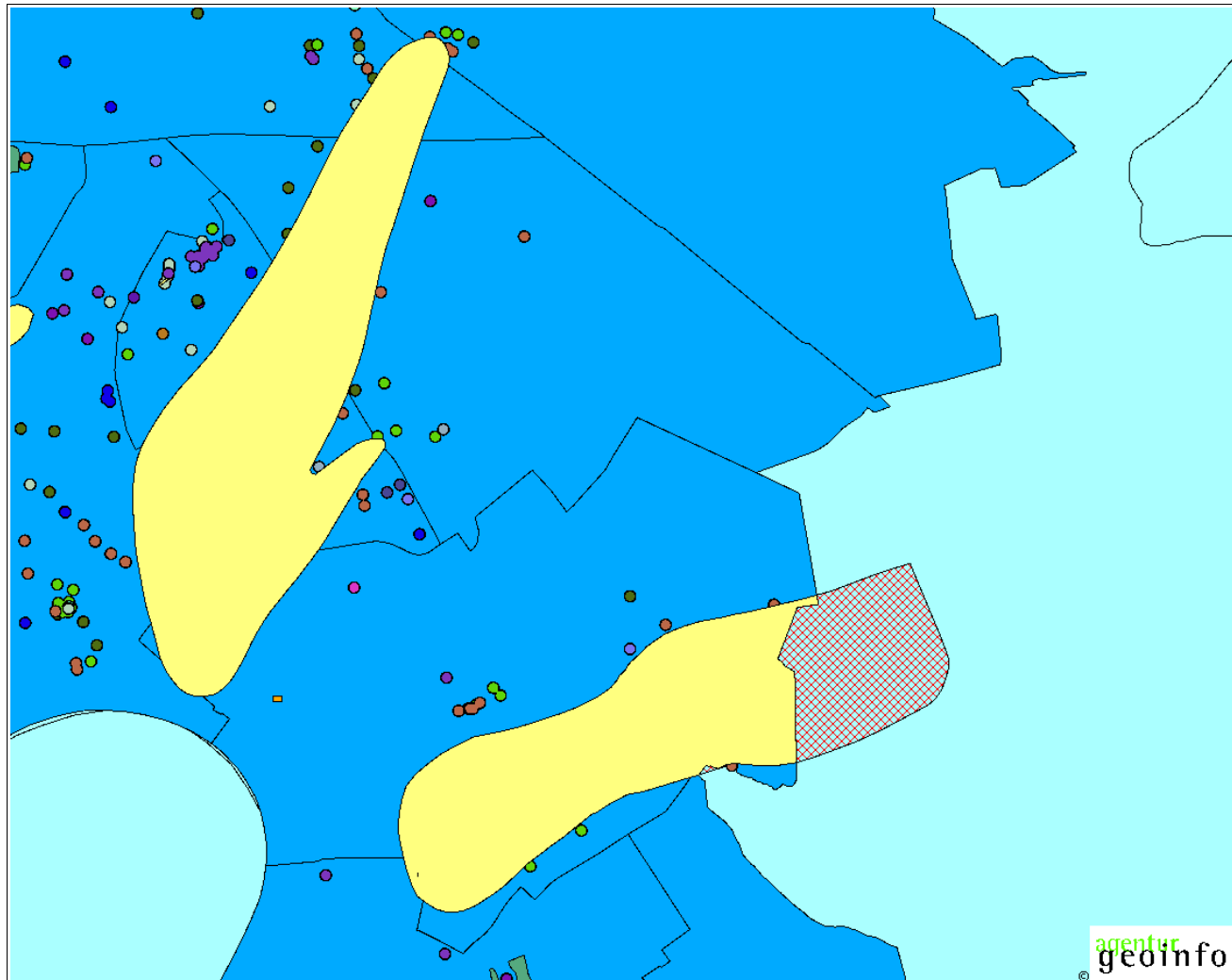
GID	stoffgruppe	stoffkuerzel
1	6	PAK6
2	0	alle_as
...



Flächenüberhang abschneiden

```
UPDATE die_box SET the_geom =  
  (SELECT ST_Multi(ST_Intersection(ST_Union(a.the_geom), ST_Union(b.the_geom)))  
    FROM stadtteile a, gw_fahnen b  
   GROUP BY b.the_geom  
  )  
;
```





Aggregat über die Flächen bilden

Messstellen

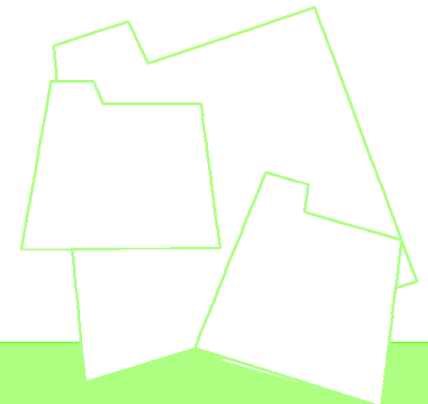
```
INSERT INTO die_box (stoffgruppe, stoffkuerzel, the_geom)
VALUES ('0', 'alle_BNR_Wolken',
        (SELECT ST_Union(the_geom) FROM die_box WHERE stoffgruppe::int > 0));
```

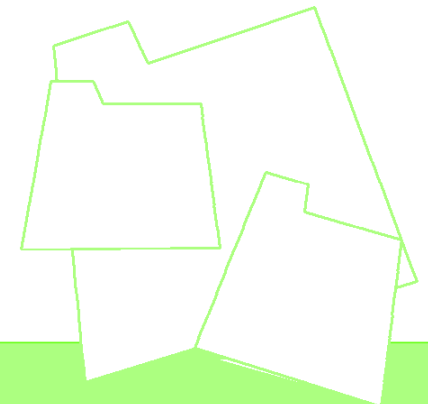
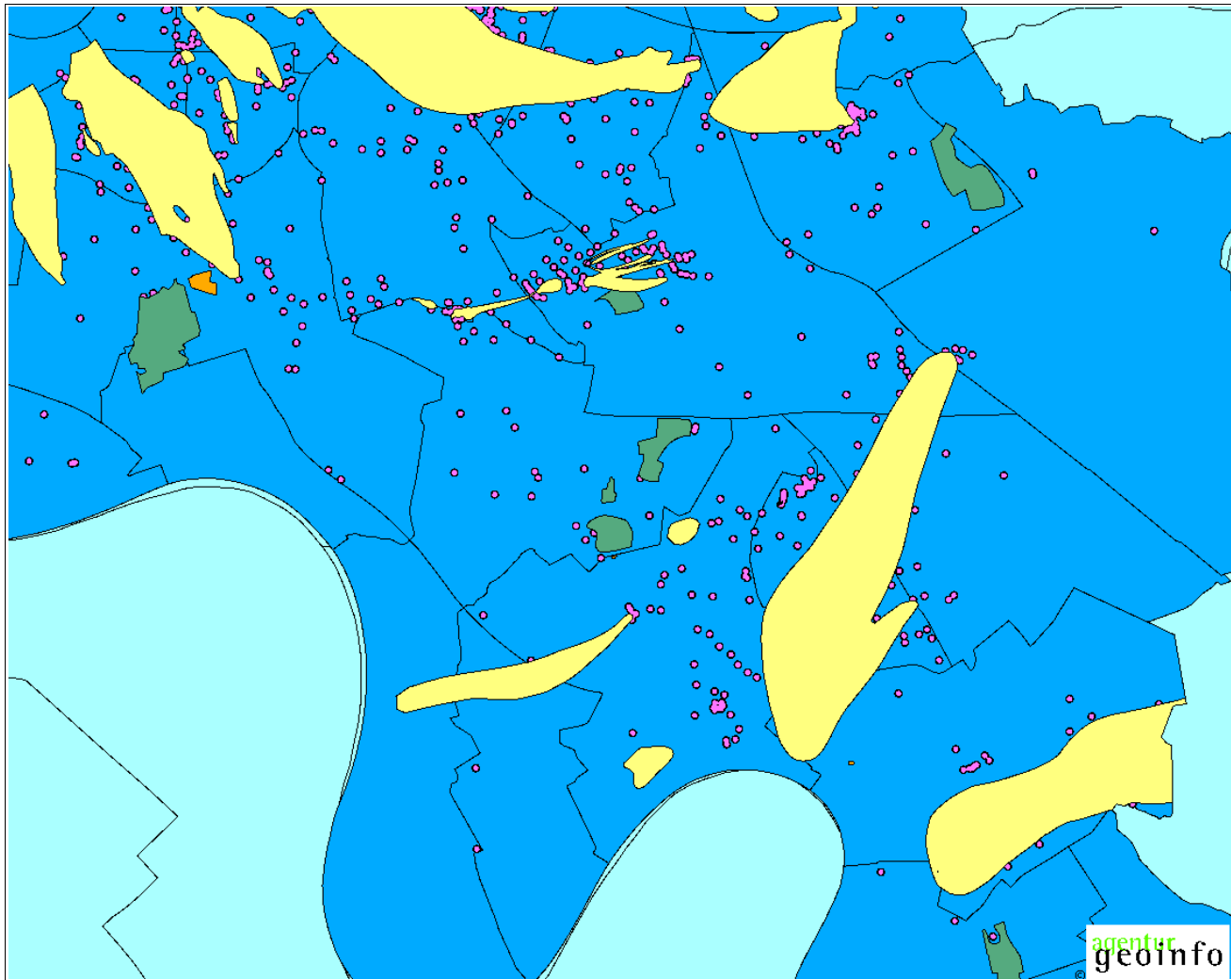
GW-Fahnen

```
INSERT INTO die_box (stoffgruppe, stoffkuerzel, the_geom)
VALUES ('0', 'alle_Fahnen',
        (SELECT ST_Union(the_geom) FROM gw_fahnen));
```

Altlastflächen

```
INSERT INTO die_box (stoffgruppe, stoffkuerzel, the_geom)
VALUES ('0', 'alle_as',
        (SELECT ST_Union(the_geom) FROM as_altlasten));
```



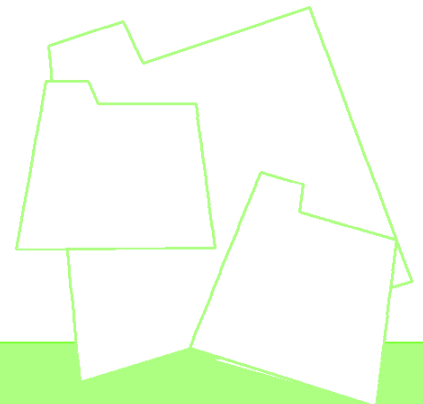


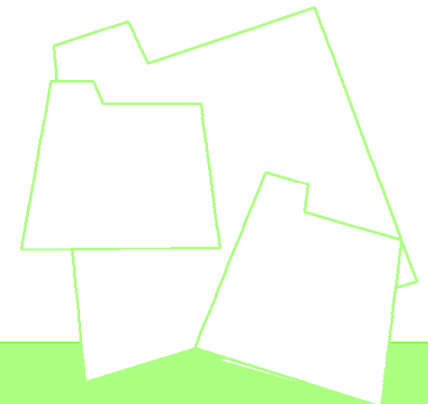
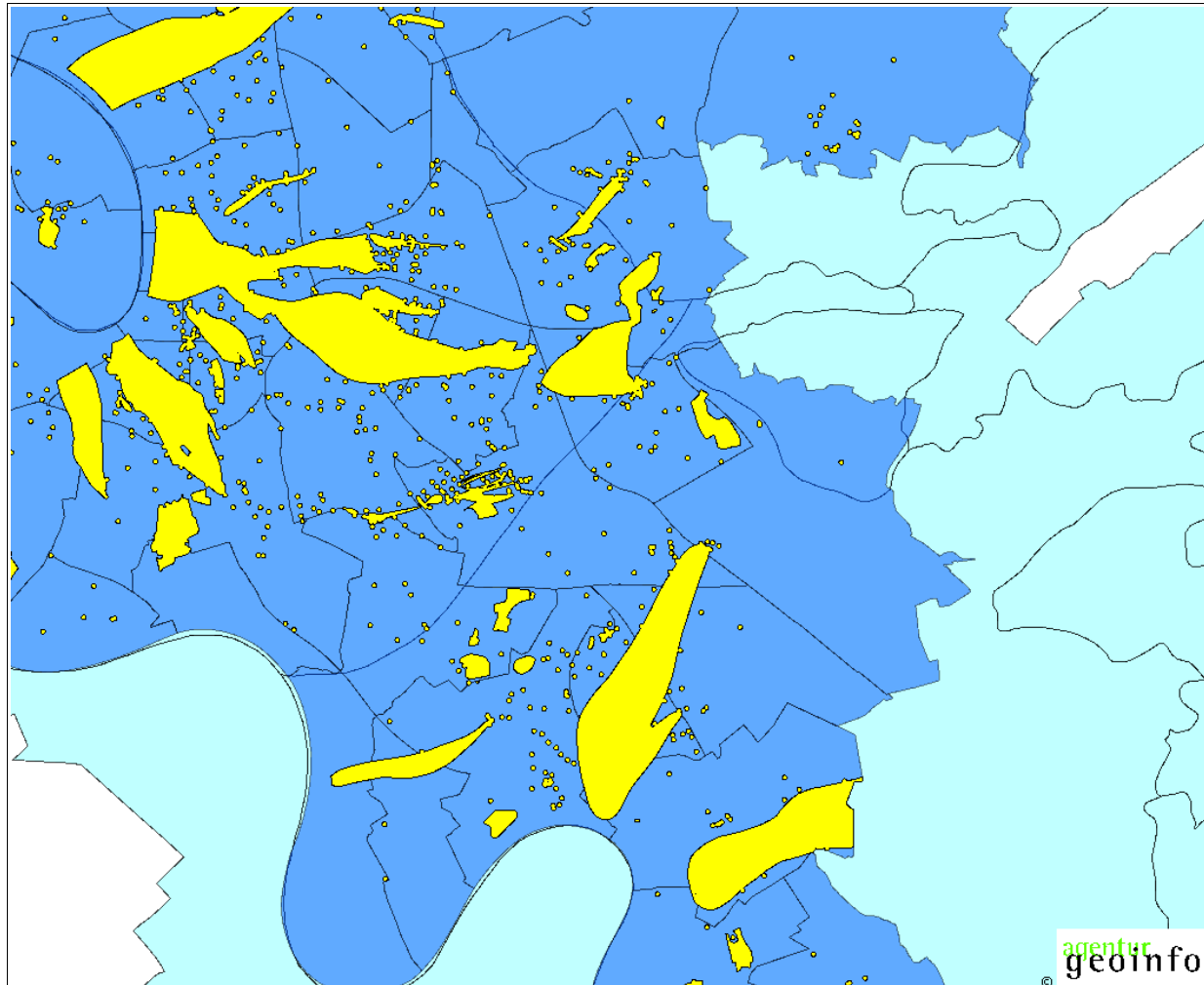
27. August 2008

< harald.schwenk@agentur-geoinfo.de >

Aggregat über alle Teilflächen (GW-Fahnen + Altlastflächen + Messstellen)

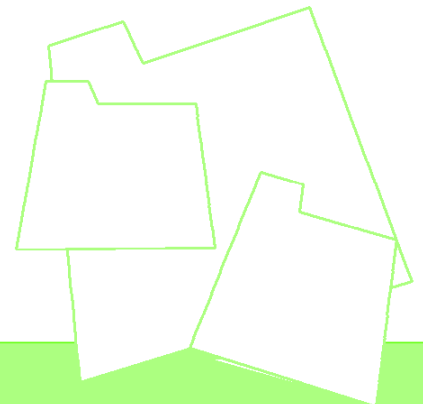
```
INSERT INTO die_box (stoffgruppe, stoffkuerzel, the_geom)
VALUES ('0', 'alles',
       (SELECT ST_Union(the_geom) FROM die_box
        WHERE stoffgruppe::int = 0
              AND stoffkuerzel <> 'alle_Fahnen'
              AND stoffkuerzel <> 'alles'
        )
);
```





die Fläche

```
SELECT ROUND((ST_Area(the_geom) / 1000000)::numeric, 2)
  FROM die_box
  WHERE stoffkuerzel = 'alles'
;
```



Vielen Dank für Ihre Aufmerksamkeit!

